Years Of Excellence

1972 - 2022

الأكاديمية العربية للعلوم والتكنولوجيا والنقل البحري

Arab Academy for Science, Technology & Maritime Transport

College of Engineering & Technology

Arab Academy for Science, Technology & Maritime Transport

College of Engineering & Technology

2021/2022

Information Directory

All inquiries and correspondence concerning the following areas should be addressed to:

Academic Offices

Dean's Office

College of Engineering and Technology, Arab Academy for Science and Technology,
P.O. Box 1029, Abu Qir Campus,
Alexandria, Egypt.
Tel: +203-562-1785 +203-562-2366 Ext. (11311)
Fax: +203-562-2915

Academic Departments

Architectural Engineering & Environment Design +203-562-2366 Ext. (11416) +203-562-0751

Basic and Applied Science +203-562-2366 Ext. (11545) +203-562-2578

Chemical and Petrochemical +203-562-2366 Ext (14219)

Computer Engineering & Computer Science +203-562-2366 Ext. (11221) +203-562-0751

Construction & Building Engineering +203-562-2366 Ext. (11143) +203-561-0755

Electrical & Control Engineering +203-562-2366 Ext. (11585) +203-562-2586

Electronics & Communications Engineering +203-562-2366 Ext. (11200) +203-562-1477

Industrial & Management Engineering +203-562-2366 Ext. (11258) +203-561-0755

Marine Engineering +203-562-2366 Ext. (14216) +203-562-2586

Mechanical Engineering +203-562-2366 Ext. (11246) +203-562-2586

Oil and Gas Engineering+203-562-2366 Ext. (14215)

Admissions and Registration

Arab Academy for Science and Technology,
P.O. Box 1029, Abu Qir Campus,
Alexandria, Egypt.
Tel: +203-561-1814

Cairo Bank

Arab Academy for Science and Technology,
P.O. Box 1029, Abu Qir Campus,
Alexandria, Egypt.
Tel: +203-562-2572

Clinic

Arab Academy for Science and Technology,
P.O. Box 1029, Abu Qir Campus,
Alexandria, Egypt.
Tel: +203-562-1586

Director of Transport Affairs

Arab Academy for Science and Technology,
P.O. Box 1029, Abu Qir Campus,
Alexandria, Egypt.
Tel: +203-556-1497 +203-556-5429

Library

Arab Academy for Science and Technology,
P.O. Box 1029, Abu Qir Campus,
Alexandria, Egypt.
Tel: +203-562-2366(432)

Student Dorms

Arab Academy for Science and Technology,
P.O. Box 1029, Abu Qir Campus,
Alexandria, Egypt.
Tel: +203-562-2100

Further directory assistance for other offices is available through the main switchboard at +203-562-2366 or +203-562-2388.
The Academy's web site address is: www.aastmt.org

President's Word

The rapid rate of technological advancement and the information revolution have opened new series of challenges as well as opportunities. The call emanates from a world that has experienced an explosion of knowledge; The Arab Academy for Science, Technology, and Maritime Transport (AASTMT) is a narrative of response to this call. AASTMT aims to prepare students to adopt these calls by equipping them with technical knowledge and capabilities, flexibility, and an understanding of the societal context of the corporate world. As an institution of higher education, AASTMT is committed to the discovery and transmission of knowledge, while also reflecting its Arab culture and heritage as a hub of research and development in the Arab World after over 50 years of knowledge and experiential learning. AASTMT has established itself as a premier educational institute in the Arab World - being a house of expertise and a successful example of mutual Arab cooperation to give students a real-time experience.

Higher education is a dynamic and ever-evolving process. Developing curiosity, being in a state of constant learning and innovation, and gaining fresh insights are a must for every professional. With this motive in the foreground and as a part of AASTMT – with the help of best caliber and experienced faculty members, the College of Engineering and Technology gives the Arab world the best we have and the best we can. Our faculty members regularly publish scientific papers and research projects along with active participation in seminars and conferences all over the world, thus providing exposure to the latest and most-advanced techniques, systems, research, and technologies.

College of Engineering and Technology is committed to constantly upgrading and improving the academic system and infrastructure in tune with future requirements. The College has many international agreements with several acclaimed universities in Europe, USA, UK, and other countries, to provide our students with abundant opportunities to continue higher education in world-class institutes and pursue their internships and summer schools abroad. College of Engineering and Technology has developed a world-class infrastructure over the years with a wide range of well-equipped workshops and laboratories that help students explore the field of engineering in an exhaustive manner. Its well-equipped labs, smart classes with audio-visual aids, seminar halls, and conference halls along with library facilities offer our students the best learning experience. To inspire the essence of service and discipline, along with a spirit of student leadership, our college has indeed become a symbol of quality education dedicated to nurturing the talent and aspirations of the promising Arab youth of Arab countries.

Prof. Ismail Abdel Gafar Ismail Farag
President, AASTMT

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College Message – Current Status and Future Prospectus

The College of Engineering and Technology, at AASTMT- Alexandria, was established in 1990. Since then, the college vision was to have a pioneering role locally and internationally in engineering education, scholarly research, and community service, and to provide a home for students who seek success and build their soft skills to build an integrated engineer personality who will become a future leader.

The core objective of the College of Engineering and Technology is to achieve Academic excellence on all levels, as it focuses on providing a community of staff and students who are dedicated to face the most urgent engineering challenges and sees an opportunity with each challenge.

As the world is changing rapidly, we understand the importance of coping with these changes, adapting the resilience approach and applying the principles of creativity, critical thinking, leadership, ethical practices, and community services.

The college sets its pillars of development to be aligned with the sustainable development goals (SDGs), which is now considered as a universal call of action for a better sustainable future. Our action plan targets the quality in education, clean and affordable energy, infrastructure, and community building.

We aspire to create a collaborative environment for both our students and the staff to allow them to create innovations, safe and sustainable solutions that will have a positive impact on their community, country and the world.
Currently, the CET offers bachelor's degrees in 10 areas of engineering. In 2018, a Dual Degree agreement with Northampton University is offered, in addition to another dual degree agreement with Cardiff Metropolitan University in the areas of architectural engineering and environmental design.

Furthermore, since 2001 the College of Engineering and Technology offers a group of unique Master of Science (M.Sc.) programs, then in 2017 the college started offering Master of Engineering (M.Eng.) in 9 areas of engineering and in 2020 started offering Doctor of Philosophy (Ph.D.) degrees in 8 areas of engineering.

All college programs are acknowledged by the Supreme Council of Egyptian Universities (SCU), National Authority for Quality Assurance and Accreditation of Education (NAQAAE) and fully accredited from the British Professional Institutes (IMechE), (IMarEST), (IET), (ICE), (IStructE), and (IHT), beside the Accreditation Board for Engineering and Technology "ABET", and the Royal Institute of British Architects (RIBA) parts 1 and 2 for the architectural engineering and environmental design program.

Number of qualified and competent faculty members have increased drastically during the last five years resulting in huge developments in research activities whether to obtain research funds from local and international entities or to publish in the highly ranked and prominent scientific journals.

Also, higher admission requirements combined with a competitive system of scholarships have been applied to attract high quality students. Furthermore, continuous development of educational resources, lab facilities, and campus infrastructure has been a constant activity in the College to maintain delivery of its quality services to students and faculty members.

As a step forward towards the enhancement of the relationship between the industrial and academic communities, the Industrial Advisory Committee holds meetings on a semi-annual basis.

These meetings discuss the opportunities of students' practical training, market needs and finally the industrial problems that may be treated in the research projects.

CET represents a profound and a strong community, which proactively provides a competitive, intellectual and market divan academic programs, research, and community services, and promotes strong collaboration between our staff members, students, researchers, alumni, industrial and business leaders.

College of Engineering Vision/Mission Statements

Vision

Pioneering in building an engineering knowledge society with distinguished scientific and technological capabilities, characterized by innovation and creativity, and keeping pace with the changing needs of the labour market and the requirements of sustainable development, by providing a high level of quality in education, training, scientific research and community service in accordance with international standards

Mission

The college strives to provide distinguished engineering education and scientific research that keeps pace with technological developments and scientific variables in order to achieve sustainable development in the local, regional and international community, through the effective application of quality standards and the implementation of continuous improvement plans, while committing to the profession ethics and engineering work charter.

Introduction

The roots of the College of Engineering and Technology extend back to the date of the establishment of the Academy in 1972, when the Marine Engineering Department started to offer a two-year program of basic studies for engineering cadets, as well as upgrading courses for marine engineers. The Department of Academic Studies was also established to conduct courses in Mathematics, Physics, Chemistry and English Language. In October 1975, the Radio and electronics department was established to offer a two-year program leading to the competency certificate of second-class program radio officer.

In 1977, following the adoption of the Credit Hour system for all undergraduate studies, the year of 1978 witnessed the beginning of the Bachelor of Engineering (B. Eng.) program plans in two major areas: Marine Engineering and Electronic Engineering. In 1984, both degrees were acknowledged by the Supreme Council of Egyptian Universities to be equivalent to similar degrees offered by the Egyptian Universities.

In 1987, the Radio and electronic department was renamed as the Electronics and Computer Department to reflect the recent technological trends towards computerization and information technology. Renaming this department, however, was accompanied by major changes in curriculum design and course contents.

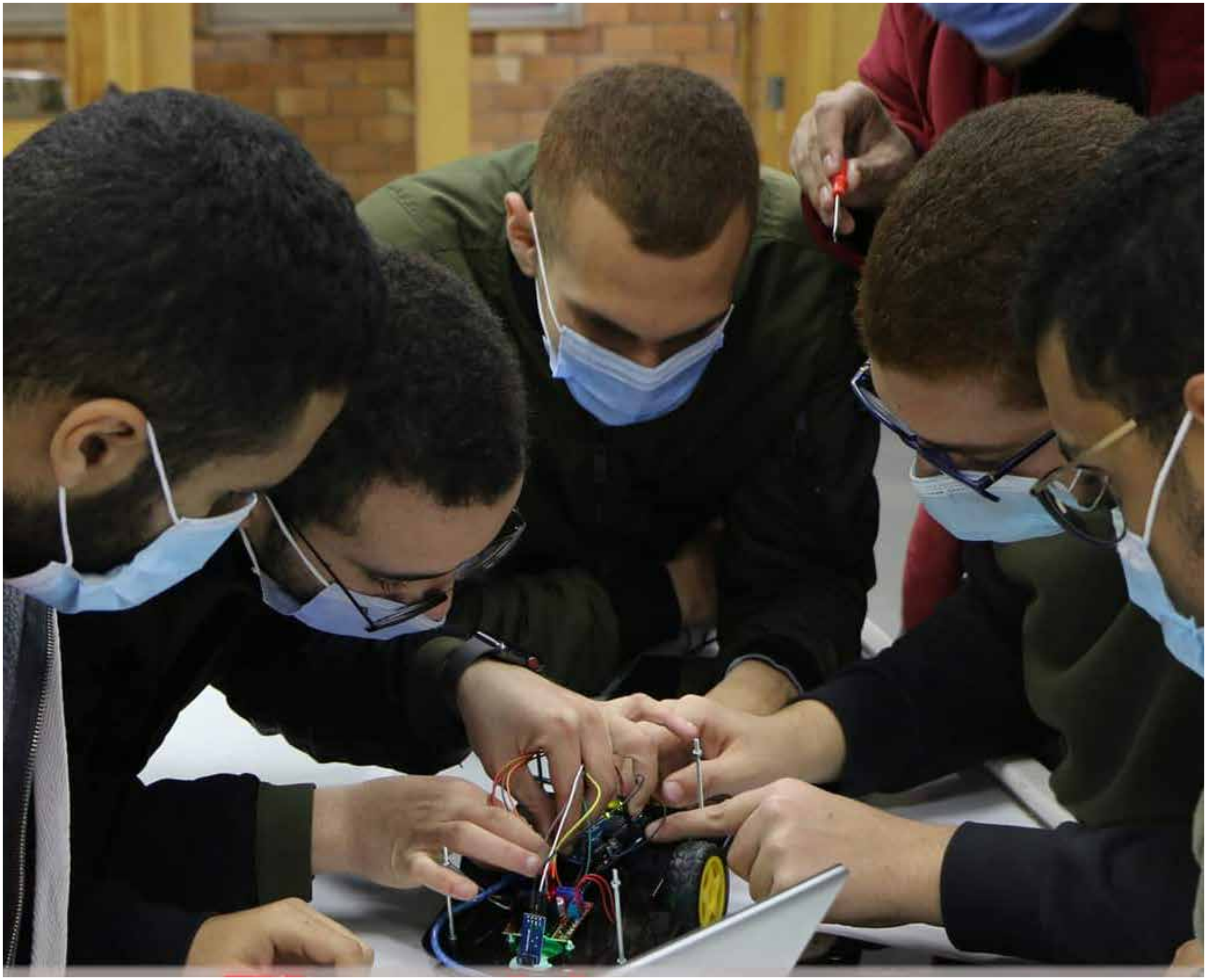
In November 1990, the formal decree to establish the College of Engineering and Technology was issued. The preliminary structure comprised the four departments of Electronics, Marine Engineering, Electrical and Control Engineering, Basic and Applied sciences.

In 1994, it was decided to introduce two more fields of study namely; Construction and Building Engineering and Industrial and Management Engineering. In 1997, the Department of Architectural Engineering and Environmental Design was also established.

In January 2020, The Supreme Council of Universities issued a statement approving the start of the bachelor's degree in Chemical and Petrochemical Engineering at Arab Academy for Science, Technology and Maritime Transport

Currently, through its ten Under Graduate departments, the College of Engineering and Technology offers Bachelor's degrees that take a minimum of 10 semesters (5 academic years) to complete.

Also, through the graduate studies department, the College offers Master's of Science degrees, Master's of Science (M.Sc.) degrees in 9 areas of engineering, Master's of Engineering (M.Eng.) in 9 areas of engineering and Doctor of Philosophy (Ph.D.) degrees in 8 areas of engineering.



Accreditation

The Arab Academy for Science and Technology and Maritime Transport is a fully accredited member of both the Association of Arab Universities and the International Association Universities.

The Arab Academy for Science and Technology and Maritime Transport has been awarded the ISO 9001:2000 certificate for its educational processes in September 1999, after following formal quality assurance procedures to maintain the educational quality level received by students and renewed on 2002, and 2008.

Undergraduate Programs offered by the College of Engineering and Technology are accredited by the Supreme Council of Egyptian Universities (SCU) according to the decree number 135 dated on August 27, 1996 and renewed according to the decrees number 3 dated on February 5, 2002, number 118 dated on July 10, 2007, number 36 dated February 24, 2011, number 284 dated on December 10, 2012, number 22 dated on January 22, 2017, then number 52 dated June 6, 2022.

Postgraduate Programs offered by the College of Engineering and Technology are accredited by the Supreme Council of Egyptian Universities (SCU) according to the decree number 30 dated on April 28, 2001 and renewed according to the decrees number 70 and 79 dated on June 19, 2006, number 97 dated on July 24, 2006, number 164 dated on September 8, 2009, number 224 dated October 17, 2010, number 84 dated December 26, 2013, and numbers 105, 106, and 107 dated April 22, 2014, number 174 dated July 29, 2020, then number dated September 16, 2021.

The Institute of Marine Engineering, Science and Technology (IMarEST) accredited the undergraduate program of Marine Engineering on March, 13, 2007. The Institute of Mechanical Engineers (IMechE) accredited the undergraduate program of Mechanical Engineering and the undergraduate program of Industrial and Management Engineering on November, 22, 2005. The Institution of Electrical Engineers (IEE) now named the Institution of Engineering and Technology (IET) accredited the undergraduate program of Computer Engineering, the undergraduate program of Electrical and Control Engineering, and the undergraduate program of Electronics and Communications Engineering on April, 27, 2005. The Joint Board of Moderators JBM: The Institution of Civil Engineers ICE, the Institution of Structural Engineers (IStructE) accredited the undergraduate program of Construction and Building Engineering and recognized by the Institution of Highways and Transportation IHT on December, 14, 2005.

The Royal Institute of British Architects (RIBA) validated the program of undergraduate Architectural engineering and Environmental Design effective from 2005/6, renewed on October 2014, then renewed on February 2020 for 5 years.

The Engineering Accreditation Commission of ABET accredited all engineering programs delivered on the AbuKir campus and Cairo campus (except for the program of Architectural Engineering and Environmental Design) on October, 1, 2009, renewed on September, 30, 2017 for 5 years

National Authority for Quality Assurance and Accreditation of education (NAQAAE) accredited the undergraduate and postgraduate programs dated on March 10, 2014 then renewed on October 5, 2020 for 5 years.

The College of Engineering and Technology has many international agreements and programs with highly noticeable universities that support our students and faculty members. These agreements with international universities extend from Staffordshire university-UK, Aston university-UK, University of Manchester- UK, Oviedo University-Spain, University of Technology Malaysia (UTM)- Malaysia, Sheridan University- Canada, Columbus State University-USA, Texas A&M University – USA, Sigfox Company- France, Rovira I Virgili -Spain, National Cheng Kung University – Taiwan, Xiamen University – China, ENSTA Bretagne University- France.

The College of Engineering and Technology also has protocols regarding graduate studies with national universities including Alexandria University.

College of Engineering & Technology

Academic Programs

The College of Engineering and Technology in The Arab Academy for Science, Technology and Maritime Transport offers Bachelor of Science degrees in the areas of:

- Architectural Engineering and Environmental Design
- Computer Engineering.
- Construction and Building Engineering.
- Chemical and Petrochemical Engineering.
- Electrical and Control Engineering.
- Electronics and Communications Engineering.
- Industrial and Management Engineering.
- Marine Engineering.
- Mechanical Engineering.
- Oil and Gas Engineering.

These programs are accredited by the supreme Council of Egyptian Universities (SCU) according to the decree number 135 dated on August 27, 1996 and renewed accordingly till 2022

Also, the College of Engineering and Technology offers Master's of Engineering degree in the areas of

- Architectural Engineering and Environmental Design.
- Computer Engineering.
- Construction and Buildings Engineering.
- Electrical and Control Engineering.
- Electronics and Communications Engineering.
- Engineering Management.
- Marine Engineering.
- Mechanical Engineering.
- Renewable Energy and Environment Engineering.

The College of Engineering and Technology offers Master's of Science degree in the areas of:

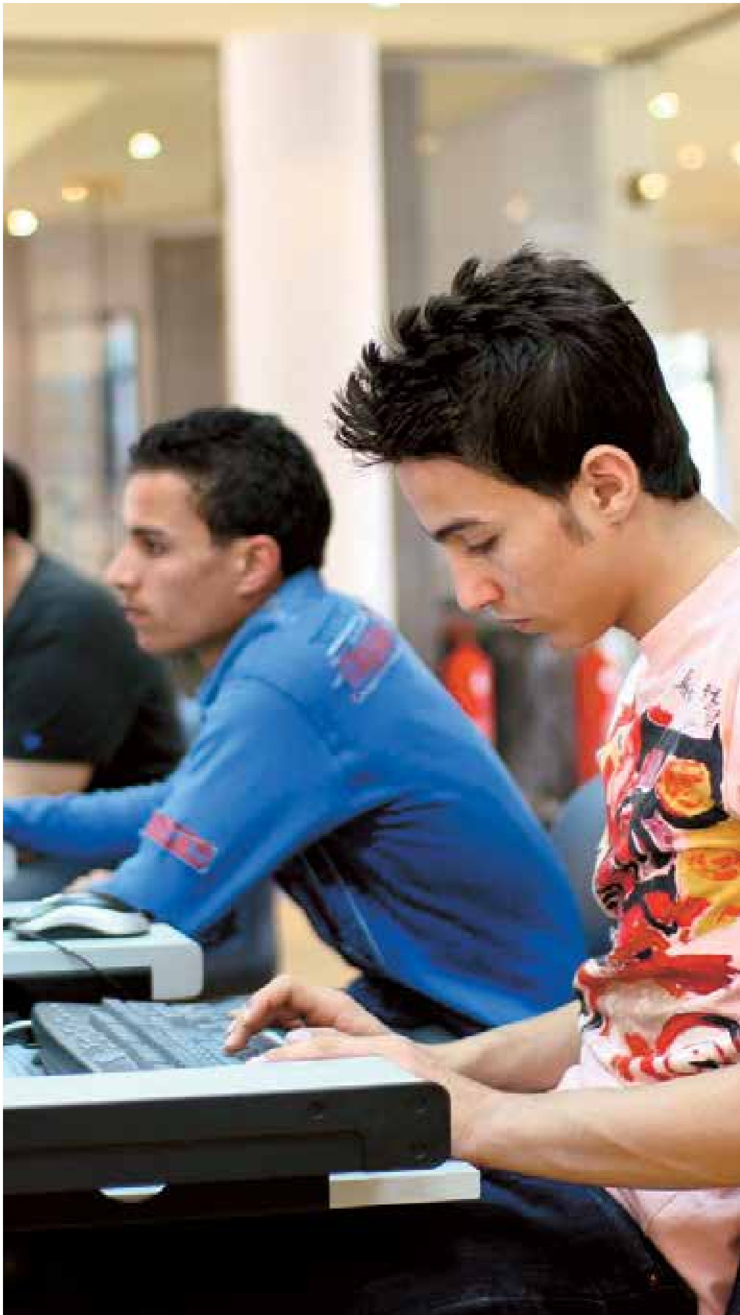
- Architectural Engineering and Environmental Design
- Computer Engineering
- Construction and Buildings Engineering
- Electrical and Control Engineering.
- Electrical Smart Grid Engineering
- Electronics and Communications Engineering.
- Marine Engineering
- Mechanical Engineering.
- Industrial and Engineering Management
- Renewable Energy and Environmental Engineering
- Smart Control Systems for Engineering Management

Finally, the College of Engineering and Technology offers Doctor of Philosophy degrees in the areas of:

- Architectural Engineering and Environmental Design.
- Computer Engineering.
- Construction and Buildings Engineering.
- Electrical and Control Engineering.
- Electronics and Communications Engineering.
- Engineering Management.
- Marine Engineering.
- Mechanical Engineering.

The college maintains sound relationships with a number of universities in USA, UK, Canada and Egypt for joint supervision of undergraduate and postgraduate studies and research work. Agreements with University of Nottingham (UK), Carlton University (Canada) are based on major activities such as: the twinning of programs of study, as jointly taught Masters Program, programs of research leading to PhD degree and regular visits by academic staff.

The College of Engineering and Technology maintains an array of laboratories, workshops and computing facilities to secure the practical aspects and hands-on experience of the technology education in many areas. These areas include diesel and steam power plants, automation, measurements, heat transfer, hydraulics, electric machines, electric marine installation auxiliaries, radar, electronics, telecommunications, microprocessors, microcomputers, computer applications, marine pollution, surveying, construction materials, metrology, computer integrated manufacturing, electronic design automation, antennas and microwaves, work analysis, internal combustion engines, and refrigeration and air conditioning.



Academic Regulations

Students Rights and Responsibilities

Each individual student is responsible for his/her behaviour and is expected to maintain standards of academic honesty and personal integrity. Students must ensure safety, health, fairness, and the proper use of available resources in their undertakings. Students share the responsibility, with faculty for creating an environment that supports academic honesty and principles of professionalism.

Proper relationship between faculty and student are fundamental to the college's function, and this must be built on mutual respect and understanding together with shared dedication to the education process.
The College strongly believes that each student is worthy of trust and that each student has the right to live in an academic environment that is free of injustice caused by dishonesty.

While students have an obligation to assist their fellow students in meeting the common goals of their education, students have an equal obligation to maintain the highest standards of personal integrity.

Student Discipline

Until a degree is issued, students remain subject to AASTMT Code of Practice for Student Discipline that is clearly defined in the implemented quality management procedures in the College.
Students must be familiar with this code of practice by reading it carefully and asking questions about anything that is unclear. Students are ultimately responsible for meeting the requirements for their degrees, responsible for their behavior, and are expected to maintain personal integrity.

Attendance, Absence and Withdrawals

Regular attendance in all classes is required. Students are expected to arrive on time and remain in class for the entire period scheduled. The responsibility for work missed due to any type of absence rests with the student. Attendance is mandatory.

Students are expected to attend every class session. Each instructor will maintain current records and will, upon request, furnish an accurate report of any student's attendance pattern to the Registration Office. Attendance is checked from the first class meeting; therefore, late registrants will have some absences when they first meet a class.

When students are absent, for any reason, they are still responsible for the content of the missed lecture and for any assignments. If the absence causes the student to miss a major examination: that examination may be made up if the instructor is convinced that the absence was justified. A student's attendance record is a legitimate part of the criteria, which the instructor may use in assigning a grade for the courses.

It is the responsibility of students to be aware of the attendance policies for their classes. After the student has missed over 15% of class, the student will be asked to withdraw from the course and a grade of "W" will be entered. In case of illness or other forcing circumstances, absence may reach 20% without forcing withdrawal.

Students withdrawing from study during a semester must fill out a withdrawal permit; have it properly executed by the Registrar in order to leave a clear record. A student completing this process before the beginning of the final examination period will have a "W" record on the permanent record.

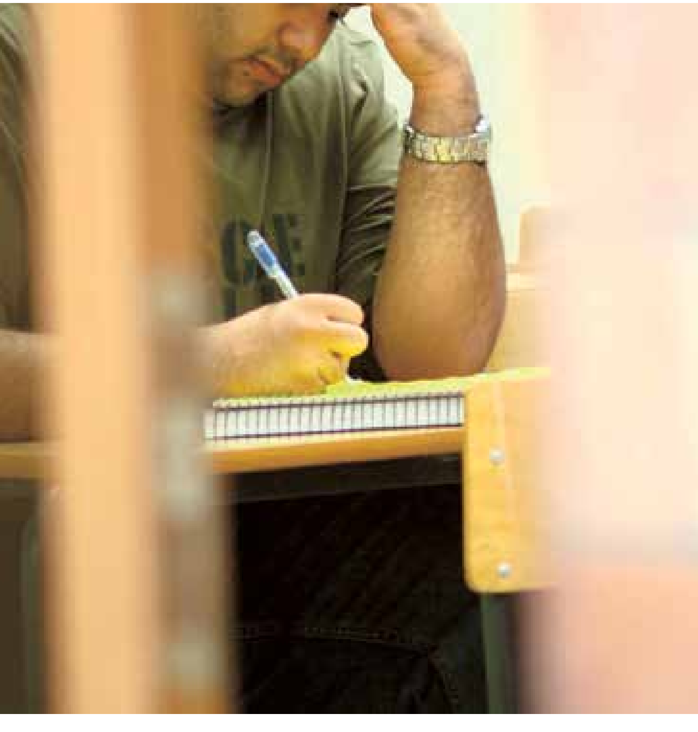
A student who withdraws without following this required procedure will be awarded an "F". Students cannot officially withdraw from study after the last day of classes prior to final examinations or while under disciplinary investigation.

Academic Advisor

Students are personally responsible for completing all requirements established for their degree by the College / Department. It is the student's responsibility to know the requirements for the appropriate degree program.

Faculty advisors will assist students in preparing schedules, completing degree plans, and generally will counsel students on academic matters, but advisors may not assume responsibility for the student's academic progress and ultimate success or failure in a given program of study.

Any substitution, waiver, or exemption for any established requirement or academic standard may be accomplished only with the approval of the department Head and the College Dean.



Graduation Requirements

To be qualified for Bachelor of Science the candidate must:

- Complete 180 credit hours of approved work
- Earn a cumulative grade point average of at least 2.00
- Complete practical training.

The College of Engineering and Technology adopts a continuous assessment system. Marks are distributed along the semester as follows:

- 30% of the grade is declared after the 7th week of class.
- Another 20% after the 12th week of class and 10% is awarded based on the student attendance, participation and assignments submission.
- The final exam is worth 40% of the grade.

Students can check their grades through the website using their assigned registration number and pin code. The letters A, B, C, D, F, I, and W are used as follows:

- A, B, and C, are passing grades.
- D is conditional passing grade, which is not counted as passing grades unless the student achieves the proper accumulative Grade Point Average for these registered credit hours. If he fails to do so, he shall have to repeat the courses with grade D to raise his GPA.
- This is to be arranged with his Academic Advisor.
- If a student fails to attend the final exam without excuse, his final Exam's mark shall be zero.
- A student's grade point average (GPA) is computed by dividing the total number of grade points accumulated by the total number of semester hours attempted.

General Grade

General Grade is set according to the following accumulative Grade Point Averages

GPA	Grade	Equivalent Percentage
From 3.7 to 4	Excellent	From 89 to 100
From 3.3 to less than 3.7	Very Good	From 84 to less than 89
From 2.7 to less than 3.3	Good	From 76 to less than 84
From 2.0 to less than 2.7	Pass	From 70 to less than 76

Course Grade

Course grades are set according to the following scheme:

Evaluation Sign	Evaluation Points	Percentages (%)
A+	12/3 = 4.00	From 97 to 100
A	11.5/3 =3.83	From 93 to less than 97
A-	11/3 =3.66	From 89 to less than 93
B+	10/3 =3.33	From 84 to less than 89
B	9/3 =3.00	From 80 to less than 84
B-	8/3 =2.66	From 76 to less than 80
C+	7/3 =2.33	From 73 to less than 760
C	6/3 = 2.00	From 70 to less than 73
C-	5/3 =1.66	From 67 to less than 70
D+	4/3 =1.33	From 64 to less than 67
D	3/3 =1.00	From 60 to less than 64
F	Zero	Less than 60

Evaluation Sign Evaluation Points Percentages (%)
F Zero Less than 50

- I In Complete
- W Withdrawn
- U Un Graded
- TR Transferred
- P Pass
- F Fail

Academic Probation and Underachievement

Students are placed under academic probation if:

Their GPA is below 2.0. Accordingly, students' academic load is reduced, and they are not entitled to register more than 12 credit hours (13 credit hours for students of Architectural Engineering and Environmental Design) in one academic semester (half load). The academic advisor's recommendation is mandatory for determining the courses to be registered.

Students are placed on the "underachievement" list if: Their achieved credit hours are less than 50% of the total number of hours they were supposed to complete since they joined AASTMT.

Measures taken with students on academic probation or "underachievement" list:
The department issues a warning to the student to raise his/her GPA to a minimum of 2.0 or achieve a number of credit hours that exceeds 50% of the total study hours that are supposed to be completed in all the semesters spent at the AASTMT. The phrases "student under academic probation" or "student with academic underachievement" appear on the student's transcript.

The maximum duration for a student to remain on the list of academic probation or underachievement in his/her department is three consecutive semesters.

A student is subsequently guided by the academic advisor to choose another educational path suitable for his/her capabilities, such as:

- Transferring to another department within the same college which is suitable for the student's capabilities (while meeting the requirements of the department transferred to).
- Transferring to another AASTMT college suitable for his/her capabilities, provided that the college admission requirements are met (high school total at the time of admission to AASTMT in addition to the requirements of the department transferred to).

A student who has received academic probation twice or an underachievement warning may be expelled completely from AASTMT after referring to the AASTMT president in the following cases:

- If he/she does not achieve a minimum GPA of 2.00 by the end of the third semester of receiving a second academic warning or remaining in a state of underachievement in the new department he/she has transferred to.
- If he/she does not achieve the graduation requirements in a maximum period of double the study period in his/her college.

Architectural Engineering and Environmental Design

The increase of population in Egypt and most Arab countries has considerably increased the need for housing, public buildings, and urban services. On the other hand several problems appear, such as: upgrading, renewal, development of deteriorated areas, creation of new towns and settlements as well as problems of restoration, preservation, conservation, and enhancement of the built heritage. These problems led to a tremendous increase in the national investment in building and construction and consequently the need for professionals in this field. The preparation of engineers specialized in architecture and environmental design is necessary for the pursuit and success of the national building and construction policy.

To cope with the needs of the Egyptian and Arab societies as well as the regional and international market demands, the College of Engineering and Technology at the Arab Academy for Science & Technology & Maritime Transport, decided in 2000 to establish a department of Architectural Engineering and Environmental Design.

The main aims of the program include:

- Introducing students to the theoretical and scientific bases.
- Enabling students to acquire professional competency which meets future needs and job opportunities.
- Preparing graduates capable of imagination, creative thinking, problem solving and critical thinking.
- Helping the architect to understand the relationship between people and buildings, and between buildings and their environment.

A set of goals are adopted by the department such as:

- Prepares graduates specialized in architectural engineering and environmental design.
- Enable students to organize livable environments on all levels.
- Prepare the students to deal with modern tools & technologies.
- Encourage graduates undertake activities related to research, futuristic approach, and development.

Everything related to the built environment, belongs to the domain of the architects. They are front - runners in the challenge to create a new - world in the Twenty First Century.

Architects can be employed by large private or public enterprises, consulting firms, governmental or local authorities... etc, whether in Arab or foreign countries. The graduates live up to the standards and requirements of the GAT Agreement such that they can compete on the highest levels.

Architects are qualified to work as Architectural designers and can gain further qualifications to become planners, landscape architects or conservation specialists. They can also work in the field of contracting, execution, tender preparation & evaluation, and/or the field of research & studies, or feasibility studies and project management as well as maintenance & restoration of buildings.

Some architects prefer to work independently or to be partners or employees in small firms. Generally young architects work for different kinds of employers in their early years, once they have gained enough experience, many set up in their own practice.

Academic Program Sheet – Architectural Design Branch

Compulsory Courses			
Year 1			
Semester 1		**Semester 2**	
BA 113	Physics 1	BA 114	Physics 2
BA 123	Mathematics 1	BA 141	Engineering Mechanics 1
CC 111	Introduction to computer	CC 112	Structured Programming
ME151	Eng. Drawing & Desc. Geometry	BA 118	Chemistry
AR 111	Visual Studies (1)	AR 114	Visual Studies (2) Theory of Colors
AR 130	Hist. of Arch. & Technology	AR 131	Hist. & Theory of Architecture (1)
LH XXX	Semester 1 Electives	LH XXX	Semester 2 Electives
Year 2			
Semester 3		**Semester 4**	
AR 210	Architectural Drawing	CB 240	Theory of Structures
AR 215	Visual Studies (3) Shade & Presp.	AR 211	Architectural Design (1)
AR 232	Hist. & Theory of Architecture (2)	AR 233	Hist. & Theory of Architecture (3)
AR 251	Building Technology (1)	AR 252	Building Technology (2)
AR 283	Computer Aided Drafting	AR 284	3D Modeling
AR XXX	Semester 3 Electives	AR XXX	Semester 4 Electives
Year 3			
Semester 5		**Semester 6**	
CB 350	Building Materials & Testing	CB 351	Reinf. Concrete & Met. Structures.
CB 370	Surveying	AR 313	Architectural Design (3)
AR 312	Architectural Design (2)	AR 335	Hist. & Theory of Architecture (5)
AR 334	Hist. & Theory of Architecture (4)	AR 354	Building Technology (4)
AR 353	Building Technology (3)	AR 362	Environmental Studies (1)
AR XXX	Semester 5 Electives	AR XXX	Semester 6 Electives

Year 4			
Semester 7		**Semester 8**	
CB 460	Soil Mech. & Foundations	CB 410	Quant. Surv. & Cost Estim.
AR 414	Architectural Design (4)	AR 415	Architectural Design (5)
AR 441	Int. to City & Regional Planning	AR 416	Interior Design (1)
AR 455	Execution Design (1)	AR 442	Introduction to Urban Design
AR 464	Environmental Studies (2)	AR 456	Execution Design (2)
AR XXX	Semester 7 Electives	AR XXX	Semester 8 Electives
Year 5 (Architectural Design Branch)			
Semester 9		**Semester 10**	
AR 500	Research & Programming	CB 510	Project Management & Sched.
AR 516	Architectural Design (6)	AR 501	Arch. Design Graduation Project
AR 543	Intro. to Site Planning & Housing	AR 541	Professional Practice & Law
AR 544	Landscape Architecture	AR XXX	Semester 10 Electives
AR 557	Execution Design (3)		
AR XXX	Semester 9 Electives		
Year 5 (Interior Design Branch)			
Semester 9		**Semester 10**	
AR 500	Research & Programming	CB 510	Project Management & Sched.
AR 512	Interior Design (2)	AR 501	Interior Design Graduation Project
AR 543	Intro. to Site Planning & Housing	AR 541	Professional Practice & Law
AR 544	Landscape Architecture	AR XXX	Semester 10 Electives
AR 553	Interior Details		
AR XXX	Semester 9 Electives		

Year 5 5 (urban design branch)			
Semester 9		**Semester 10**	
AR 500	Research & Programming	CB 510	Project Management & Sched.
AR 518	Urban Design	AR 501	Urban Design Graduation Project
AR 543	Intro. to Site Planning & Housing	AR 541	Professional Practice & Law
AR 544	Landscape Architecture	AR XXX	Semester 10 Electives
AR 558	Site Details		
AR XXX	Semester 9 Electives		
College Electives			
Semester 1		**Semester 2**	
LH 131	ESP 1	LH 132	ESP 2
LH 133	Langue Française 1	LH 134	Langue Française 2

Department Electives			
Semester 3		**Semester 4**	
AR 222	Presentation Techniques	AR 224	Workshop & Arch. Models
AR 223	Arch. of Egypt Time & Place	AR 225	Introduction to Painting
AR 226	Creativity & Innovation	AR 227	Int. to Arch. Photography
Semester 5		**Semester 6**	
AR 324	Introduction to Sculpture	AR 323	Music & Civilization
AR 325	Rendering & Animation	AR 326	Comp. Graphic Design
AR 327	Interior Design Principles	AR 328	Furniture Design
AR 321	Understanding Urban Environment	AR 329	Comp. App. in Urban Planning G.I.S.
Semester 7		**Semester 8**	
AR 421	Architectural Criticism	AR 422	Medit. City Urban & Arch. History
AR 420	Dev. Approaches in Urban Design	AR 429	Social Dimensions in Urban Design
AR 424	Functional Req. In Interior Env.	AR 423	Topics in Sustainability
AR 426	Comp. App. In Architecture: BIM1	AR 425	Int. Environmental Systems
AR 427	Introduction to Web Design	AR 428	Comp. App. In Architecture: BIM2
Semester 9		**Semester 10**	
AR 521	Comparative Urbanism	AR 523	Hist. Preservation & Conservation
AR 522	Design with Light	AR 524	EIA in Urban Planning
AR 526	Vernacular Architecture	AR 527	Conceptual Interiors
AR 529	Computer Application in Architecture 3	AR 528	Finishing Materials
		AR 525	Intelligent Urbanism

Graduation Requirements

College Requirements					
A total of 26 credit hours are required by the college as per the following table:					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
Compulsory Courses A total of 22 Cr. Hr. of the following compulsory courses					
BA	1	BA 113	Physics (1)	3	None
	2	BA 114	Physics (2)	3	BA 113
	2	BA 118	Chemistry	2	None
	1	BA 123	Mathematics (1)	3	None
	2	BA 141	Engineering Mechanics (1)	3	None
CC	1	CC 111	Introduction to computer	3	None
	2	CC 112	Structured Programming	3	CC 111
ME	1	ME 151	Eng. Drawing and Descriptive Geometry	2	None

College Electives At least four credit hours (4 Cr. hr.) from the following list of the college electives					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
NE	1	LH 131	ESP(1)	2	None
	2	LH 132	ESP (2)	2	LH 131
	1	LH 133	Langue Française (1)	2	None
	2	LH 134	Langue Française (2)	2	LH 133

Department Requirements

A total of 154 credit hours are required by the department, which are distributed as follows:

- 138 credit hours of compulsory courses.
- A minimum of 16 credit hours of department restricted electives.

The required compulsory and restricted elective courses are listed in the following table.

College Requirements					
A total of 26 credit hours are required by the college as per the following table:					
Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 138 Cr. Hr. of the following compulsory courses					
AR	1	AR 111	Visual Studies 1	3	None
	1	AR 130	Hist. of Arch. & Technology	2	None
	2	AR 114	Visual Studies 2 Theory of Colors	3	None
	2	AR 131	Hist. & Theory of Architecture (1)	2	None
	3	AR 210	Architectural Drawing	4	ME 151
	3	AR 215	Visual Studies 3 Shade & Perspective	3	ME 151
	3	AR 232	Hist. & Theory of Arch. (2)	3	None
	3	AR 251	Building Technology (1)	3	None
	3	AR 283	Computer Aided Drafting	3	ME 151
	4	AR 211	Architectural Design (1)	4	AR210/AR114
	4	AR 233	Hist. & Theory of Architecture (3)	3	None
	4	AR 252	Building Technology (2)	3	AR 251
	4	AR 284	3D Modeling	3	AR 215/AR283
	5	AR 312	Architectural Design (2)	4	AR 211/ AR 215
	5	AR 334	Hist. & Theory of Architecture (4)	3	AR 131
	5	AR 353	Building Technology (3)	3	AR 252
	6	AR 313	Architectural Design (3)	4	AR 312
	6	AR 335	Hist. & Theory of Architecture (5)	3	AR 334
	6	AR 354	Building Technology (4)	3	AR 353

College Requirements					
A total of 26 credit hours are required by the college as per the following table:					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
Compulsory Courses A total of 138 Cr. Hr. of the following compulsory courses					
AR	6	AR 362	Environmental Studies (1)	3	None
	7	AR 414	Architectural Design (4)	4	AR 313
	7	AR 441	Int. to City & Regional Planning	3	None
	7	AR 455	Execution Design (1)	3	AR 354
	7	AR 464	Environmental Studies (2)	3	AR 362
	8	AR 415	Architectural Design (5)	4	AR 414
	8	AR 416	Interior Design (1)	3	AR 312
	8	AR 442	Introduction to Urban Design	3	AR 441
	8	AR 456	Execution Design (2)	3	AR 455/AR 464
	9	AR 516	Architectural Design (6)	4	AR 415
	9	AR 558	Site Details	3	AR456
	9	AR 518	Urban Design	4	AR415/ AR442
	9	AR 543	Introduction to Site Planning & Housing	3	AR 442
	9	AR 544	Landscape Architecture	3	None
	9	AR 557	Execution Design (3)	3	AR 456
	9	AR 500	Research & Programming	3	None
	9	AR 553	Interior Details	3	AR 456
	9	AR 512	Interior Design (2)	4	AR 416/ AR 415
	10	AR 501	Architectural Design Graduation Project	12	AR 516/ AR 500
	10	AR 501	Interior Design Graduation Project	12	AR 512/ AR 500
	10	AR 501	Urban Design Graduation Project	12	AR500/AR518
	10	AR 541	Professional Practice & Law	2	AR 444

College Requirements					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
CB	4	CB 240	Theory of Structures	3	BA 141
	5	CB 350	Building Materials & Testing	3	CB 240
	6	CB 351	Reinf. Concrete & Metallic Structures	3	CB 350
	5	CB 370	Surveying	3	BA 123
	8	CB 410	Quant. Surv. Cost Estimation	3	CB 351
	7	CB 460	Soil Mechanics & Foundations	3	CB 351
	10	CB 510	Project Management & Scheduling	2	AR 444
Department Restricted Electives At least eight courses (16 Cr. Hr.) from the following list of the college electives					
AR	3	AR 222	Presentation Techniques	2	None
	3	AR 223	Arch. Of Egypt Time & Place	2	None
	3	AR 226	Creativity & Innovation	2	None
	4	AR 224	Workshop & Arch. Models	2	None
	4	AR 225	Introduction to Painting	2	None
	4	AR 227	Introduction to Arch. Photography	2	None
	5	AR 324	Introduction to Sculpture	2	None
	5	AR 325	Rendering & Animation	2	AR 215/AR 284
	5	AR 327	Interior Design Principles	2	None
	5	AR 321	Understanding Urban Environment	2	None
	6	AR 323	Music & Civilization	2	None
	6	AR 326	Comp. Graphic Design	2	AR 283
	6	AR 328	Furniture Design	2	None
	6	AR 329	Comp. App. in Urban Planning G.I.S.	2	AR 210

College Requirements					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
AR	7	AR 420	Dev. Approaches in Urban Design	2	None
	7	AR 421	Architectural Criticism	2	None
	7	AR 424	Functional Req. in Interior Env.	2	None
	7	AR 426	Comp. App. In Architecture: BIM 1	2	AR 283
	7	AR 427	Introduction to Web Design	2	AR 326
	8	AR 422	Med. City Urban & Arch. History	2	None
	8	AR 423	Topics in Sustainability	2	None
	8	AR 425	Int. Environmental Systems	2	None
	8	AR 428	Comp. App. In Architecture: BIM 2	2	AR 426
	9	AR 521	Comparative Urbanism	2	None
	9	AR 522	Design with Light	2	AR 114
	9	AR 526	Vernacular Architecture	2	AR 334
	9	AR 529	Comp. App. In U.P.G.I.S.	2	AR 283/AR 441
	10	AR 523	Hist. Preservation & Conservation	2	None
	10	AR 524	EIA in Urban Planning	2	AR 441
	10	AR 527	Conceptual Interiors	2	None
	10	AR 528	Finishing Materials	2	None

Course Description

AR 111 – Visual Studies 1

Cr.3. Prerequisite: None

This course is an introduction to the techniques of graphic representation in pencil, pen and ink, and charcoal. Students begin by studying visual properties of form and space: definition, organization; basic principles of architecture, proportion and scale and ordering principles. Introduction to photography, with an emphasis on methods and techniques of general and architectural photography.

Finally, students reach an understanding of form, space and principles that guide their abilities of ordering and architectural design in the built environment.

AR 112 – Visual Studies 2: Theory of Colours

Cr.3. Prerequisite: None

The factors of visual perception and vision system. The nature of colours and the optical system. Colour properties: hue, value and saturation. The theory of colours organization (Faber, Munsell and Chevreul organization). Principles of colour schemes; chromatic harmony, Monochromatic harmony, Triadic harmony and complementary harmony. Colours and architectural spaces (Internal and External spaces).

AR 130 – History of Architecture & Technology

Cr.2. Prerequisite: None

Introduction to art as a human activity. The study begins with the first traces of prehistoric buildings and settlements in the Ancient World and covers Egypt: The Archaic Period, The Old Kingdom, The Empire and The Late Period until the Arab conquest. Mesopotamia: Summer, Akkad, Babylon, Assyria and Persia until the Arab conquest.

AR 131 – History & Theory of Architecture 1

Cr.2. Prerequisite: None

A survey of the Classical Civilization focusing on the architecture, art and formation of cities in the Greek and Roman period. Aegean period, (Minoan, Mycenaean). Greek, (Archaic, Classical) and Hellenistic periods. Etruscan and Roman periods.

AR 232 – History & Theory of Architecture 2

Cr.3. Prerequisite: None

- **History**: The study includes the various phases of the Christian Era; Early Christian, Coptic, Byzantine, Carolingian, Romanesque and Gothic.
- **Theory**: Fundamentals of Architectural Design, Building Components, Walls, Floors, Roofs, Ceiling, Circulation, Entrances and Approaches.

AR 210 – Architectural Drawing

Cr.4. Prerequisite: AR 112

The course introduces the student to more practice in orthographic projections in large projects contain stairs. Also the course integrate drawing tools skills with digital drawing media. Students also learn presentation techniques such as tone drawings and the use of study models.

This course also focuses on basic computer aided drafting skills using the latest release of AutoCAD software. It includes file management, the Cartesian coordinate system, drawing set-ups, drawing aids, layer usage, drawing geometric shapes, editing objects, text applications, basic dimensioning and help access. Students learn how to develop the necessary Knowledge and skills for using the computer in drafting.

AR 211 – Architectural Design 1

Cr.4. Prerequisite: AR 210 & AR 114

This course is an introduction to the fundamentals of architectural design through the design process, definition, analysis, concepts, development and presentation. Students begin by studying different building forms and their relation to human activity, scale and furniture as a means of creating space. Next, they learn to conduct spatial analysis. Training includes simple projects focusing on the functional relationships and the use of space. The student should be able to present his/her different design concepts based on their acquired presentation skills.

AR 222 – Presentation Techniques

Cr.2. Prerequisite: None

The course is a journey throughout various manual presentations techniques. The course is based on advanced architectural presentation techniques, the observation of colour, materials, relationship between architectural elements and its environment. Trial is encouraged through studio sessions, evaluations and group discussions.

AR 223 - Architecture of Egypt: Time & Place

Cr.2. Prerequisite: None

This course introduces students to the architecture of Egypt which include Pharaonic, Greco-Roman, Islamic, Modern and Post-Modern concepts. Students are encouraged to sketch and have discussions and arguments throughout the course. In addition, a studio work is held on the light of the lessons learned throughout the lectures. The studio work includes the application and design of post-modern concepts on different pavilions reflecting different Post-Modern approaches.

AR 224- Workshops & Architectural Models

Cr.2. Prerequisite: None

Architectural Models are one of the main means by which an architect invents and develops his design. They serve as a bridge between the idea and its realization and are clear and comprehensible examples of how design ideas can be skillfully translated into models. This course encompasses the definitions, analyses, concepts, development and presentation of fundamentals of architectural models. Students learn how to build abstract and architectural forms using different materials such as wood, paper, plaster ….etc. The course aims to:

AR 225- Introduction to Painting

Cr.2. Prerequisite: None

This course is based on the observation of colour and its effect on lighting, shadow, composition, and the relationship between the figure and its environment. Trial is encourged through studio sessions, evaluations and group discussions.The workshop is held under the supervision of a professional academic assistant.

AR 226- Creativity & Innovation

Cr.2. Prerequisite: None

Creativity (meaning, components, importance), Characteristics of Creative persons, Creative thinking. Logical thinking and lateral thinking, Creative thinking and innovative ideas, Creative thinking problem solving, Energizing creative power, creative thinking strategies, Implementing.

AR 227- Introduction to Architectural Photography

Cr.3. Prerequisite: None

This course explores the practical and creative interplay between photographic practice and theory in the field of visual representations of urban space. It aims to encourage an innovative approach to architectural and urban photography by adopting a critical approach to the way we perceive, relate and respond to the physical realm of architecture.

AR 233 – History & Theory of Architecture 3

Cr.3. Prerequisite: None

(a)History: The course examines the formation and development of architectural, artistic, and urban traditions of the Islamic World. The study includes the ideas and cultures that shaped the architectural character. The course includes; Early Islamic, Abbassid period, Egypt, Mesopotamia, Persia, The Mongol period, Syria, Spain, The Seljuks of Rum, The Ottoman Turks. Emphasis is placed upon the study of Islamic Architecture in Cairo. Study of selected examples of religious, civic and residential Islamic Architecture in chronological order.

(b)Theory: Introduction to architectural design. Buildings and location. Design process and methodology. Design Approaches, Types of design process, Character and environment, Principles of house design. Types of Educational Buildings, nurses and schools. The course includes formal lectures and seminars.

AR 251- Building Technology 1

Cr.3. Prerequisite: None

The course introduces the students to the principles and fundamentals of building construction. Topics include the basic concepts of structural systems and foundations according to building loads and soil characteristics. In addition, the course presents the basic units of wall construction systems.

AR 252- Building Technology 2

Cr.3. Prerequisite: AR 251

The course continues the components of the building, focusing on two main elements, namely roofs and floors. Students are introduced to different materials used in their construction (reinforced concrete, wood and steel). Further, floor finishing materials and different methods of building insulation are introduced. Students also learn the different design considerations and architectural treatments of building joints

AR 284- 3D. Modelling

Cr.3. Prerequisite: AR210

This course is an introduction to the world of 3D modelling. Through the course, students study the basics and go through the process of building a visual model. Students learn how to produce a professional model and to express their own designs using different tools and techniques. The course aims to:

AR 312- Architectural Design 2

Cr.4. Prerequisite: AR 211

This course covers both a study of architectural projects involving a simple program and a study of spatial design according to climatic issues. Students start off by studying the relation of the building with its setting and the orientation according to natural requirements with special emphasis on the local environment. By the end of the course, students learn how to produce projects with an emphasis on human needs and local environmental considerations.

AR 313- Architectural Design 3

Cr.4. Prerequisite: AR 312

This course targets designing projects at an intermediate level, focusing on the ways in which the nature of structural systems and building materials affect and influence architectural design. Students begin by researching basic structural systems. The students should be able to select building materials as well as design projects with sound structural systems, to satisfy the requirements of building programs as an integral part of the design

AR 321- Understanding the Urban Environment

Cr.2. Prerequisite: None

This course seeks to achieve a better understanding of the definition of urban environment, its characteristics and its different elements, the complexity of the built environment and understanding its influence on human. It highlights the dynamic human parameters that are necessary in designing spaces for public use and modelling the spatial and temporal patterns of land conversion and understanding the causes and consequences of these changes. It identifies the changes and forces that affect the urban environment. The course contributes to the better understanding of people's relationship with cities. The purpose of this course is insight. The class will involve lectures, videos, and several tour walks in different areas of the city and urban sketching. There will be formal discussion session involving invited guests in addition to the seminar discussions.

AR 323- Music & Civilization

Cr.2. Prerequisite: None

This course provides a tour through the world of music. Students start by studying the elements of music (melody, harmony, rhythm, timbre, texture, etc.) and building a comprehensive vocabulary with which to understand and evaluate musical expression. After this introduction, seven historical periods of music are presented: Medieval, Renaissance, Baroque, Classical, Romantic, Modern and Post - modern. Composers of the various periods are presented within the context of their era relating it to the civilization as well. Students learn how architecture has common terms with music such as harmony, texture, rhythm, and module according to the characteristics of the era- emphasis on music as a part of general culture. :

AR 324- Introduction to Sculpture

Cr.2. Prerequisite: None

The course introduces the students to the fundamentals of art in three-dimensional form. Students learn relevant terminologies and are introduced to basics of shape, volume, light, texture, color and value. During the course, they are introduced to materials: clay, plaster, wood, stone, metal …etc., techniques, tools and their selection, proper usage and finishing.

AR 325- Rendering & Animation

Cr.2. Prerequisite: AR 284

This course is an advanced 3D Studio Max course that aims to develop students' computer skills by giving them the ability to be professional in architectural rendering and animation, using v-ray plug in. Students begin by studying V-Ray materials, general settings of realistic material and v-ray lighting in different model type (interior and exterior). After this, students will learn how to deal with v-ray camera and animation different types with in a simple building. Students will learn how to present the architectural concept of the building through animation. Finally, students will be able to create realistic images and animated videos of their projects.

AR 326- Computer Graphics Design

Cr.2. Prerequisite: AR 210

This course develops the students' capacity to handle all the tools, techniques, softare and media that are available in the vast world of graphics. The course focuses on developing critical and creative thinking processes to prepare the students for any professional setting.

AR 327- Interior Design Principles

Cr.2. Prerequisite: None

Space is the essential element in interior design. This space give life to the architecture which houses it. This course is a visual study of the nature of this interior setting. Fundamental element which make up our interior environments. Characteristics of each element. Emphasis is placed on basic design principals and how design relationships determine the functional, structural, and aesthetic qualities of interior spaces. Study of the design process.

AR 328- Furniture Design

Cr.2. Prerequisite: None

Introduction to the concepts, function, materials and techniques of furniture. Review of historical background and design theory development two and three-dimensional forms of a basic furniture concepts or design.

AR 329- Computer Applications in Urban Planning. G.I.S.

Cr.2. Prerequisite: AR 210

This course is addressed to students to students who have no previous experience with computer-based geographic information handling but who need to learn GIS and desktop mapping technology. It introduces the fundamental concepts and structure of Geographic Information Systems, in the context of other related disciplines such as cartography, remote sensing and urban planning.

AR 334 – History & Theory of Architecture 4

Cr.3. Prerequisite: AR 131

(a)History: The Early Renaissance, the High and Late Renaissance, the Baroque and Rococo are covered. The developments of the nineteenth century which lead to the various architectural movements, innovation in materials (iron and glass) are carefully traced through eclecticism and classical revival.

(b)Theory: Architectural movements and structure systems. Structure systems (Types, Materials and conceptions). Study of Form-active system, Vector – active system, Bulk-active system, Surface-active system and Vertical-structure system. Design criteria of educational buildings (types, location and design principles). Design criteria of hotels (types, location and design principles).

AR 335 – History & Theory of Architecture 5

Cr.3. Prerequisite: AR 334

(a)History : Architectural movements and pioneers. The essential characteristics of "MODERNISM" from the styles of 19th century to the end of 20th century. Changed vocabulary and new structure systems.

(b)Theory : The concept of Architectural character within the scope of environmental design. Study and analysis of cultural, Health and Transportation buildings and facilities.

AR353- Building Technology 3

Cr.3. Prerequisite: AR 252

This course deals with the main complementary elements of a building (openings and stairs). Students begin by studying different materials of construction, finishing materials and accessories. Students also learn the different design considerations and architectural treatments of building joints.

AR 354- Building Technology 4

Cr.3. Prerequisite: AR 353

The course covers a wide range of finishing materials for both external envelopes and internal spaces of buildings. Facing, cladding and curtain walls for external walls as well as suspended ceilings, light partitions and internal wall treatments of internal spaces are the main topics of this course. These different topics are studied through both conventional and advanced materials and methods of construction. In addition, the course deals with some important architectural details of fixed furniture and landscape elements.

AR 362- Environmental Studies 1

Cr.3. Prerequisite: None

This course is a preparation for the course Environmental Studies II. The course introduces the students to the environmental science, the basic concepts of environmentalism. The course aims at developing the basic environmental design principles in students and starts them with environmental urbanism and quality of life in preparation for the proceeding course.

AR 363- Environmental Studies 2

Cr.3. Prerequisite: AR 362

This course is an extension of the course Environmental Studies I and a preparation knowledge for the course of Execution design 2 . The course introduces the students to the environmental science, in which basic equations are used as a quantitative approach of active environmental design. Topics covered include indoor environmental quality using mechanical system (HVAC), energy conservation in buildings, water supply and sanitary systems.

* AR 411- Architectural Design & Urban Landscape

Cr.3. Prerequisite: None (For Construction and Building Engineering Department Only.)

This course is an introduction to the fundamentals of architectural design and landscape architecture for non-architectural students. It familiarizes students with the design process, the analysis of form and function, and the development of an architectural project. The course focuses on the role of the architect and urban planner in organizing space to fulfil different human needs and activities. It directs students with how to deal with different design problems through systematic design process, how to take into consideration different physical, cultural, and temporal factors. The course also introduces the landscape design process as one of the duties of the architect.

AR 414- Architectural Design 4

Cr.4. Prerequisite: AR 313

This course is a practical application of the environmental design elements that the students studied in the Environmental Studies I course. The development of architectural concept, character and language is of particular importance. Course material combined with an understanding of appropriate environmental systems is a must. Environmental awareness and sustainability are studied and addressed throughout the course and within given projects.

AR 415- Architectural Design 5

Cr.4. Prerequisite: AR 414

This course is a continuation of design, but with more complex projects that have to be oriented to one of the modern architectural trends. Students should create new ideas, concepts, forms, and thinking methodologies using computer skills.

AR 416- Interior Design 1

Cr.3. Prerequisite: AR 312

This course is concerned with design principles as presented through graphic rendering techniques. Topics covered include: interior spaces, interior design, design vocabulary and interior environmental systems. Studio projects cover commercial and residential interiors. The course stresses the planning and construction of interior space and the coordination of furnishing and accessories. Problem solving studio involves the understanding and application of color, fabrics, lighting, interior materials, paints, floor coverings, wall coverings, ceilings and lighting.

AR 420- Development Approaches in Urban Design

Cr.2. Prerequisite: None

This course addresses the different approaches and methods for the morphological analysis and environmental behaviour studies in the theory system of the urbanization process. It links the abstract political, social and economic factors with the identity physical environment and the entire city. It highlights the basic theories, concepts, methods and research agendas of urban development. It seeks to achieve a higher level of integration between disciplinary approaches and urban models.

AR 421- Architectural Criticism

Cr.2. Prerequisite: None

Architectural Criticism introduces principles, methods and criteria of making judgments & evaluation of architectural work. Different conceptions, ideas and directions of critics & criticism schools are presented. Studies of comparative nature enhance skills of analysis, description, interpretation and assessment of architectural work to be criticized.

AR 422- A Mediterranean City . Urban & Architectural History

Cr.2. Prerequisite: None

Study of the development of a Mediterranean City as a case study. The special organization and its changing character through time. Geographical, historical, social, political and cultural factors as determining the shaping of the city. Texture and architectural development. Relationship between economic growth and urban development. Selected readings, lectures and visits to historic Sites are included.

AR 423- Topics in Sustainability

Cr.2. Prerequisite: None

The course reviews theories and concepts of sustainability and how the term has developed and embraced change and shift in policies and global commitment. Students are encouraged to think critically of developing principles and consider the design process with sustainable principles at the forefront. Innovative ideas and international examples are explored. By the end of the course, students should be able to critically engage with the concept and practical implications on various scales and suggest local contextual interpretations.

AR 424- Functional Requirements in Interior Environment

Cr.2. Prerequisite: None

Interior design is the planning, layout, and design of the interior spaces. The purpose of interior design, is the functional improvement, aesthetic enrichment, and psychological enhancement of interior space. The purpose of this course is the study of the relationship between user activity and furnishing requirements and design.

AR 425- Introduction to Environmental Systems

Cr.2. Prerequisite: None

Interior environmental systems are essential components of any building since they provide for occupants the thermal, visual, auditory, & sanitary conditions necessary for their comfort & convenience. This course is intended to study the design of these elements in order to function properly.They must also be coordinated with building's structural system. The course include: Heating and air conditioning systems. Water supply and sanitary drainage systems. Electrical and lighting systems. Acoustics, fire protection and fire alarm systems.

AR 426 – Computer Application in Architecture 1

Cr.2. Prerequisite: AR 284

Computer applications in architecture are expected to be form of architectural presentations used in the future. This course provides hands on experience to students seeking the use of advanced applications and techniques to produce and enhance building ideas and concepts.The student will develop their skills and apply new skills in computer applications regarding Building Information Modeling (BIM), which is the process of generating and managing building data during its life cycle. Typically, the student will study how to apply computer software of BIM such as Autodesk Revit Architecture, which uses three-dimensional, real-time, dynamic building modeling software to increase productivity in building design and construction. The student will work with the process that produces the BIM, which encompasses building geometry, spatial relationships, geographic information, and quantities and properties of building components.

AR 427- Introduction to Web Design

Cr.2. Prerequisite: None

Multimedia is expected to be the form of architectural presentation used in the future. This course provides hands on experience to students seeking the use of advanced multimedia techniques to produce a simple and enhancing website. Student will develop their skills and apply new skills in multimedia production. They will study how to design their website, story boarding, creating and making flash intros and flash site, special effects.It will be in the form of a website or CD application. Students will work with different multimedia packages and study how to put them altogether.

AR 428- Computer Application in Architecture 2

Cr.2. Prerequisite: AR426

This course provides hands on experience to students seeking the use of advanced applications and techniques to produce and enhance building ideas and concepts. Students will develop their skills regarding Massing, which is an advanced tool for creating design ideas at a macro level. They will be able to quickly and easily quantify and analyze the results. This allows them to confidently work from general to specific as design progresses, without starting with actual building elements. In addition, massing allows creating forms and containers to control more granular components.

This course takes a further look at Revit's Conceptual Design tool and shows students how they can leverage it for sustainable design analysis. As students move from a more traditional design workflow to Revit, they will see more opportunities to engage environmental simulations within the Revit model. This ability to see the model from different points of view makes a BIM project perfect for exploring sustainable design strategies.

AR 429- Social Dimensions in Urban Design

Cr.2. Prerequisite: None

Urban sociology studies the way that cities shape social life, considering spatial context as fundamental to understanding the social world. Over the semester, this course will explore three essential components of the city: 1) its formation, 2) its geographical and physical structure and composition, and 3) social organization among its residents. The course will pivot between an examination of macro-level processes of the shape and character of the city, and the micro-level processes though which the urban context shapes the lives and social interactions of those who reside within it. The course will start by thinking about urban life as a sociological construct and examining contrasting paradigms for understanding what it means to reside in a city. The course considers the way macro-economic processes such as deindustrialization, segregation, and suburbanization have interacted to create areas of concentrated urban poverty, and examine the character and consequences of social life in these inner-city neighborhood settings. It explores the role of the built environment in shaping social interactions, and how space is related to mechanisms of both formal and informal social control. This course addresses a selective review of urban sociology, it deprives a key explanatory tool for understanding the socio-spatial 'context of contexts' in which urban spaces and locally

embedded social forces are positioned. It highlights a conceptually innovative explanation of the socialist cities, urban population growth under socialism. It addresses urbanism as a way of life. It highlights some urban sociology issues concerning the spread of poverty, slums, and the description of women in the sociological literature of the city, globalization and loss of authenticity and urban development strategies in the socialist era, ethnic segregation, and inequality in the socialist city. It involves a critique of conventional urban sociology; formulating an alternative approach for urban analysis; and empirical research.

AR 441- Introduction to City and Regional Planning

Cr.3. Prerequisite: AR 338

This course is an introduction to the field of planning. Students begin by studying planning and its different levels, concepts and related physical, social and economic phases. Subsequently, students learn about the role of the planner in creating sustainable environments for social, economic and cultural requisites of the society on a local, regional, and national level with application on Egypt.

AR 442- Introduction to Urban Design

Cr.3. Prerequisite: AR 441

This course is designed to provide students an overview of the design of urban areas and urban spaces. The course is divided into three main parts. Part I introduce students to the concept of urban form, urban pattern and the different types of urban voids within the city fabric. Part two deals with the detailed analysis of urban space: its enclosure, enclosing elements and elements within enclosure. At the end of this part students can identify urban spaces typology, characteristics, potentialities and problems. Part three clarify the human experience of urban space. The different levels of man-place interaction as well as their results are the core of this part. The course ends with detailed application of both the analysis and human experience on the main types of urban spaces: streets and squares.

AR 444- Introduction to management, practice and law

Cr.3. Prerequisite: AR 354

The course consists of four main parts covering its overall aim and objectives. Part one, of two weeks duration, is introductory to the main characteristics of building project management: its phases, participants and documents with particular of design phase. Part two, of three weeks duration, discusses the specification writing of different building items with concentration on architectural aspect of building. Part three, of five weeks duration, concentrates on Quantity survey, price breakdown and cost estimate of different building items. For three weeks duration, part four ends the course with introduction to building permits, cost estimate and tender issuing. This end prepares student to a separate detailed courses of professional practice and building regulations.

AR 455- Execution Design 1

Cr.3. Prerequisite: AR 354

This course introduces the student to the fundamentals of execution design drawings based upon the wide range of vocabulary taught through the previous courses of Building Technology. Students start by learning about the concepts of execution design and how detailing is mainly a design exercise. Then direct application is conducted in which the student applies basic execution instructions and previously earned knowledge of execution details into a small project. This includes arranging the information into easy, readable & complete set of execution documents. Execution basic documents are presented in the form of site plans and landscape, plans, sections, elevations, schedules, and types of the different components of a building.

AR 456- Execution Design 2

Cr.3. Prerequisite: AR 455-AR 363

This course deals with preparing execution design drawings for more sophisticated projects, taking into consideration the different technical systems and their installation. Advanced technical systems, as well as sanitary electromechanical ducts (HVAC, lighting & electrical power) and spatial requirements are introduced through the study of the course. Students practice how to coordinate between different building systems.

AR 484- Environmental Simulation

Cr.3. Prerequisite: AR 363-AR 284

This course provides hands on experience to students seeking the use of advanced applications and techniques to produce and enhance building ideas and concepts. BIM has a number of tools that support sustainable design processes and analysis, ranging from accurate material takeoffs, energy analysis and daylighting, to Mechanical, Electrical, and Plumping (MEP) details. This course introduced the students to digital simulation techniques of passive and active systems. It focuses on the integrated environmental design, MEP features, General workflows, and coordination. As students move from a more traditional design workflow, they will gain ability to design from different points of view and to explore sustainable design approaches.

AR 500 – Research & Programming

Cr.3. Prerequisite: None

This course is an introduction to basic principles and fundamentals of research & programming methodology. Program development and research methods in architectural design, urban design and related disciplines is investigated. Emphasis is placed on information gathering techniques relevant to the theory and practice of environmental design. Skills of technical and creative writing as well as conducting simple library researches are acquired.

AR 501- Architectural Design Graduation Project

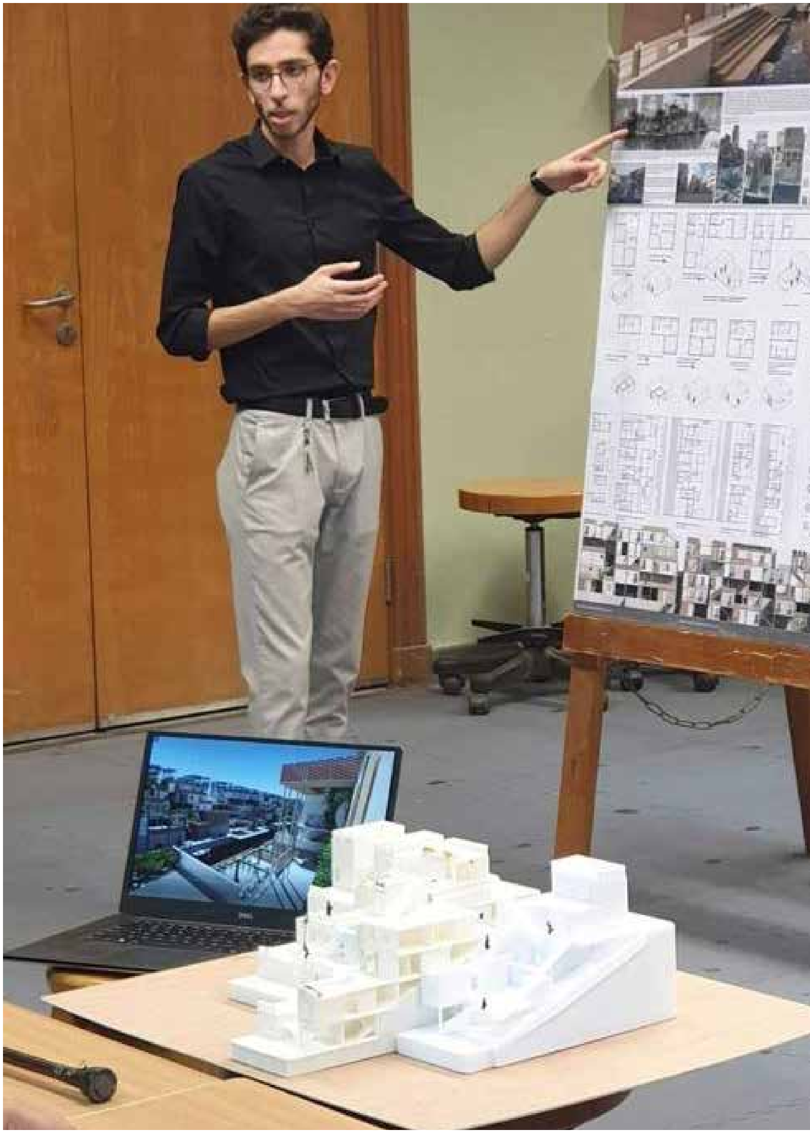
Cr.12. Prerequisite: AR 516– AR 500

The students proceed to design the project of his choice. The program and location has been prepared in the previous semester. This comprehensive architectural project is the culmination of the student's architectural education. The student must presents new concepts and imaginative solutions based on real problems taking into consideration the environmental, social, cultural and structural systems. The project is presented in a series of drawings, perspectives, models, etc.

AR 501- Interior Design Graduation Project

Cr.12. Prerequisite: AR 512– AR 500

The students proceed to design the project of his choice. This comprehensive interior design project is the culmination of the student's education. The student must present new concepts an imaginative solutions based on real problems. The project is presented in a series of drawings, perspectives and models.



AR 501- Urban Design Graduation Project

Cr.12. Prerequisite: AR 518– AR 500

The student proceeds to design the project of his own choice. The program and location had been prepared in the previous semester. This comprehensive architectural project is the accumulation of the student's architectural education. The student must present new concepts and imaginative solutions based on real problems taking into consideration the environmental, social, cultural and structural aspects. The project is presented in a series of drawings, perspectives, diagrams and models, etc.

AR 512- Interior Design 2

Cr.4. Prerequisite: AR 415- AR 416

Continuation of design with projects dealing with the development of comprehensive design solutions for private residential interiors. Emphasis on programming, space organization, integration of lighting with interior spaces components. Introduction to commonly used design methods in the analysis and organization of interior spaces taking into consideration the basic needs of the users.

AR 516- Architectural Design 6

Cr.4. Prerequisite: AR 415

This course is taking a contextual architectural design approach which will be achieved through studies of an architectural project related to realistic problems within the urban environment. The strategy of the program guides the students through field surveys, such that students can build a sufficient understanding of environmental, social, historic and economic factors of urban environments. The student is assisted in studying and proposing solutions to problems pertaining to a selected action area.

AR 518 – Urban Design

Cr.4. Prerequisite: AR 415/AR442

This course is taking a contextual urban design approach which will be achieved through studies of an urban project related to realistic problems within the urban environment. The strategy of the program guides the students through field surveys, such that students can build a sufficient understanding of environmental, social, historic and economic factors of urban environments. The student is assisted in studying and proposing solutions to problems pertaining to a selected action area.

AR 520 – Urban Design in Practice

Cr.2. Prerequisite: None

This course addresses the collaborative and multi-disciplinary process of shaping the physical setting for life in cities, towns and villages. It highlights the art of making places, design in an urban context. The course will help the students to analyze relevant international examples of different urban design projects that involve the design of buildings, groups of buildings, space and landscapes, water bodies development and the establishment of frameworks and processes that facilitate successful development. The course includes rich collection of ideas and projects that urban designers are generating internationally. It shows that urban design can improve the human experience from the most local project to the wider environment.

AR 521 – Comparative Urbanism

Cr.2. Prerequisite: None

A growth of interest in urbanism stems from the need to find a new way of looking at the human habitat and resolving how humans create urban places. Students in this course will be introduced to concepts and meanings of urbanism from a variety of perspectives to enhance their understanding and encourage an active exploration and analysis of urbanism in an era of unprecedented urban change fueled by accelerated urban growth, climate change and the proliferation of information technology.

AR 522- Design with Light

Cr.2. Prerequisite: AR114

Color is an inherent visual property of all form. The colors we attribute to objects find their source in the light that illumines and reveals form & space. Without light, color does not exist. This course emphasis the study of color as a property of light. Study of color, hue, value & intensity. Altering colors with pigments or with light, the effects of adjacent colors, color schemes, tonal & chromatic distribution, texture & light, general lighting task lighting& accent lighting, brightness, contrast, glare, diffusion …etc. The course explores the use of light as a design element in interior spaces with an overview of the basics of electricity and electrical distribution systems.

AR 523- Historical Preservation and Conservation

Cr.2. Prerequisite: None

Introduction to historic preservation in an architectural context with concentration on building materials properties and technologies of conservation and restoration. Review of preservation and conservation as social attitudes. Emphasis will be given to historic preservation within the general context of the built environment. Contemporary methods and process of historic preservation considering technical, economic and aesthetic problems of assessing, restoring and adapting historical buildings for alternatives occupancies.

AR 524- Environmental Impact Assessment in Urban Planning

Cr.2. Prerequisite: AR 441

This course introduces the environmental dimension as an integral part of urban planning. Environmental measures are to be taken to minimize adverse effects of urbanization prior planning for a new development. Environmental Impact Assessment (EIA) establishes a sound environmental tool to identify, predict, evaluate and present mitigation measures for key impacts of a development.

AR 525- Intelligent Urbanism

Cr.2. Prerequisite: None

This course addresses the concept of Intelligent Urbanism, its historical background, its principles intended to guide the formulation of city plans and urban designs. It is concerned with design with nature, resilient cities, an ontology-based intelligent information system for urbanism and civil engineering data and smart alternatives to generic new city development.

AR 526- Vernacular Architecture

Cr.2. Prerequisite: None

This course will provide an introduction to the field of vernacular architecture, research in different countries, describing and defining basic building types, focusing on interpretive concerns such as how to read a building, the social functions of architecture and the hidden intentions in the built form.

Also demonstrating how material ,culture can be analyzed to provide a broader ,richer account of the human past ,while reaching out for cross cultural comparisons, the course will concentrate on African and Arabian countries vernacular architecture with particular intention to regional formation.

AR 527 – Conceptual Interiors

Cr.2. Prerequisite: None

This course offers an introduction to the map of design process, Problem solving as it applies to interior architecture and design. The student will learn concept finding and concept visualization through quick sketches and study models, Exploration of design alternative and source of design inspiration will be studied. Student will study the relationship between concept as stimulus and visual equivalent to determine their appropriate use.

AR 528 – Finishing Materials

Cr.2. Prerequisite: None

An introduction to interior materials, finishes and textile products used in interior design. Course topics will include interior and building materials, criteria for selecting finish materials, flooring materials, wall coverings, window treatments, furniture construction, and upholstery; and selection of these appropriate interior materials and finishes.

AR 529- Computer Applications in Architecture 3

Cr.2. Prerequisite: AR284

This course introduces students to the field of parametric design. It focuses on creating a methodological link between computation and architecture by using the basic tools and techniques of parametric modelling. Parametric design suggests very high controlled variations via different types of algorithms. Having gained a wider area of application in architectural design, parametric modelling has already been a part of research and urbanism in the name of 'parametric urban design'.

AR 541 – Professional Practice

Cr.2. Prerequisite: AR 444

This course is meant to inform the student of all the parties, duties and responsibilities they will face in the professional world. Students begin by studying the different models of professional relationships between different parties of building projects. Then, they learn in details the different professional relationships between involved parties in the profession. Owner-Consultant, Owner-Contractor and Consultant-Contractor relationship are the main spine of the course. These different relationships are deeply considered through different project phases and stages.

AR 542 – Regulations & Law

Cr.2. Prerequisite: AR 444

This course aims to teach students the different building regulations concerning executed buildings in real practice. It also aims to acknowledge students the different urban planning rules and obligations that govern real planning practices. Students begin by studying building laws. This entails different building regulations concerning terminology, lighting, ventilation & courts, stairs, heights, projections, fire protection, license requisites, license obligations. After this they are introduced to urban planning laws concerning terminology, general plan, implementation and detailed plans, land subdivision, and planning regulations of city center, industrial zones and district redevelopment. Different regulation of building safety and parking requirements of different building functions are introduced as well.

AR 543- Introduction to Site Planning & Housing

Cr.3. Prerequisite: AR 442

Developing an understanding for the different housing types and the related influencing factors which enhance the practical skills regarding the geological, topographical, environmental, aesthetic and legal aspects.

AR 544- Landscape Architecture

Cr.3. Prerequisite: AR 442

This course is aimed towards the integration of both the building and the environment through the theories and principles of landscape design. Students with an in-depth understanding of how the two disciplines can be combined to produce integrated sustainable solutions. This is followed by the theoretical and historical backgrounds of landscape studies, site analysis, plant materials and landscape elements..

AR 553- Interior Details

Cr.3. Prerequisite: AR 456

This course is an introduction to the concepts of function & materials & interior design and techniques in their relationship of building design and association with walls or structural system to create integrated design internally and externally

AR 557- Execution Design 3

Cr.3. Prerequisite: AR 456

This course masters execution documents for buildings' functional spaces and sophisticated structural, environmental, interior, and outdoor/landscape elements. Environmental awareness, sustainability and their applications are also addressed throughout different stages of the course. The course then concentrates on advanced architectural detailing and execution problem-solving concepts and on the coordination between passive and technical systems on one hand, and execution documents and drawings on the other. Students learn the selection and treatment of advanced structural systems, construction materials and technologies and solving execution design problems using various techniques. Developments of various and advanced execution design methods, tools, and techniques available for building's structural and environmental design elements are also covered thoroughly.

AR 558- Site Details

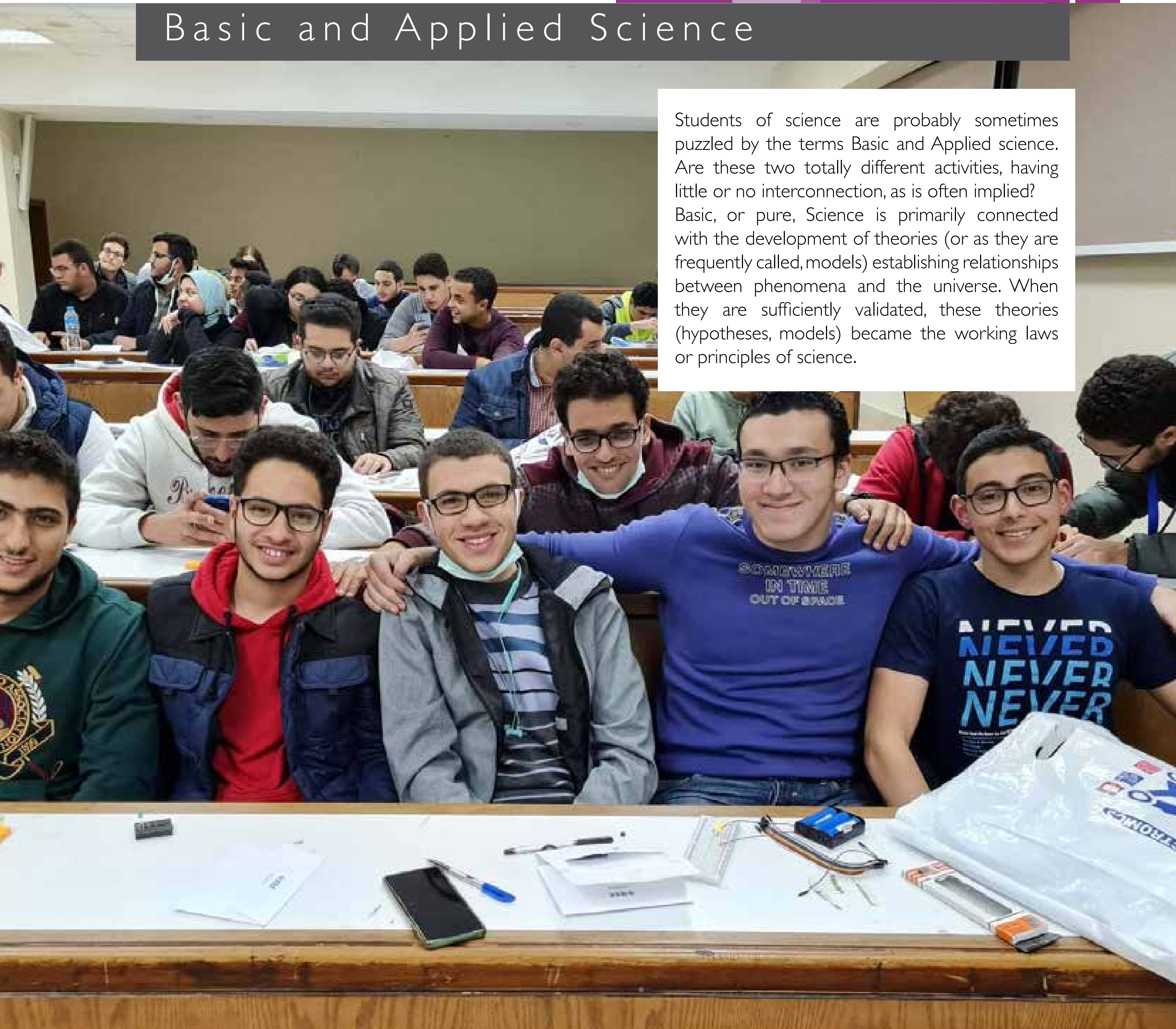
Cr.3. Prerequisite: AR 456

This course masters execution documents for site details at outdoor spaces and sophisticated structural, environmental, and outdoor/landscape elements. Environmental awareness, sustainability and their applications are also addressed throughout different stages of the course. The course concentrates on advanced urban design detailing and execution problem-solving concepts and on the coordination between outdoor elements, materials and environmental treatments, and execution documents and drawings. Students learn the theories and principles of advanced construction materials and technologies and solving execution design problems using various techniques. Developments of various and advanced execution design methods, tools, and techniques available for open spaces, structural and environmental design elements are also covered thoroughly.

Basic and Applied Science

Students of science are probably sometimes puzzled by the terms Basic and Applied science. Are these two totally different activities, having little or no interconnection, as is often implied?

Basic, or pure, Science is primarily connected with the development of theories (or as they are frequently called, models) establishing relationships between phenomena and the universe. When they are sufficiently validated, these theories (hypotheses, models) became the working laws or principles of science.



Applied science, on the other hand, is directly connected with the application of the working laws of pure science to the practical affairs of life. In order to increase man's control over his environment thus leading to the development of new techniques, processes and machines, such activities as investigating the strength and uses of materials, extending the findings of pure mathematics to improve the sampling procedures used in agriculture or the potentialities of atomic energy. All are examples of the work the applied scientist or technologist achieve.
It is evident that many branches of purely theoretical or experiment work. Thus the study of radio activity began as a piece of basic research, but its results are now applied in a great number way, for instance the study of metal fatigue. Conversely, working in applied science and technology frequently acts as a direct stimulus to the development of pure or basic science. It seems, then two branches of science are mutually dependent and interacting, and that the so-called division between the basic and the applied scientist is real.
Basic and Applied Science includes four major disciplines: Mathematics, Physics, Chemistry and Mechanics which are the base of all work done in the engineering departments.
The objectives of the Basic and Applied Sciences department include:

- Forming a base for specialized studies in all educational programs.
- Offering advanced and applied courses for B. Eng., B. Tech and upgrading studies all Colleges.

Course Description

BA 123 – Mathematics I

Cr.3. Prerequisite: None

Basic rules of differentiation – Trigonometric functions and their derivatives – Inverse trigonometric functions and their derivatives – Logarithmic function and its derivative – Derivatives of hyperbolic and inverse hyperbolic functions – Parametric differentiation, implicit differentiation – Limits and L'Hopital's rule – Partial Differentiation – Taylor's and Maclaurin's expansions – Curve sketching: critical, maximum, minimum and inflection points – Curve sketching (rational functions) and physical application (velocity and acceleration) – Conic sections: parabola, ellipse and hyperbola.

BA 124 – Mathematics II

Cr.3. Prerequisite: BA 123

Integration by parts – Integration of rational functions – Integration of trigonometric powers – Integration by trigonometric substitution – Integration of quadratic forms and the reduction formulas – Areas and volumes – Length of the curve – Average of a function – Numerical integration – Matrix algebra – Eigenvalues and eigenvectors – Cayley-Hamilton theorem.

BA 223 – Mathematics III

Cr.3. Prerequisite: BA 124

First order ordinary differential equations: separable, homogeneous, exact, linear and Bernoulli's equations – Second order ordinary differential equations with constant coefficients, general solution of homogeneous and non-homogeneous equations: method of undetermined coefficients, the method of variation of parameters – Second order ordinary differential equations with variable coefficients: Cauchy-Euler equation – Laplace transform: first shifting theorem, derivatives of transforms, transform integration, unit step function, second shifting theorem, inverse Laplace transforms – Applications of Laplace transform: solution of ODEs, solution of R-L circuit – Fourier series of periodic functions of period 2P – Fourier series for even and odd functions, half range expansions and harmonic functions.

BA 224 – Mathematics IV

Cr.3. Prerequisite: BA 223

Vectors in 2D and 3D Space – Vector Algebra – Vector and scalar functions – Vector differential calculus – Vector integral calculus – Integral theorems and their physical interpretation – Complex algebra – Complex functions – Complex differentiation – Complex integration – Poles and zeros of analytical functions – Residue theorem, and application to real integrals.

BA 323 – Mathematics V

Cr.3. Prerequisite: BA 224

Solving ODE using power series methods – Gamma functions – Beta functions – Bessel functions – Legendre's polynomials – Partial D.E., method of separation of variables – Heat equation – Wave equation – Conformal Mapping: complex functions as mapping – Linear fractional mapping – Schwarz-Christopher mapping.

BA 325 – Mathematics VI

Cr.3. Prerequisite: BA 124

Sample spaces and events, probability theorems – Conditional probability and independence – Total probability and Bayes theorem – Discrete probability distribution – Continuous probability distribution – Mathematical expectation, moments, variance and mean – Special discrete distributions: Bernoulli, binomial, negative Binomial, geometric, and Poisson – Special continuous distributions: uniform, exponential and normal - Discrete joint probability distributions: marginal distributions, conditional distributions, covariance , correlation coefficient – Continuous joint probability distributions: marginal distributions, conditional distributions, covariance , correlation coefficient – Random processes: classification, strict stationary, second orders stationary, wide sense stationary, independence, ergodic auto-correlation, cross-correlation.

BA 326 – Mathematics VI: Probability and Statistics

Cr.3. Prerequisite: BA 124

Descriptive statistics – Sample spaces and events, probability theorems – Conditional probability and independence –Total probability and Bayes theorem – Enumeration methods – Discrete probability distribution – Continuous probability distribution – Mathematical expectation, moments, variance and mean – Special discrete distributions : Bernoulli, binomial, negative Binomial, geometric, and Poisson – Special continuous distributions: uniform, exponential and normal – Discrete joint probability distributions: marginal distributions, conditional distributions, covariance, correlation coefficient – Continuous joint probability distributions: marginal distributions, conditional distributions, covariance , correlation coefficient.

BA 327 – Statistics & Numerical Methods

Cr.3. Prerequisite: BA 124

Descriptive statistics – Sample spaces and events, probability theorems – Conditional probability and independence – Total probability and Bayes theorem – Discrete probability distribution – Continuous probability distribution – Mathematical expectation, moments, variance and mean – Numerical methods: introduction, solution of equations, interpolation.

BA 329 – Probability and Statistics

Cr.3. Prerequisite: BA 124

Descriptive statistics – Sample spaces and events, probability theorems – Conditional probability and independence – Total probability and Bayes theorem – Discrete probability distribution – Continuous probability distribution – Mathematical expectation, moments, variance and mean – Special discrete distributions: Bernoulli, binomial, negative binomial, geometric, and Poisson – Special continuous distributions: uniform, exponential and normal – Discrete joint probability distributions: marginal distributions, conditional distributions, covariance , correlation coefficient – Continuous joint probability distributions: marginal distributions, conditional distributions, covariance, correlation coefficient.

BA 113 – Physics I: Electricity-Magnetism-Optics

Cr.3. Prerequisite: None

Electrostatics – Coulomb's law – Electric field – Motion of charged particles in a uniform electric field – Electric flux and Gauss's law – Electric potential energy and electric potential – Capacitors (parallel plate capacitors, energy stored) – Capacitors in series and parallel – Electric current – Ohm's law – Resistivity – Power in the circuits – Resistors in series and parallel – Kirchhoff's rules – R.C circuit – Magnetism – Force on a charge in magnetic field – Force on a current-carrying conductor in magnetic field – Biot-Savart's law and its applications – Ampere's law and its applications – Electromagnetic induction – Magnetic flux – Faraday's law – Mutual induction – Self induction – Electromagnetic waves – Interference of light – Young's double slit experiment.

BA 114 – Physics II: Heat & Sound

Cr.3. Prerequisite: BA 113

Temperature – Temperature scales – Thermal expansion – Specific heat capacity – Latent heat ¬– Zeroth law of thermodynamics – Heat – Work – Definition of reversibility and PV diagram – First law of thermodynamics – Non-flow energy equation – Perfect gas – Joule's law – Enthalpy – Reversible non-flow processes: constant volume, constant pressure, constant temperature, adiabatic and polytropic – Second law of thermodynamics – Entropy – TS diagram – Heat engine, heat pump and efficiency – Heat transfer – Fourier's law of conduction – Newton's law of cooling – Heat transfer: composite wall and electrical analogy – Sound waves – Doppler effect.

BA 118 – Chemistry

Cr.3. Prerequisite: None

Metals and corrosive environments – Basics of corrosion – Forms of corrosion Part 1 – Forms of corrosion Part 2 – Basics of corrosion protection – Chemistry of fuel Part 1 – Chemistry of fuel Part 2

– Physical and chemical properties of fuel – Water chemistry – Basics of water treatment – Chemical and physical properties of building materials.

BA 119– Organic Chemistry I (Petrochemical)

Cr.3. Prerequisite: None

Introduction on organic chemistry; bonding, structure, hybridization and types of bond cleavage Classification of organic compounds, functional groups and types of organic chemical reactions. Alkanes; nomenclature, physical properties, conformations and Preparation of alkanes. Free Radical substitution reaction of alkanes, Alkenes; nomenclature, physical properties and stability, geometrical isomerism. Preparation of alkenes; Elimination reactions and catalytic hydrogenation of alkynes. Reactions of alkenes; addition, oxidation and polymerization.Alkynes; nomenclature, preparation and reactions. Alkyl halides; nomenclature, stereochemistry and nucleophilic substitution reaction. Alcohols and ethers; nomenclature, physical properties, preparation and reaction. Aromatic compounds; aromaticity, nomenclature and electrophilic substitution reactions. Applications on electrophilic substitution reactions on benzene and its derivatives.-Aldehydes and ketones, nomenclature and preparation. Reactions of aldehydes and ketones. Carboxylic acids, nomenclature, properties, and synthesis. Reactions of carboxylic acids and its derivatives. Amines, classification, nomenclature, synthesis, and reactions.

BA 130– Biochemistry

Cr.3. Prerequisite: None

Course overview and inrtoduction to biochemistry. Basics of cell biology.Cell membrane and cell organelles.Cell transport (passive transport). Cell transport continued (Active & bulk transport). Fundamental biochemistry of proteins (importance of proteins, properties & classification of amino acids). Fundamental biochemistry of proteins continued (peptide bonds, conformational levels of proteins, conjugated proteins, Denaturation). Enzymes and co-enzymes (mechanism of enzyme catalysis, specifity, models of fitting, classification of enzymes, co-factors). Holoenzymes, pro-enzymes, isoenzymes, enzyme kinetics (factors affecting activity). Enzyme inhibitors and applications. Nucleotides and structure of nucleic acids. Central dogma of life and genetic code. Gene expression and regulation, and protein synthesis. Water soluble and fat soluble vitamins. Metabolic pathways and biosynthesis of metabolites

BA 218 – Organic Chemistry I (Oil and Gas)

Cr.3. Prerequisite: None

Introduction – Electrochemical Reactions, Electro chemical cells, Introduction, Electrochemical Reactions, Electro chemical cells, Electrochemical Series, Polarization, Passivity, Definition of Corrosion, Metals and Corrosive Environments, Forms of corrosion, uniform, Galvanic and D.A.C., Pitting corrosion , S.C.C and I.G.C., Atmospheric Corrosion Erosion Corrosion, Coating protection and Inhibitors, Cathodic Protection, Classification of Fuel, Properties of liquid fuel, Combustion of fuel, Purpose of Lubrication, Classification of Lubricants, Properties of Lubricating Oils, choice of Lubricant, Additives, Introduction to Impurities in Water, Purification and Treatment of Water.

BA 141 – Engineering Mechanics I: Statics

Cr.3. Prerequisite: None

Introduction to mechanics – Force system: rectangular components of a force, parallelogram law – Equilibrium of a particle: springs and cables – Force system resultant: moment of a force, free body diagram – Equilibrium of a rigid body: condition of rigid body equilibrium, equation of equilibrium, two and three force member – Structural analysis: simple trusses, the method of joint, zero force members, method of sections – Frames and machines – Friction – Mass moment of inertia.

BA 142 – Engineering Mechanics II: Dynamics

Cr.3. Prerequisite: BA 141

Kinematics of a particle: rectilinear kinematics, curvilinear motion – Motion of projectile – Kinetics of a particle: Newton's laws of motion, equations of motion – Work and energy of a particle – Principle of work and energy – Work and energy for a system of particles – Kinematics of a rigid body – Motion of a rigid body, translational and rotational motion – General plane motion – Relative motion analysis – Relative motion analysis using rotating axis – Kinetics of a rigid body: translation motion, rotation about a fixed axis – General plane motion.

NE 264 – Scientific Thinking

Cr.3. Prerequisite: None

Introduction about nature of scientific thinking and thinking patterns development – Meaning and construction of science – Scientific values and attitudes – Science, non-science disciplines – Science, engineering and technology – Properties of science – Mental operations used in science and scientific guessing – Types of deductions and representation – Research methods in natural sciences – Definitions, experiments, observations – Scientific postulates and their conditions – Verification of scientific postulates – General methods of problems solving: creative and critical thinking, fluency types, flexibility, originality and basics of brain storming techniques.

NE 465 – Creative Awareness

Cr.3. Prerequisite: None

Introduction to fine arts – Art in our lives – The basic meaning of art – Design elements: shape and form – Design elements: space – Design elements: texture and pattern – Design elements: color – Color theory – The Principles of Design: balance, emphasis, contrast, repetition – The principles of design: proximity, proportion, harmony, unity and variety – Ethics of engineering.

NE 466 – Environmental Science and Technology

Cr.3. Prerequisite: None

Environmental sciences and engineering and definitions of physical, chemical, biological, and social environments and environmental studies – Ecology and ecological system, formations, functions and limiting factors, energy transfer and materials cycling in ecosystem – Population and population growth and resources depletion and pollution – Air pollution sources, types and control, smoke, fogs and smog phenomena – Greenhouse gases and impacts on the environment – Climate changes and sea level rise and management – Acid rains and its effects on soil, water and biological systems – Tropospheric and stratospheric ozone sources, roles and effects in the environment – Sustainable developments and preventive technology – Green technology and sustainable communities – pollution types, sources and treatments – Radiation Green and radioactivity and health hazards and radiation protection – Waste sources, types and management – Environmental auditing, impacts assessment and methodology- Risk type, sources, characterization and management – Environmental management.

NE 467 – Management of Energy Resources

Cr.3. Prerequisite: None

Energy for sustainable development – Metal and corrosive Environments; Strategic components of sustainable energy – Renewable energy technologies – Energy audit process and maintenance management – Lighting – Power factor correction – Control system and computers – Combustion processes and the use of industrial wastes – Heating, ventilating and air conditioning (HVAC).

BA 020 – Preparatory Mathematics

Cr.0. Prerequisite: None

Basic rules of algebra, solving system of linear equations, solving quadratic equation. Plane trigonometry: definition of trigonometric and inverse trigonometric functions, some rules for trigonometric functions, solving plane triangle, length of arc, area of sector, elevation angles.

BA 121 – Mathematics 1

Cr.3. Prerequisite: BA 020

Solving system of linear equations, solving quadratic equation: by factorization, by using the formula. Definition of trigonometric, inverse trigonometric functions and some rules of trigonometric functions. Spherical triangle: definition, solving right angle, quadrantal, oblique spherical triangle. Basic Rules of differentiation and application. Basic rules of integration and application.

BA 122 – Mathematics 2 Geometric and vector analysis

Cr.3. Prerequisite: BA 121

Calculations for Perimeters and areas for some geometric figures. Calculations for total surface area and volumes for the Sphere, Right Circular Cylinder, Cube and Cuboids. Coordinates and Straight lines in the plane: formation of the equation of a straight line, parallel and perpendicular lines, distance between a point and a line, angle between two lines. The circle, the conic section: Parabola, Ellipse and the Hyperbola. Vector Algebra: vector addition, subtraction and equalities, vector length, unit vector. Dot product of two vectors, perpendicular vectors, angle between two vectors. Cross product, unit vector perpendicular to two vectors.

BA 010 – Preparatory Physics

Cr.3. Prerequisite: None

Importance of Physics; The physical quantities; Types of physical quantities; Fundamental quantities; Derived quantities; The fundamental quantities in mechanics; Standards of Length, Mass and Time; Systems of units: The International, the Gaussian and the British system of units; Conversion of units; Dimensions and Dimensional analysis; Vector and Scalar Quantities; Vectors Algebra; Kinematics: The Study of Motion: Position, Velocity, Speed and acceleration; Newton's laws of motion; Acceleration due to gravity; Hooke's law; Equilibrium and center of Gravity; Density and pressure; Heat and temperature: Work, Energy and Power.

Atomic Structure, elements and compounds, chemical bonds and electrochemical reactions, acids and alkalis and pollution and effects of some gases about marine environment.

BA 111N – Physics 1

Cr.3. Prerequisite: BA 010

This Course provide the background knowledge on units, Conversions of units, Mass, weight, force, work, energy and power- Vectors and coordinate systems- Circular motion and rotation- Rotation of a Rigid body about a fixed axis- Moment of inertia, Kinetic energy of a Rigid body- Oscillatory motion, energy of the simple harmonic oscillator- Gravitation, the law of universal gravitation, Newton's inverse Law - Kepler's laws with applications, and the rotation of the earth- Archimedes principle and flotation- Heat, temperature, expansion of solids and liquids- Transmission of heat, change of states, Gas & Vapours.

BA 112N – Physics 2 Waves

Cr.3. Prerequisite: BA 111

Waves: (Introduction and Classification), electromagnetic radiation and the Electrochemical cells. Sound: Harmonic sound waves and Electrochemical cells. Intensity of sound waves and sound level/ Galvanic cell, dry cell battery and electrolytic cell. Sound and spherical sound waves; Standing waves and waves in strings/ Electrochemistry. Doppler Effect and principles of corrosion. Superposition of sound waves and principles of corrosion. Optics: Light waves, Nature and Properties/ Forms of corrosion. Snell's law and its applications/ Protection from corrosion (Coating method). Total internal reflection and the critical angle/ Protection from corrosion (Cathodic protection). Magnetism: Nature and Properties, Classification of material from magnetic point of view/ Basic Chemistry of crude oil. First and second law of magnetism / cargo and safety of marine environment: Electrical principles and DC circuits / Chemistry of crude oil. Work energy and power in an electric circuit / Water Analysis.

BA 101 – Calculus 1

Cr.3. Prerequisite: None

Basic rules of Differentiation – Trigonometric functions and their derivatives – Inverse trigonometric functions and their derivatives – Logarithmic function and its derivative. Logarithmic function and its derivative – Derivatives of hyperbolic and inverse hyperbolic functions – Parametric differentiation, Implicit differentiation – Limits and L'Hospital rule –Partial Differentiation – Taylor's and Maclaurin's expansions – Curve sketching: Critical, maximum, minimum and inflection points – Curve sketching (rational functions) and physical application (velocity and acceleration) – Conic sections: Parabola, Ellipse and Hyperbola.

BA 102 – Calculus 2

Cr.3. Prerequisite: BA 101

Integration by parts – Integration of rational functions – Integration of Trigonometric powers –Integration by trigonometric substitution – Integration of quadratic forms and the Reduction formulas – Areas and Volumes – Length of the curve – Average of a function – Numerical integration – Matrix Algebra – Eigenvalues and Eigenvectors – Cayley – Hamilton theorem.

BA 201– Calculus 3

Cr.3. Prerequisite: BA 102

First order ordinary differential equations (Separable, Homogeneous, Exact, Linear and Bernoulli's equations) – Second order ordinary differential equations with constant coefficients (General solution of homogeneous and Non-homogeneous equations: Method of undetermined coefficients – The Method of variation of parameters) – Second order ordinary differential equations with variable coefficients:[Cauchy- Euler Equation] – Laplace transforms(First Shifting Theorem – Derivatives of Transforms – Transform Integration – Unit Step Function – Second Shifting Theorem – Inverse Laplace Transforms – Applications(Solution of ODEs using Laplace Transforms – Solution of R-L circuit using the Laplace Transforms) – Linear programming.

BA 203 – Probability & Statistics

Cr.3. Prerequisite: BA 102

Descriptive statistics - Sample spaces and events, probability theorems - conditional probability and independence - Total probability and Bayes Theorem. – Discrete probability distribution – Continuous probability distribution – Mathematical Expectation, moments, variance and mean – special discrete distributions : Bernoulli, Binomial, Negative Binomial, Geometric, and Poisson – special continuous distributions: Uniform, exponential and Normal - discrete joint probability distributions: marginal distributions, conditional distributions, covariance , correlation coefficient - Continuous joint probability distributions: marginal distributions, conditional distributions, covariance , correlation coefficient.

BA 304 – Linear Algebra

Cr.3. Prerequisite: BA 101

Matrices: types of matrices, matrix operation and their properties, determinants, inverse matrices, equivalent matrices and the rank, system of linear equations. Vector space: vector spaces and subspaces, linear independence, the span, basis and dimension, ortho-normal basis, Gram-Schmidt process, linear transformation and matrices, eigenvalues and eigenvectors, diagonalization, Diagonalization of symmetric matrices.

AB 127 & EB 127 – Mathematics 1

Cr.3. Prerequisite: None

Straight line, general equation, relations between lines. Graphical representation of straight line, Parabola and hyperbola. Conic sections, parabola and hyperbola. Translation of axes. Determinants, Evaluation of second and third order determinants, solving system of equations using determinants. Matrices, definition, order, types of Matrices operations with matrices, matrix inversion, and solution of system of equations by using matrices. Curve fitting of first and the second order by using the least square method. Linear programming, inequalities, graphical representation of inequalities, graphical solution, applications on linear programming.

AB 128 & EB 128 – Mathematics 2

Cr.3. Prerequisite: AB 127 & EB 127

Definition of derivatives. Rules of Differentiation. Implicit Differentiation. Higher order derivatives. Differentiation of exponential and logarithmic functions. Differentiation applications, Curve sketching. Partial differentiation. Integration Applications of Integration, bounded integration and area under the curve. Mathematics of finance: Simple and compound interest, discount.

ABA110, EBA110 & EBE110 – Mathematics (Logistics)

Cr.3. Prerequisite: None

Coordinates, distance between two points, Straight line, general equation, relations between lines. Graphical representation of straight line, Equation of the circle, Equation of the parabola, Determinants, Evaluation of second and third order determinants, solving system of equations using determinants, Matrices, definition, order, types of Matrices operations with matrices, matrix inversion, solution of system of equations by using matrices, Definition of derivatives. Rules of Differentiation, Integration Applications of Integration, bounded integration and area under the curve, Economical, Logistical and financial applications using Differentiation and Integration. Concepts of simple interest versa compound interest.

BA125 – Mathematics 1 (Fisheries)

Cr.3. Prerequisite: None

Solving system of linear equations, solving quadratic equation: by factorization, by using the formula. Definition of trigonometric, inverse trigonometric functions and some rules of trigonometric functions. Spherical triangle: definition, solving right angle, quadrant, oblique spherical triangle. Basic Rules of differentiation and application. Basic rules of integration and application.

BA126 – Mathematics 1 (Fisheries)

Cr.3. Prerequisite: BA 125

Calculations for Perimeters and areas for some geometric figures. Calculations for total surface area and volumes for the Sphere, Right Circular Cylinder, Cube and Cuboids Coordinates, distance between two points, Straight line, general equation, relations between lines. Graphical representation of straight line, parallel and perpendicular lines, distance between a point and a line, angle between two lines. The circle, the conic section: Parabola, Ellipse and Hyperbola. Vector Algebra: vector addition, subtraction and equalities, vector length, unit vector. Dot product of two vectors, perpendicular vectors, angle between two vectors. Cross product, unit vector perpendicular to two vectors, and Linear programming, inequalities, graphical represintstion of inequalities, graphical solution, applictions on linear programming.

BA115+ –Physics (Fisheries)

Cr.3. Prerequisite: None

Fluid Mechanics - The First Law of Thermodynamics Temperature - Capacitor & Dielectric - Electric Potential - Gauss's law - Electric Field - Wave optics - Magnetic field - Direct current circuit - Current & Resistance.

Chemical and Petrochemical Engineering

The first objective is to present graduates able to Contribute effectively in presenting and/or solving technical problems in their careers to become successful electrical and control engineers.

The second objective is to present graduates able to Cope with technological changes and work in different societies through engaging appropriately in a teamwork ethical environment and as required by the profession

The third objective is to present graduates able to Lead successful professional careers or pursue admission in graduate programs.

The fourth objective is to present graduates able to acquire interpersonal and communication skills to become productive individuals

Chemical and Petrochemical Engineering

An Overview

Chemical engineering is concerned with processes in which matter and energy undergo change. The range of concerns is so broad that the chemical engineering graduate is prepared for a variety of interesting and challenging employment opportunities. The chemical engineer with a strong background in sciences is found in management, design, operations, and research. The chemical engineer is employed in almost all industries, including food, polymers, chemicals, pharmaceuticals, petroleum, medicine, materials, and electronics. Since solutions to energy, environmental, and food problems must surely involve chemical changes, there will be continued demands for chemical engineers in the future.

Chemical engineers work in many different and exciting workplaces – not only in the expected settings of the petrochemicals and mining industries, but also in a wide variety of process- based disciplines, such as the food, paint and pharmaceutical industries.

The Role Of Electrical And Control Engineers

Chemical engineers translate processes developed in the lab into practical applications for the commercial production of products and then work to maintain and improve those processes. They rely on the main foundations of engineering: math, physics, and chemistry (though biology is playing an increasing role). The main role of chemical engineers is to design and troubleshoot processes for the production of chemicals, fuels, foods, pharmaceuticals, and biologicals, just to name a few. They are most often employed by large-scale manufacturing plants to maximize productivity and product quality while minimizing costs.

The Petrochemical and chemical industries, EV automotive, bioproducts, electronics, environmental, medical, and military industries seek the skills of chemical engineers in order to help develop and improve their technical products, such as: Ultra strong fiber, fabrics, and adhesives for vehicles, Biocompatible materials for implants and prosthetics, Films for optoelectronic devices

Chemical engineers work in almost every industry and affect the production of almost every article manufactured on an industrial scale. Some typical tasks include: Ensuring compliance with health, safety, and environmental regulations, conducting research into improved manufacturing processes, Designing and planning equipment layout, Incorporating safety procedures for working with dangerous chemicals, Monitoring and optimizing the performance of production processes and Estimating production costs.

Career Opportunities For Electrical And Control Engineers

Chemical engineers work in many different and exciting workplaces – not only in the expected settings of the petrochemicals and mining industries, but also in a wide variety of process-based disciplines, such as the food, paint and pharmaceutical industries.

Drawing on the problem-solving skills that are central discipline, many CEOs of large companies have combined chemical engineering with a business-related qualification, such as an MBA. Many more work in niche consultancies or run their own businesses. There are also endless opportunities in research and development.

Academic Program Sheet

Year 1			
Semester 1		**Semester 2**	
BA123	Mathematics (1)	BA124	Mathematics (2)
BA119	Organic chemistry I	BA114	Physics II
BA113	Physics I	ME151	Eng. Drawing & Projection
LH131	English I	CC112	Structured Programming
CC111	Introduction to computer	ME273	Material Technology
IM112	Manufacturing Technology	LH132	English II
BA143	Mechanics	BA130	Biochemistry
Year 2			
Semester 3		**Semester 4**	
CH201	Chemical engineering calculations	CH204	Mass Balance
CH202	Organic chemistry II	ME232	Thermodynamics (I)
CH203	Physical chemistry I	CH205	Energy balance
NE323	Social sciences	BA224	Mathematics IV
BA223	Math III	IM514	Polymer, Ceramics and Composite Materials
EE231	Electrical circuits	ME361	Fluid Mechanics
Year 3			
Semester 5		**Semester 6**	
BA328	Math V	CH305	Applied heat transfer
ME431	Heat Transfer	CH306	Electrochemistry and Corrosion
CH310	Chemical Engineering Thermodynamics (II)	CH307	Industrial Wastewater Treatment
CH302	Mechanical Unit Operations	CH308	Mass Transfer
CH303	Physical chemistry II	CH309	Chemical industrial technologies
NE232	Engineering Ethics	CH304	Chemical Engineering Economics

Year 4			
Semester 7		**Semester 8**	
CH401	Separation processes I	EE417	Process Automation and Control I
CH402	Process Modelling and Simulation I	CH405	Chemical Engineering Process Design
CH403	Petrochemical Industries I	CH406	Petrochemical Industries II
EE218	Process Instrumentation and Measurements	CH407	Petroleum Refining
CH404	Kinetics and reactor design	CH408	Gas Processing
CHXXX	Chemical Engineering Elective ---	CHXXX	Chemical Engineering Elective ---
Year 5			
Semester 9		**Semester 10**	
CH501	Separation processes II	CH505	Industrial Pollution and Control
CH502	Chemical Process Control	CH506	Plant and Environmental Safety
CH504	Senior Project I	CH507	Corrosion Protection techniques
CHXXX	Chemical Engineering Elective ---	CH508	Senior Project II
CHXXX	Chemical Engineering Elective ---	CHXXX	Chemical Engineering Elective ---

Department Restricted Electives			
Group 1: Chemical Industries and Petrochemical industries		**Group 2: Gas processing**	
CH511	Engineering Material Selection	CH511	Engineering Material Selection
CH512	Polymeric Material Testing and Characterization	CH514	Chemical Engineering Project Management
CH513	Catalysis in petrochemical industries	CH519	Natural Gas Plant design
CH514	Chemical Engineering Project Management	CH520	Refrigeration Systems
CH516	Fertilizers Production Engineering	CH517	Heat Exchanger Design
CH517	Heat Exchanger Design	CH503	Process Modelling and Simulation II
BA518	Polymer science		
CH503	Process Modelling and Simulation II		
Group 3: Biochemical and Environmental Engineering			
CH514	Chemical Engineering Project Management		
CH511	Energy and Environmental Engineering		
CH522	Renewable Energy		
CH523	Biochemical Engineering		
CH524	Energy Storage and Fuel Cell Engineering		
CH525	Water Management		
CH527	Biofuel Technology		
CH528	Water Desalination		
CH503	Process Modelling and Simulation II		

Graduation Requirements

College Requirements					
A total of 57 credit hours are required by the college as per the following table:					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
Compulsory Courses A total of 57 Cr. Hr. of the following compulsory courses					
BA	1	BA 113	Physics (1)	3	None
	2	BA 114	Physics (2)	3	BA 113
	2	BA 130	Biochemistry	2	None
	1	BA 123	Mathematics (1)	3	None
	2	BA 124	Mathematics (2)	3	BA 123
	3	BA 223	Mathematics (3)	3	BA 124
	4	BA 224	Mathematics (4)	3	BA 223
	5	BA 328	Mathematics (5)	3	BA 224
	1	BA 143	Mechanics	3	None
	1	BA 119	Organic Chemistry (1)	3	None
CC	1	CC 111	Introduction to computer	3	None
	2	CC 112	Structured Programming	3	CC 111
IM	1	IM 112	Manufacturing Technology	2	None
	4	IM 514E	Material Science (2)	3	ME 273
ME	2	ME 151	Eng. Drawing & Projection	2	None
	2	ME 273	Material Technology	2	None
LH	1	LH 131	English I	2	None
	2	LH 132	English II	2	LH 131

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 81 Cr. Hr. of the following compulsory courses					
LH	1	LH 131	English I	2	None
	2	LH 132	English II	2	LH 131
EE	3	EE231	Electrical Circuits	3	BA114
NE	3	NE 323	Social Sciences	3	None
	5	NE 232	Engineering Ethics	3	None

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 108 Cr. Hr. of the following compulsory courses					
BA	7 - 10	BA518	Polymer science	3	CH403, 90 Cr.hr
CH	3	CH 201	Chemical engineering calculations	3	None
	3	CH 202	Organic chemistry II	3	BA 119
	3	CH 203	Physical chemistry I	3	None
	4	CH 204	Mass Balance	3	CH 201
	4	CH 205	Energy balance	3	CH 201
	5	CH 310	Chemical engineering Thermodynamics II	3	ME 232
	5	CH 302	Mechanical Unit Operations	3	ME 361
	5	CH 303	Physical chemistry II	3	CH 203
	6	CH 308	Mass Transfer	3	ME 361
	6	CH 305	Applied heat transfer	3	ME 431
	6	CH 306	Electrochemistry and Corrosion	3	None
	6	CH 307	Industrial Wastewater Treatment	3	None
	6	CH 304	Chemical Engineering Economics	3	None

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 108 Cr. Hr. of the following compulsory courses					
CH	6	CH 309	Chemical industrial technologies	3	CH 204, CH 302
	7	CH 401	Separation processes I	3	CH 308
	7	CH 402	Process Modelling and Simulation I	3	CH 224
	7	CH 403	Petrochemical Industries I	3	CH 202
	7	CH 404	Kinetics and reactor design	3	CH 203
	8	CH 405	Chemical Engineering Process Design	3	CH 401, CH 404
	8	CH 406	Petrochemical Industries II	3	CH 202
	8	CH 407	Petroleum Refining	3	CH 202
	8	CH 408	Gas Processing	3	CH 401
	9	CH 501	Separation processes II	3	CH 308
	9	CH 502	Chemical Process Control	3	CH 204, CH 205
	9	CH 504	Senior Project I	3	CH 405, Elective group, 138 Cr.hr, GPA 2.0
	10	CH 505	Industrial Pollution and Control	3	CH 307
	10	CH 506	Plant and Environmental Safety	3	None
	10	CH 507	Corrosion Protection techniques	3	CH 306
	10	CH 508	Senior Project II	6	CH 504
ME	4	ME 232	Thermodynamics (I)	3	BA 114
	4	ME 431	Heat Transfer	3	BA 113
	4	ME 361	Fluid Mechanics	3	BA114
EE	7	EE 218	Process Instrumentation and Measurements	3	EE231
	8	EE 417	Process Automation and Control I	3	EE 218, BA 223

The restricted elective courses are listed in the table below; where, selection of courses from the three main course groups is as follows:

- Group (1): Chemical Industries and Petrochemical industries
- Group (2): Gas processing
- Group (3): Biochemical and Environmental Engineering

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Department Restricted Electives At least Five courses from the following list of the college electives					
Group 1	7 - 10	CH511	Engineering Material Selection	3	IM514E, 90 Cr.hr
	7 - 10	CH512	Polymeric Material Testing and Characterization	3	CH406, 90 Cr.hr
	7 - 10	CH513	Catalysis in petrochemical industries	3	CH406, 90 Cr.hr
	7 - 10	CH514	Chemical Engineering Project Management	3	CH304, 90 Cr.hr
	7 - 10	CH516	Fertilizers Production Engineering	3	CH406, 90 Cr.hr
	7 - 10	CH517	Heat Exchanger Design	3	CH305, 90 Cr.hr
	7 - 10	CH 503	Process Modelling and Simulation II	3	CH 402, 90 Cr.hr
Group 2	7 - 10	CH511	Engineering Material Selection	3	IM231, 90 Cr.hr
	7 - 10	CH514	Chemical Engineering Project Management	3	CH304, 90 Cr.hr
	7 - 10	CH519	Natural Gas Plant design	3	CH408, 90 Cr.hr
	7 - 10	CH520	Refrigeration Systems	3	CH310, 90 Cr.hr
	7 - 10	CH517	Heat Exchanger Design	3	CH305, 90 Cr.hr
	7 - 10	CH 503	Process Modelling and Simulation II	3	CH 402, 90 Cr.hr

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Department Restricted Electives At least Five courses from the following list of the college electives					
Group 3	7 - 10	CH514	Chemical Engineering Project Management	3	CH304, 90 Cr.hr
	7 - 10	CH521	Energy and Environmental Engineering	3	90 Cr.hr
	7 - 10	CH522	Renewable Energy	3	90 Cr.hr
	7 - 10	CH523	Biochemical Engineering	3	BA130, 90 Cr.hr
	7 - 10	CH524	Energy Storage and Fuel Cell Engineering	3	CH306, 90 Cr.hr
	7 - 10	CH525	Water Management	3	CH307, 90 Cr.hr
	7 - 10	CH527	Biofuel Technology	3	BA130, 90 Cr.hr
	7 - 10	CH528	Water Desalination	3	CH501, 90 Cr.hr
	7 - 10	CH 503	Process Modelling and Simulation II	3	CH 402, 90 Cr.hr

Course Description

CH 500 – Practical Training

Cr.0. Prerequisite: None.

This course is a non-credit course and is a college graduation requirement. Students are asked to undertake a minimum of four weeks of practical training in off-campus sites recommended by the college and the department in order to pass this course. Students are required to submit a recognition letter from the site where they received their training; in addition, a report and a presentation are submitted. Course is a Pass/Fail course.

CH 504 – Senior Project I

Cr.3. Prerequisite: Senior Standing – Elective group – Completion of 138 Credit Hours and a GPA of at least 2.00.

Application-oriented project to show competence in major academic area. Where, the research project is conducted under the guidance of a faculty member in the Department of Chemical and Petrochemicals Engineering. The research should contribute to the advancement of knowledge in the field and related to the elective group chosen by the student. Written report and formal presentation are required.

CH 508 – Senior Project II

Cr.6. Prerequisite: CH 504.

Application-oriented project to show competence in major academic area. Where, the research project is conducted under the guidance of a faculty member in the Department of Chemical and Petrochemicals Engineering. The research should contribute to the advancement of knowledge in the field and related to the elective group chosen by the student. Written report and formal presentation are required.

CH 201 – Chemical Engineering Calculations

Cr.3. Prerequisite: None.

The course introduces engineering calculations, the use of common process variables, and conservation and accounting of extensive properties - mass, energy, charge, linear momentum - as a common framework for engineering analysis and modeling. Applications of conservation of mass and energy in analysis of chemical engineering processes will be addressed including recycle, bypass and multi-stream processes. There will be an introduction to equipment, flowcharts, techniques and methodologies used by practicing chemical engineers. The use of computer software, especially spreadsheets, will be integrated into the course.

CH 203 – Physical Chemistry I

Cr.3. Prerequisite: None.

The course aims at Acquiring knowledge of the order of chemical reaction, first, second and third order reactions, occurring in one step and multi steps, the rate determining step, parallel, consecutive, chain reversible reactions. Determination of the order of chemical reactions. Theories illustrating the reasons of increasing the rate of chemical reaction with temperature. Arrhenius equation, simple collision, the activated complex theories. Using mathematical modeling to determine the mechanism of chemical reactions. Catalysis; homogenous, heterogenous, contact and carrier catalysis.

CH 202 – Organic Chemistry II

Cr.3. Prerequisite: BA119.

The course deals with the study of the chemistry of carbon compounds and their properties, structures and reactions for example: Benzene derivatives, aromaticity and aromatic compounds are introduced and the chemical reactions of this class of compounds are discussed. Reactions of alcohols, ethers, epoxides, amines, aldehydes, ketones, and carboxylic acid and its derivatives are discussed in detail, along with key mechanisms. Providing the important organic compounds and to impart knowledge on synthetic routes to many types of industrially important organic compounds and their characterization.

CH 204 – Mass Balance

Cr.3. Prerequisite: CH 201.

Familiarizing the students with the following topics: Processes system and its variables, mass, volume, flow rates, chemical composition, pressure, temperature, fundamentals of material balance (batch and continuous), single and multiple unit calculations; recycle, bypass and purge calculations; balances on reactive systems, single phase systems and multiple systems.

CH 308 – Mass Transfer

Cr.3. Prerequisite: ME 361.

The course describes the Mass transfer principles: diffusion in gases, liquids, solids, membranes and between the phases. Mass transfer processes accompanied with chemical reactions, mass transfer by convection, simultaneous mass and heat transfer, analogy between momentum, heat and mass transfer.

CH 302 – Mechanical Unit Operations

Cr.3. Prerequisite: ME 361.

The course describes the Flow of fluids past particles: flow of fluids through granular beds, filtration, and centrifugation. Operations involving relative motion between fluid and particles: Sedimentation, fluidization, conveying, gas cleaning. Size reduction of solids: power requirements, classification of solid particles. Mixing and agitation: mixing of solids and pastes. Equipment used in all the aforementioned mechanical operations.

CH 303 – Physical Chemistry II

Cr.3. Prerequisite: CH 203.

The course describes additional concepts on Kinetics, including reaction mechanism, chain reactions, polymerization reactions and collision theory. Phase transitions, vapor pressure, solutions, interfaces, surface tension, wetting, absorption, surfactants, Gibbs adsorption isotherm, micelles, adsorption at gas/solid interface, heterogeneous catalysis, insoluble monolayers.

CH 304 – Chemical Engineering Economics

Cr.3. Prerequisite: None.

This course presents the economic principles as applied in chemical engineering by providing the basic concepts of economics for the students of chemical engineering which will enable them to understand the economic feasibility of chemical engineering processes and design.

CH 305 – Applied Heat Transfer

Cr.3. Prerequisite: ME 431.

This course deals with the heat exchanger sizing, specification, or operation: Types and applications of heat exchangers - Fundamentals of heat exchanger performance - Heat exchanger selection criteria - Single-phase applications - Boiling applications - Condensing applications - Operational problems – Troubleshooting during operation.

CH 306 – Electrochemistry and Corrosion

Cr.3. Prerequisite: None.

This course provides Basic concepts of Corrosion: mechanism of chemical, electrochemical corrosion – Pilling Bed worth rule – Types of Electrochemical corrosion - galvanic corrosion - differential aeration corrosion - pitting corrosion - stress corrosion – Measurement of corrosion (wt. loss method only) - factors influencing corrosion - basic concepts of electrochemistry and fundamentals of electroanalytical chemistry -Introduction and Overview of Electrode Processes - Basic Concepts of Electrochemistry - Fundamentals of Electrode Kinetics - Electroanalytical Techniques - Controlled-Potential Technique - Controlled-Current Technique - Industrial Electrochemical Processes.

CH 307 – Industrial Wastewater Treatment

Cr.3. Prerequisite: None.

The course provides an appreciation of industrial and domestic wastewater discharge regulation, industrial wastewater quality monitoring and measurements (BOD, COD, TDS, …etc.), septic tanks, preliminary treatment, oil separation from wastewater, physical treatment (settling, filtration, coagulation, ……), chemical treatment (ions exchange, RO, electrochemical process, biological treatment, aerobic digesters, solid and residuals management.

CH 205 – Energy Balance

Cr.3. Prerequisite: CH 201.

This course deals with the fundamentals of energy balance, forms of energy, the first law of thermodynamics, closed and open systems, thermodynamics table, energy balance for non-reactive systems, pressure and temperature change, phase change operations, psychrometric charts, mixing operations, energy balance for reactive systems, heat of reactions, heat of formation, heat of combustion, fuels and combustion.

CH 309 – Chemical industrial technologies

Cr.3. Prerequisite: CH 204, CH 302.

This course discusses the structure of the industry and the historical development and evolution of the technologies which have shaped them and the common flowsheet elements which have proven to be commercially successful. Examples such as production of acids, Caustic soda, industrial gases, cement production which are drawn from a range of industry sectors, production scales, chemistries, and enabling technologies. The industry is examined considering factors which have most influenced its development including raw materials of choice, energy availability, and the development of new unit operations, as well as those which will influence its future course including advances in science and technology, environmental impact minimization, water availability, and sustainability concerns.

CH 310 – Chemical Engineering Thermodynamics (II)

Cr.3. Prerequisite: ME232

Familiarizing the students with the following topics: Thermodynamics Second law - Carnot's Principle - Carnot Cycle - Diagrams of Ideal and Real Processes - Power Plant Components - Heat Rejection - Typical Steam Cycle - Causes of Inefficiency - Boyle's and Charles' Laws - Otto Cycle - Diesel Cycle – Dual Cycle – Heat pumps – Refrigeration systems – Heat of Formation – Heat of reaction.

CH 401 – Separation Processes I

Cr.3. Prerequisite: CH 308.

course explains: Different techniques used in the separation process: Different methods of expressing the separation processes, Distillation towers: design of distillation towers, Fundamentals of Multistage Separation, Binary Distillation: Principles, Binary Distillation: Applications, Multi-Component Separation: Conventional Distillation, Liquid-Liquid Extraction, Packed Columns.

CH 402 – Petroleum Refining

Cr.3. Prerequisite: CH 202.

This course explains thermal cracking, catalytic cracking and multicomponent distillation operations involved with petroleum refining industries, in addition to storage and transportation of petroleum products. Instructional objectives will be taught as Petroleum refining and thermal cracking processes - Catalytic cracking and catalytic reforming processes - Petroleum compounds treatment methods - Production of fuels such as aviation gasoline, motor fuel, kerosene, jet fuel - Storage and transportation of petroleum products.

CH 403 – Petrochemical Industries I

Cr.3. Prerequisite: CH 202.

This course presents: Petrochemical industries: raw materials, natural gas: sources, classification, treatment methods, petroleum composition: petroleum distillation products used in petrochemical industries, thermal cracking, catalytic cracking, petrochemical industries processes: types of reactors used in the petrochemical industries, Methane, ammonia, urea, olefins production, liquid and gaseous materials, ethylene production, Fischer Trop reaction.

CH 404 – Kinetics and Reactor Design

Cr.3. Prerequisite: CH 203.

This course provides an appreciation of the principles of kinetics of chemical reactions: rate equation, temperature effects, activation energy, and entropy and, theories that clarify the effect of temperature on reaction rate. Engineering principles of reactor design: design of batch reactors, continuous tubular reactors and continuous stirred tank reactors to carry on homogenous and heterogeneous chemical reactions, catalytic reactors. Isothermal and adiabatic reactions, concentration and flow rate effect on residence time, recycle and its effect on reactor volume.

CH 405 – Chemical Engineering Process Design

Cr.3. Prerequisite: CH 401, CH 404.

It provides an adequate knowledge of Process design development, the design approach, feasibility, flow diagram, preliminary design, general design considerations (plant locations, plant layout, etc.), scale up, fluid transfer in pipes, storage of raw materials, intermediate compounds and products.

CH 406 – Petrochemical Industries II

Cr.3. Prerequisite: CH 202.

This course presents: Aromatics compounds production, Reactions and Chemicals of Benzene, Reactions and Chemicals of Toluene, Chemicals from Xylenes, Aromatics petrochemicals industries, Introduction to polymer chemistry: polymers from petroleum derivatives, Synthetic Petroleum-Based Polymers, Synthetic Rubber, Synthetic detergents, Synthetic fibers.

CH 407 – Process Modelling and Simulation I

Cr.3. Prerequisite: BA 224.

It provides an adequate knowledge of modeling in chemical engineering process system and also familiarize the numerical simulation of model equations by understanding the terms involved in conservation of mass momentum and energy equations, providing training to develop models for CSTR's, batch reactors, distillation columns and providing training to solve the model equations using numerical techniques.

CH 408 – Gas Processing

Cr.3. Prerequisite: CH 401.

This course deals with the Introduction to natural gas, composition, classification, treatment processes, gas vapor equilibrium, distillation, hydrates, their effects and control, vapor and gases removal, gaseous treatment, gaseous acids injection, sulfur recovery and nitrogen removal, liquid hydrocarbon recovery.

CH 501 – Separation Processes II

Cr.3. Prerequisite: CH 308.

This course explains the mass transfer operations of distillation, leaching, extraction, adsorption and membrane separation processes. By familiarizing the students on: Distillation operation - The methods of designing distillation columns - Leaching and extraction processes - Adsorption& crystallization operations - Processes such as membrane separation, electro-dialysis, thermal & sweep diffusion, ion-exchange.

CH 502 – Chemical Process Control

Cr.3. Prerequisite: CH 204, CH 205.

This course provides depth of knowledge and experience necessary to apply the technology and techniques required for the development of automation, instrumentation and control systems. professional automation, instrumentation and control systems have become essential in the chemical and process industries over the years. Today, it is inconceivable that anybody would contemplate building a new plant or designing a new process without installing comprehensive instrumentation and control systems.

CH 503 – Process Modelling and Simulation II

Cr.3. Prerequisite: CH 402, 90 Cr.hr.

Introduces the methods and techniques of model building skills and the use of the SIMULINK package for dynamic modelling.Topics covered are - purposes, uses & benefits of system modelling: model development; empirical and first principles models, steady state and dynamic models, time domain solutions, model validation: modelling techniques; lumped parameter models, absolute & deviation variables, linearization: models of process systems; hydrodynamic, multistage, reacting, multivariable, distributed parameter, discrete event: transfer function models; block diagram representation, modelling of control loop elements, integration of process & control models: simulation; continuous system simulation, selection of numerical integration routines, discrete event simulation, functional testing.

CH 505 – Industrial Pollution and Control

Cr.3. Prerequisite: CH 307.

Definition of pollutant, types of pollution; Air, Water, Land, noise- adverse effects of pollutants eco system and human health - need for effluent treatment and toxicity, control. Water standards for portable, agricultural and left-off streams- air standards for cities, industrial areas, resorts.

CH 506 – Plant Environmental Safety

Cr.3. Prerequisite: None.

The course describes the Development of Industrial Health and Safety, Safety Organization – Polices-Culture -Planning-Promotion – Inspection –Rules-Responsibility – Supervision, Safety Committee – role of safety functionaries, Elements of work place Safety Program, Economic and Social Benefits from Safety Program- Effective Safety Education and Training.

CH 507 – Corrosion Protection Techniques

Cr.3. Prerequisite: CH 306.

The course describes the Cathodic protection - sacrificial anodic method – corrosion inhibitors. Protective coatings: surface preparation for metallic coatings - electroplating (copper plating) and electroless plating (Nickel plating) – chemical conversion coatings - anodizing, phosphating & chromate coating.

CH 511 – Engineering Material Selection

Cr.3. Prerequisite: 90 Credit Hours, IM 514E.

Design considerations in the use of materials are: quality control; selecting materials to optimize multiple properties; materials failure; long-term materials properties; materials behavior under extreme; conditions; corrosion; discussion of design and materials selection strategy; processing and process selection strategy; process economics; life-cycle thinking and eco-design; special topics.

CH 512 – Polymeric Material Testing and Characterization

Cr.3. Prerequisite: 90 Credit Hours, CH 406.

To present the flow behavior of polymer melts, polymer solutions, and two-phase polymer systems and to relate these observations to the material microstructure such as: Stress, Strain Rate and Material Functions - Instruments for Shear Rheology - Shear Behavior of Polymeric Fluids - Linear viscoelasticity - Extensional Flow - Constitutive Equations - Suspensions - Emulsions - Foams - Granular Powders.

CH 513 – Catalysis in petrochemical industries

Cr.3. Prerequisite: 90 Credit Hours, CH 406.

The course presents: Overview of catalytic reactors with their application in the petroleum and petrochemical industry, basic characteristics, Reaction mechanisms and the reaction kinetics modelling. The classification and selection of reactor models. The description of reactor models, boundary conditions, estimation and/or calculation of key model parameters (effective diffusion coefficient, efficiency characteristics, interphase and interphase transfer mass and heat transfer coefficients, etc.), model validation. Catalytic hydrotreatment (HDS, HDN, HDO, HDA, HDM, HDAs), types of catalysts, modelling. Catalytic reforming, Fluid catalytic cracking.

CH 514 – Chemical Engineering Project Management

Cr.3. Prerequisite: 90 Credit Hours, CH 304.

Describe and understand project management and the technical and soft skills needed by a project manager to successfully manage a typical chemical engineering plant investment project. Although focus will be given in chemical plant projects, the approach will be generic. The primary objective is for the students to understand what is needed to successfully manage a chemical plant project from conceptualization to commissioning.

CH 516 – Fertilizers production Engineering

Cr.3. Prerequisite: 90 Credit Hours, CH 406.

The course focuses on: Chemical fertilizers and organic manures - types of chemical fertilizers. Nitrogenous fertilizers - methods of production of ammonia and urea - Nitrogen sources - nitric acid, ammonium sulphate, ammonium sulphate nitrate, ammonium nitrate. Ammonium chloride - their methods of production, characteristics, and storage and handling specifications - Phosphatic fertilizers - raw materials, phosphate rock, Sulphur pyrites, process to produce Sulphuric and phosphoric acids, ground phosphate rock, bone, single super phosphate. Triple super phosphate - methods of production, characteristics and specifications. Potassic fertilizers, potassium chloride, potassium sulphate - methods of production, specification, characteristics, complex fertilizers, NPK fertilizers. Mono-ammonium phosphate, di-ammonium phosphate, nitro phosphate - methods of production.

CH 517 –Heat Exchanger Design

Cr.3. Prerequisite: 90 Credit Hours, CH 305.

This course aims the students to solve complex heat transfer problem as is typical for a chemical engineer. They will be able identify and understand the various mechanisms of heat transfer that characterize a given system, formulate and build up mathematical model, apply analytical and numerical methods to solve problems. Combine thermodynamics and fluid mechanics principles to analyze heat convection processes. Use computer technology, methods and languages to write programs to solve complex heat transfer models.

CH 519 –Natural Gas Plant Design

Cr.3. Prerequisite: 90 Credit Hours, CH 408.

This course describes the latest and the advanced principles of natural gas production and processing including properties of natural gases, vapour-liquid equilibrium and separation techniques.

CH 520 – Refrigeration Systems

Cr.3. Prerequisite: 90 Credit Hours, CH 310.

The course is designed to give knowledge of various refrigeration systems, properties of refrigerants and its behavior under various conditions and it ensures that the students should be able to: Acquire an overview of various common refrigeration systems - Estimate the refrigeration load & design the system components - Able to understand simple refrigeration system - Develop the skills to analyze the multi pressure refrigeration systems.

CH 521 – Energy and Environment Engineering

Cr.3. Prerequisite: 90 Credit Hours.

This course discusses the major challenge to society and to future chemical engineers is how to produce and use energy in ways that are sustainable, economical and environmentally friendly.

CH 522 – Renewable Energy

Cr.3. Prerequisite: BA130, 90 Credit Hours.

The course is designed to give knowledge of various renewable energy sources, systems and applications in the present context and need and after learning the subject, student will be able to understand: Importance of RE sources - Applications of different RE sources - Carry our preliminary economic analysis of RE systems.

CH 523 – Biochemical Engineering

Cr.3. Prerequisite: 90 Credit Hours, BA130.

Students will learn the fundamentals of bioprocess and biotechnology that use enzymes and microorganisms for the production of biofuel, food, pharmaceutical and other health-care biological.

CH 524 – Energy Storage and Fuel Cell Engineering

Cr.3. Prerequisite: 90 Credit Hours, CH 306.

The objective of the course is to give the students a solid foundation upon which they will be able to use the modern electrochemistry, fuel cell, battery and supercapacitor technologies into their research and career.

CH 525 – Water Management

Cr.3. Prerequisite: 90 Credit Hours, CH 307.

This course introduces students to source water challenges and issues. Students study how ground and surface source waters and their catchment areas can face threats and vulnerabilities that impact water safety and sustainability. Students learn to characterize source waters, delineate protection areas, and identify water quality and quantity hazards and vulnerabilities. Using this data, students develop risk assessments and response plans to mitigate hazards through water system design, operations, and watershed management.

CH 527 – Biofuel technology

Cr.3. Prerequisite: 90 Credit Hours, BA130.

Fundamental concepts in understanding biofuels/bioenergy systems; renewable feedstocks, their production, availability and attributes for biofuel/bioenergy production; types of biomass derived fuels and energy; thermochemical conversion of biomass to heat, power and fuel; biochemical conversion of biomass to fuel; environmental aspects of biofuel production; economics and life- cycle analysis of biofuel; value adding of biofuel residues; case studies on biofuel production.

CH 528 – Water Desalination

Cr.3. Prerequisite: 90 Credit Hours, CH 405.

The course provides theoretical and practical aspects of seawater/brackish water desalination technologies. The main topics include basic concepts of water chemistry; detailed evaluation and technology description of thermal-based (MSF, MED, VC) and membrane-based (RO, NF, ED/EDR) desalination processes; conventional and innovative intake and pretreatment systems (including MF, UF); process design and system performance; fouling, scaling (including bio-fouling) and cleaning; product water quality and post-treatment. Other related topics such as innovative desalination technologies (Forward Osmosis (FO), Membrane Distillation (MD), Adsorption Desalination (AD); energy consumption; environmental impact; economics; hybrid systems; desalination using renewable energy; trends of desalination market; full scale plants and case studies, will also be covered in this course depending on time availability.

Construction and Building Engineering

The Construction and Building engineering program at the AASTMT provides the necessary technical skills that are consistent with the accreditation standards and national needs in many fields. Such fields are mathematics, basic sciences, engineering science, engineering design, humanities and social sciences. Moreover, the program provides critical learning for a broad foundation in structures, environmental engineering, geotechnical, materials, water resources, construction management, construction engineering, and transportation. Considerable emphasis is placed on group-based, open-ended design projects to provide students with the necessary skills needed for creative teamwork and to prepare them professionally for diverse employment opportunities. Preparation for professional practice and graduate studies is accomplished through careful selection of professional and technical electives. Students are motivated to keep abreast of current technical developments, improve communication skills, use computer tools, be aware of project constraints, and maintain high standards of ethics and professionalism. The construction and building engineering program provides an environment conductive to learning that stimulates both students and faculty.

The vision of the Construction and Building Engineering Department is to provide students and the construction industry with the highest level of technical preparation, professional development and leadership skills for successful careers in construction engineering and provides a high-quality education based on a well-balanced curriculum.

Graduates of the Construction and Building Engineering degree program design and manage construction processes that create living and working environments such as office buildings, industrial buildings, airports, housing, roads, bridges, utilities, water resources and coastal engineering projects. Graduates fill positions in construction companies, engineering consulting firms, government agencies, and large construction corporations. The positions usually involve the planning, design, and management of the construction process, or the coordination, inspection, and management of design, contracts, or facilities for a business, industry or government owner.

When you ask top managers in construction and engineering firms why they selected this career, you can hear the excitement of the construction industry in their responses. Some say they like to conceive an idea and then engineer and manage it through to reality. Others say that they like the combination of computerized planning, process design, cost engineering, and scheduling with the gratification of seeing a job well done.

Graduates of this degree program enjoy a wide range of opportunities to apply their technical knowledge with tremendous variety in the day-to-day work. Some choose design, planning, or financial management positions working in an office environment, while others prefer to direct field operations.

Following are some of the job opportunities that can be pursued by the program graduates:

- Field engineer: implements and coordinates engineered construction processes.
- Design engineer: develop conceptual and detailed designs for many construction projects such as office buildings, industrial buildings, airports, housing, roads, bridges, hydraulic structures, coastal structures, utilities, and dams.
- Surveying engineer: perform surveying activities for all types of construction projects
- Cost Estimator: develops itemized costs and budgets for design and construction based upon knowledge and pre-design of operations, materials, and resources requirements.
- Scheduling engineer: designs and monitors the plan for timing and sequence of construction operations.
- Quality control engineer: ensures that the items of the construction project conform to specifications and standards.
- Projects controls engineer: reviews the cost and time performance of the project during construction.
- Contract administrator: reviews the project's contracts and reviews.
- Project engineer: designs all or part of the project construction process, coordinates construction engineering to accomplish the overall objectives of

the facility design team.

- Project manager: oversees all aspects of a project, coordinates subcontractors, and provides primary contact to the client as well as to the company›s leaders.
- Chief engineer, designer, estimator, project controls, contract administration, and project manager: oversees operations in designated areas related to multiple projects.
- Division head or vice president, president, chief executive officer: manages overall company operations.

The main aim of the department is to prepare individuals for a professional career in construction engineering and management and for life-long learning by providing graduates with the necessary technical skills, personal skills and knowledge in construction and building engineering.

Graduates of the Construction and Building Engineering department are expected to be able to:

- Utilize underpinning mathematics, science and engineering fundamentals to address and solve construction related problems.
- Apply analytical, experimental, design and management techniques with proficiency aided by modern tools.
- Understand global, ethical, and social implications of the profession regarding public safety and sustainability issues.
- Acquire and utilize personal, communication, and leadership skills and be able to work collaboratively in a multidisciplinary team.
- Pursue distinguished employment as well as lifelong learning.

Academic Program Sheet

Year 1			
Semester 1		**Semester 2**	
BA 113	Physics 1	BA 114	Physics 2
BA 123	Mathematics 1	BA 118	Chemistry
BA 141	Engineering Mechanics 1	BA 124	Mathematics 2
CC 111	Introduction to computer	BA 142	Engineering Mechanics 2
IM 111	Industrial Relations	CC 114	Introduction to Programming
LH 131	English for Special Purposes 1	IM 112	Manufacturing Technology
ME 151	Eng. Drawing & Descriptive Geometry	LH 132	English for Special Purposes 2
Year 2			
Semester 3		**Semester 4**	
CB 221	Construction Engineering Drawings	BA 224	Mathematics 4
CB 241	Structural Analysis 1	EE 218	Measurements & Instrumentation
CB 251	Testing of Materials	CB 242	Strength of Materials
EE 238	Electrical Engineering Fundamentals	CB 271	Construction Surveying 1
BA 223	Mathematics 3	CB 281	Hydraulics for Civil Engineers
LH 231	Technical Report Writing	NE XXX	Non Engineering Elective 1
Year 3			
Semester 5		**Semester 6**	
BA 329	Probability & Statistics	CB 311	Introduction to Construction Management
CB 382	Water Resources Engineering	CB 354	Design of Reinforced Concrete Structures 1
CB 343	Structural Analysis 2	CB 362	Soil Mechanics
CB 352	Construction Materials	CB 313	Quality Control in Construction
CB 361	Engineering Geology	CB 312	System Analysis for Construction Engineers
CB 326	Building Information Modelling (BIM)	CB 322	Building Construction

Year 4			
Semester 7		**Semester 8**	
CB 472	Transportation and Traffic Engineering	CB 431	Technical Installations in Buildings
CB 455	Design of Reinforced Concrete Structures 2	CB 463	Design and Construction of Earth Structures & Foundation
CB 483	Irrigation & Drainage	CB 474	Highway Design and Construction
AR 411	Architectural Design & Urban Landscape	CB 444	Design of Metallic Structures
CC 413	Numerical Analysis	CB 415	Quantity Surveying, Cost Estimating & Specifications
NE XXX	Non Engineering Elective 2	CB 485	Design & Construction of Coastal Structures
		IM 400 CB	Practical Training

Year 5			
Semester 9		**Semester 10**	
CB 514	Construction Contracts and Law	CB 524	Methods & Equipment for Construction 2
CB 523	Methods & Equipment for Construction 1	CB 533	Environmental Control & Energy in Buildings
CB 516	Construction Project Management 1	CB 519	Construction Project Management 2
CB 532	Environmental & Sanitary Engineering	CB 503	Project 2
CB 501	Project 1	CB 5XX	Department Elective Course 2
CB 5XX	Department Elective Course 1		

College Electives			
Non-Engineering Elective 1		**Non-Engineering Elective 2**	
NE 266	Creativity and Innovation	NE 465	Aesthetics Edu. & Art Appreciation
NE 264	Scientific Thinking	IM 531	Human Resource Management
IM 539	International Business Management	NE 466	Environmental Science and Technology

Department Restricted Electives			
CB 545	Structural Dynamics	CB 546	Special topics in Steel & Composite Structures
CB 556	Concrete Technology	CB 558	Special topics in Reinforced Concrete Structures
CB 573	Construction Surveying 2	CB 575	Special Topics in Transportation Engineering
CB 584	Special Topics in Hydraulic and Coastal Structures	CB 525	Special Topics in Construction Engineering
CB 518	Financial Management and Accounting in Const.	CB 534	Special Topics in Environmental Engineering
CB 564	Special Topics in Geotechnical Engineering	CB 557	Inspection, Maintenance and Repair of Structures
CB 576	Special Topics in Railway Engineering		

Graduation Requirements

College Requirements					
A total of 60 credit hours are required by the college as per the following table:					
Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 54 Cr. Hr. of the following compulsory courses					
BA	1	BA 113	Physics (1)	3	None
	2	BA 114	Physics (2)	3	BA 113
	2	BA 118	Chemistry	2	None
	1	BA 123	Mathematics (1)	3	None
	2	BA 124	Mathematics (2)	3	BA 123
	3	BA 223	Mathematics (3)	3	BA 124
	4	BA 224	Mathematics (4)	3	BA 223
	5	BA 329	Probability & Statistics	3	BA 224
	1	BA 141	Engineering Mechanics (1)	3	None
	2	BA 142	Engineering Mechanics (2)	3	BA 141
CC	1	CC 111	Introduction to Computer	3	None
	2	CC 114	Introduction to Programming	3	CC 111
	7	CC 413	Numerical Analysis	3	CC114 & BA 224
IM	1	IM 111	Industrial Relations	2	None
	2	IM 112	Manufacturing Technology	2	None
	8	IM 400 CB	Practical Training	0	None

College Requirements					
A total of 60 credit hours are required by the college as per the following table:					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
Compulsory Courses A total of 54 Cr. Hr. of the following compulsory courses					
ME	1	ME 151	Eng. Drawing and Descriptive Geometry	2	None
LH	1	LH 131	English for Special Purposes (1)	2	None
	2	LH 132	English for Special Purposes (2)	2	LH 131
	3	LH 231	Technical Report Writing	3	LH 132
EE	3	EE 238	Electrical Engineering Fundamentals	3	BA 124
	4	EE 218	Measurements & Instrumentation	3	EE 238

College Electives					
At least six credit hours (6 cr. hr.) from the following list of the college electives					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
Compulsory Courses A total of 54 Cr. Hr. of the following compulsory courses					
NE	4	NE 264	Scientific Thinking	3	None
	4	NE 266	Creativity and innovation	3	None
	7	NE 466	Environmental Science and Technology	3	None
	7	NE 465	Aesthetic Education and Art Appreciation	3	None
IM	4	IM 539	International Business Management	3	126 Cr. Hr.
	7	IM 531	Human Resource Management	3	126 Cr. Hr.

Department Requirements

A total of 120 credit hours are required by the department, which are distributed as follows:

- 114 credit hours of compulsory courses.
- A minimum of 6 credit hours of department electives

The required compulsory and restricted elective courses are listed in the following table.

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 114 Cr. Hr. of the following compulsory courses					
CB	6	CB 311	Introduction to Construction Management	3	BA 224
	6	CB 312	Systems Analysis for Construction Engineers	3	BA 329
	6	CB 313	Quality Control in Construction	3	BA 329
	9	CB 514	Construction Contracts and Law	3	CB 311 & CB 415
	8	CB 415	Quantity Surveying, Cost Estimating & Specifications	3	CB 322 & CB 354
	9	CB 516	Construction Project Management 1	3	CB 311 & CB 322
	10	CB 519	Construction Project Management 2	3	CB 415 & CB 516
	3	CB 221	Construction Engineering Drawings	3	ME 151
	6	CB 322	Building Construction	3	CB 326
	5	CB 326	Building Information Modelling (BIM)	3	CB 221
	9	CB 523	Methods & Equipment for Construction 1	3	CB 322
	10	CB 524	Methods & Equipment for Construction 2	3	CB 523
	8	CB 431	Technical Installations in Buildings	3	CB 322
	9	CB 532	Environmental & Sanitary Engineering	3	CB 382
	10	CB 533	Environmental Control & Energy in Buildings	3	CB 431
	3	CB 241	Structural Analysis 1	3	BA 141

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 114 Cr. Hr. of the following compulsory courses					
CB	4	CB 242	Strength of Materials	3	CB 241 & CB 251
	5	CB 343	Structural Analysis 2	3	CB 242
	8	CB 444	Design of Metallic Structures	3	CB 343 & 326
	3	CB 251	Testing of Materials	3	None
	5	CB 352	Construction Materials	3	CB 251
	6	CB 354	Design of Reinforced Concrete Structures 1	3	CB 343
	7	CB 455	Design of Reinforced Concrete Structures 2	3	CB 354 & CB 326
	5	CB 361	Engineering Geology	3	None
	6	CB 362	Soil Mechanics	3	CB 361
	8	CB 463	Design & Const. of Earth Structures & Foundation	3	CB 362 & CB 354
	4	CB 271	Construction Surveying 1	3	BA 124
	7	CB 472	Transportation and Traffic Engineering	3	CB 271
	8	CB 474	Highway Design and Construction	3	CB 472
	4	CB 281	Hydraulics for Civil Engineers	3	BA 114
	5	CB 382	Water Resources Engineering	3	CB 281
	7	CB 483	Irrigation & Drainage	3	CB 382
	8	CB 485	Design & Construction of Coastal Structures	3	CB 281
	9	CB 501	Project 1	3	138 Cr. Hrs.
AR	7	AR 411	Architectural Design & Urban Landscape	3	CB 326
IM	8	IM 400 CB	Practical Training	0	None

Department Restricted Electives					
At least two courses (6 Cr. Hr.) from the following list of the college electives					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
CB	9 – 10	CB 518	Financial Management & Accounting in Const.	3	CB 516
	9 – 10	CB 525	Special Topics in Construction Engineering	3	CB 523
	9 – 10	CB 534	Special Topics in Environmental Engineering	3	CB 532
	9 – 10	CB 545	Structural Dynamics	3	CB 343
	9 – 10	CB 557	Inspection, Maintenance. & Repair of Structures	3	CB 444 or CB 455
	9 – 10	CB 546	Special topics in Steel & Composite structures	3	CB 444
	9 – 10	CB 556	Concrete Technology	3	CB 352
	9 – 10	CB 558	Special Topics in Reinforced Concrete Structures	3	CB 455
	9 – 10	CB 564	Special Topics in Geotechnical Engineering	3	CB 463
	9 – 10	CB 573	Construction Surveying 2	3	CB 271
	9 - 10	CB 575	Special Topics in Transportation Engineering	3	CB 474
	9 – 10	CB 576	Special Topics in Railway Engineering	3	CB 472
	9 – 10	CB 584	Special Topics in Hydraulic & Coastal Structures	3	CB 483

Course Summary Description

CB 221 – Construction Engineering Drawings

Cr.3. Prerequisite: ME 151

Introduction to construction engineering as related to the overall types of Engineering projects - A brief review of the construction industry; site layout, erection of steel and concrete structures - Drawings to demonstrate the concepts of various types of civil engineering and construction projects which include: residential and industrial buildings, water resources projects, urban transportation systems, coastal development projects, and environmental protection projects - Design and construction drawings which include architectural systems, structural systems, mechanical and electrical installation. Field strips and analysis of local construction projects.

CB 241 - Structural Analysis 1

Cr.3. Prerequisites: BA141

Definition of a structure, its support conditions and its various structural forms in addition to various loading conditions that a structure must support. Study the stability and determinacy of structures. Calculation of reaction forces. Basic concepts of structural analysis. Calculation of the internal forces (normal forces, shear forces and bending moments) and its distribution on statically determinate beams, frames and arches. Member forces in trusses. Influence lines and its use to calculate the maximum response functions in structures.

CB 242 - Strength of Materials

Cr.3. Prerequisites: CB 241 & CB 251

Properties of Areas-Normal stresses - Axial stress, thermal stress and bending stresses. Shear stresses: Direct shear stress - Transverse loading and torsional stresses, Principal stresses and strains - Elastic deflection of beams - Buckling of columns.

CB 251 - Testing of Materials

Cr.3. Prerequisites: None

Codes and Specifications - Classification of Engineering Materials - The Architecture of Solids - Mechanical Properties of Engineering Materials - Testing materials machinery - Axial static tension: stress- strain relationship - Static compression: test - static bending - static torsion - mechanical properties and testing - Hardness of metals - Dislocations and Strengthening Mechanism in Metals – Fracture - impact testing – Fatigue - Creep.

CB 271 - Construction Surveying 1

Cr.3. Prerequisites: BA 124

Standards - Unit calibration - Measurement of distance - Linear surveying technique - Bearing calculation and measurement - Compass Traversing - Rectangular coordinates calculation -Application of practical surveying problems - Measurement of horizontal and vertical angles -Theodolite Traversing - Profile levelling - Contouring - Computation of earthwork - Layout of construction engineering projects.

CB 281 - Hydraulics for Civil Engineers

Cr.3. Prerequisites: BA 114

Properties of fluids and flow continuum – hydrostatics - hydrodynamic applications - flow kinematic properties and forces - flow conservation equations - continuity equation - momentum principle - energy equations - flow measurements - flow in closed/open conduits - flow in pipeline systems - pipes in series - pipes in parallel - pipeline network and pump stations - features of hydraulic analyses for the design of civil engineering projects in rivers - lakes and coastal zone.

CB 311 –Introduction to Construction Management

Cr.3. Prerequisites: BA224

The nature of the construction industry - participants of the construction project - management functions - organizational structures - time value of money and interest - cash flow diagram and equivalence - measures of worth, comparison of alternatives - feasibility studies - application of economic analysis principles to the construction industry.

CB 312 - Systems Analysis for Construction Engineers

Cr.3. Prerequisites: BA 329

A comprehensive introduction to probability, as a language and set of tools for understanding statistics, science, risk, and randomness. Basics: sample spaces and events, conditional probability, and Bayes Theorem. Univariate distributions: density functions, expectation and variance, Normal, Binomial, Negative Binomial, Poisson, exponential distributions. Bivariate distributions.

CB 326 – Building Information Modelling

Cr.3. Prerequisites: CB 221

Introduction to Building Information Modelling (BIM) and its applications in construction. Starting and developing of a BIM. Creating basic building and structural components. Viewing and presenting the model. Detailing, drafting and clash detection. Massing studies. Creating documentation standards. Creating Bill of Quantities (BOQ) and schedules. Templates and file management. Project collaboration and work-sharing. Working with families.

CB 322 - Building Construction

Cr.3. Prerequisites: CB 326

The course covers topics in the area of building construction in view of both aspects; construction engineering and architectural engineering. The subjects related to the architectural engineering are architectural engineering drawings, brick works, insulation, stairs, building openings, services and finishing materials. The subjects related to construction engineering are site and temporary works, substructure, and superstructure. The course also applies Building Information Modeling (BIM) to building construction.

CB 343 - Structural Analysis 2

Cr.3. Prerequisites: CB 242

Introduction to statically indeterminate structures - Methods of structural analysis of statically indeterminate structures - Method of consistent deformations - Method of three-moment equation for continuous beams - Virtual work method - Slope-deflection method - Moment distribution method -Stiffness method - Computer validations.

CB 352 - Construction Materials

Cr.3. Prerequisites: CB 251

Terminology and basic geology of construction materials Physical properties (Weight , Volume relationship, Sieve Analysis, Graduation curves, and Classification) - Engineering properties - Strength and deformation characteristics - Aggregates in Construction - Hydraulic Cements - Properties of Cement Paste - Portland cement concrete (Basic ingredients, basic constituent, Proportioning of concrete mixtures) - Concrete Strength and behaviour - Concrete Durability -Admixtures in Concrete – Masonry - Asphalt concrete (proportions, Mix procedures and Engineering properties).

CB 354 - Design of Reinforced Concrete Structures 1

Cr.3. Prerequisites: CB 343

Introduction and material properties - Elastic Method - Analysis and design of beams considering flexure - Limit slate Design Method - Analysis and Design of beams considering flexure and shear -Development length and anchorage - Design of one- way at two-way solid slabs - Analysis and design of short columns.

CB 361 - Engineering Geology

Cr.3. Prerequisites: None

Earth composition. Major types of rocks and deposits. Clay minerals. Weathering conditions. Principles of structural geology. Subsurface exploration: techniques and tests. Influence of geological origin on composition and structure of soils. Index properties. Soil description and engineering classification. Permeability and capillarity.

CB 382 - Water Resources Engineering

Cr.3. Prerequisites: CB 281

Watershed hydrology and hydraulic measurements - Principles of hydrologic modelling for surface water - Introduction to ground water engineering - Design of erodible and non-erodible channels open channels - Flow characterization of lakes & reservoirs and its design engineering - Design and construction aspects of water resources structures - Dams and ancillary water supply structures -Flood-damage mitigation and storm water control structures - Planning of water resources projects and introduction to water resources management - Field visits to water resources projects and laboratory facilities.

CB 313 - Quality Control in Construction

Cr.3. Prerequisites: BA 329

Introduction to quality - Quality improvement techniques - Control charts for variables - In addition, the evaluation of strength test results of concrete, variation and analysis is presented - Quality assurance -Quality systems - ISO 9000 series - Total quality management.

CB 514 - Construction Contracts and Law

Cr.3. Prerequisites: CB311& CB415

Principles and basics of construction contracting, Types of construction contracts, selection of construction contracts, contracts documents, and project delivery systems, introduction to building and construction law, Legal aspects associated with construction projects, claims and change orders, Alternative Dispute Resolution.

CB 415 - Quantity Surveying, Cost Estimating and Specifications

Cr.3. Prerequisites: CB 322& CB 354

Quantity surveying. Introduction to cost estimating in construction. Direct and indirect costs. Markups and profits. Construction bidding. Computer applications to quantity surveying and cost estimating. Construction specification writing, types and uses.

CB 516 – Construction Project Management 1

Cr.3. Prerequisites: CB 311& CB322

Network Diagramming Methods. Advanced activity relationships. Bar Charts and Calendars. Work Breakdown Structures (WBS). Activity duration estimation. Project scheduling process. Resource management techniques: resource loading; resource planning & control; resource levelling; and resource allocation. Project cash flow analysis and improvement. Project progress measurement and schedule updating. Project control and Earned Value Analysis. Types of construction schedules and practical scheduling issues.

CB 444 - Design of Metallic Structures

Cr.3. Prerequisites: CB 343 & CB 326

Introduction to metallic structures - Structural proprieties and allowable stresses of steels - Fields of applications of steels – Loads - Planning & Bracing of steel structures - Design of axially loaded tension and compression steel members - Design of steel beams and beam-columns - Design of steelwork connections - Steel frames - Steel bridges - Construction of steel structures and BIM and computer application in steel construction/detailing.

CB 455 - Design of Reinforced Concrete Structures 2

Cr.3. Prerequisites: CB 354 & CB 326

Analysis and design of sections subjected to torsion, design of stairs, design of eccentric sections, Analysis and design of slender columns, design of frames, design of flat slabs and hollow blocks, Design of water tanks, Applications of BIM in Reinforced Concrete structures, and Introduction to pre-stressed concrete.

CB 362 - Soil Mechanics

Cr.3. Prerequisites: CB 361

Seepage - Effective stress - Vertical stresses - Consolidation and settlement - Shear strength - Slope stability - Lateral earth pressure - Compaction - Bearing capacity. Experimental determination of soil properties - Grain size distribution - Atterberg limits -Density and Compaction – Permeability - Shear strength – Consolidation - Bearing Capacity - In Situ Testing and Sampling. Soil report writing.

CB 463 - Design and Construction of Earth Structures and Foundations

Cr.3. Prerequisites: CB 362& CB354

Types of foundation and selection criteria - Design of shallow and deep foundations - Construction and practical considerations - Pile-load test - Retaining structures - Sheet-pile walls - Diaphragm walls.

CB 472 – Transportation and Traffic Engineering

Cr.3. Prerequisites: CB 271

Transportation systems - Individual vehicle motion - Transportation networks - Vehicle flow - Time – Space diagrams - Fundamental flow relationships - Transportation planning - Trip generation -Trip distribution - Modal choice - Network assignments - Network equilibrium - Classification of Highways - Geometric design - Horizontal alignment - Vertical alignment - intersections – interchanges – structural design of highway.

CB 483 - Irrigation and Drainage

Cr.3. Prerequisites: CB 382

Application of the hydraulic & hydrologic principles to the design and construction of irrigation and drainage systems - Crop water requirements and hydrologic determination of the design flow - traditional and modern irrigation methods and systems - Types of drainage systems - hydraulics of surface drainage-ground water interface - Irrigation and drainage system design and structures.

CB 519 – Construction Project Management 2

Cr.3. Prerequisites: CB 516 & CB 415

Feasibility studies and economic evaluation of public projects. Value Engineering. Building Information Modelling (BIM). Probabilistic Scheduling (Pert). Cost-Time relation and schedule compression. Line of Balance. Delay Analysis Methods. Health & safety management systems. Risk Management. Sustainable construction. Advanced topics in construction project management

CB 518 - Financial Management and Accounting in Construction

Cr.3. Prerequisites: CB 516

Principles of financial management and accounting - Financial statements' compilation and analysis -projecting cash flow - project financing – budgeting - cost control - introduction to cost accounting and risk-return relationship.

CB 523 - Methods and Equipment for Construction 1

Cr.3. Prerequisites: CB 322

Design and construction of formwork systems - horizontal formwork - vertical formwork - Concrete technology - mixing and batching concrete - transporting concrete - placing and compacting concrete. Design and construction of dewatering systems - open sumps system – well points system - deep wells system - Design and construction of shoring systems - continuous piles system - secant piles system - diaphragm walls system – Cranes: derrick cranes - mobile cranes - tower cranes.

CB 524 - Methods and Equipment for Construction 2

Cr.3. Prerequisites: CB 523

Engineering fundamentals of moving earth - Tractors and related equipment – tractors – bulldozers - clearing land - ripping rock – Scrapers - Excavating equipment – draglines – clamshells - hydraulic excavators – loaders - trenching machines - Trucks and wagons - Belt conveyor systems -Piles and pile-driving equipment - The production of crushed stone aggregate.

CB 525 - Special Topics in Construction Engineering

Cr.3. Prerequisites: CB 523

Construction of multi-story buildings - Shoring and reshoring operations - Assessment of formwork removal times - Advanced formwork systems - Slip form technique - Lift slab system - Tilt-up construction - Up-down construction technique - Precast concrete technology - Bridge construction systems -Cast-in-place system - cantilever carriage method - flying shuttering - Tunnel construction - Compressed air - Blasting rock.

CB 431 - Technical Installations in Buildings

Cr.3. Prerequisites: CB 322

Thermal Comfort, Heating, Ventilation & Air Conditioning (HVAC), Central heating & cooling systems, Distribution Media, Delivery devices, Heat and Moisture transfer in buildings, Lighting, On-site power generation, Normal electrical systems, Special systems, Water supply & Drainage systems, Types of fixtures, Private sewerage systems, Fire protection systems, Architectural acoustics. Computer applications in Mechanical, Electrical, and Plumbing (MEP) works including Building Information Modelling.

CB 532 - Environmental & Sanitary Engineering

Cr.3. Prerequisites: CB 382

Sources of pollution- water quality management, waste-water treatment, industrial wastes, types and disposal, solid waste management, collection and disposal, hazardous wastes.

CB 533 - Environmental Control and Energy in Buildings

Cr.3. Prerequisites: CB 431

Energy expenditure in construction stages - Comparison of building material on a production energy basis - Energy demands of a building - Renewable energy and Sustainable development - Thermal load of building spaces - Effect of building envelop - Energy conscious building design - Description of some methods of energy conservation & waste-energy recovery - Alternative building demands -Environmental safety & public health considerations.

CB 534 - Special Topics in Environmental Engineering

Cr.3. Prerequisites: CB 532

Ecological perspective, water cycle, ecosystems, environmental regulation and legislation - Origin of environmental impact assessment - Sources of pollution - Air pollution and indoor air quality - Water quality management - Industrial wastes - Solid waste management, collection and disposal - Marine pollution -Noise pollution - Traffic noise prediction - Contribution of civil engineer in environmental control.

CB 545 - Structural Dynamics

Cr.3. Prerequisites: CB 343

Structural vibrations - Earthquake response of structures - Design criteria for seismic resistant structures - Seismic response of tall buildings - Response spectra.

CB 546 - Special Topics in Steel and Composite Structures

Cr.3. Prerequisites: CB 444

Design load for steel bridges according to the Egyptian code requirements - Design of steel structural elements of bridges - Construction methods for steel bridges - Design of composite structural elements, columns beams and beam- columns - Design of and Constructions of structural elements made of cold-formed steel sections.

CB 556 - Concrete Technology

Cr.3. Prerequisites: CB 352

Concrete workability and consistency - Concrete manufacturing -Mixing, transporting and casting of concrete - Properties of hardened concrete - Compacting and curing of concrete - Expansion joints -Concrete admixtures - Concrete durability - Design of concrete mixtures - Evaluation of concrete strength - Ready mix concrete - Hot weather concrete curing.

CB 557 - Inspection, Maintenance, and Repair of structures

Cr.3. Prerequisites: CB 444 or CB 455

Overview of maintenance - Causes and agents of deterioration - Diagnosis and investigation techniques - Diagnosis and investigation techniques - Foundations repair, concrete defects - Repair of concrete structure - Site visit for a repair project -Other materials investigation and repair.

CB 558 - Special Topics in Reinforced Concrete Structures

Cr.3. Prerequisites: CB 455

The design of concrete structures for special tasks - These structures include bridges, halls, and storage structures - The design of contemporary R.C. bridges is achieved through learning the theory and basics behind restressed concrete and the design of pre-stressed bridges - In addition, the design of halls in buildings or factories is applied through the design of saw-tooth (north light) structures, shell roof structures, and arched frame structures - Moreover, the design of special structures for storage such as elevated circular tanks, ground tanks, and silos are covered in the course.

CB 564 - Special Topics in Geotechnical Engineering

Cr.3. Prerequisites: CB 463

Foundations on problematic soils - Ground modification - Soil Improvement - Mat foundation - Unsaturated soil; stress, shear strength, water flow – Geo-environmental fundamentals - Fate and transport of contaminants in the subsurface - Treatment and disposal methods of waste - Land disposal - Site remediation and subsurface characterization - Containment.

CB 573 - Construction Surveying 2

Cr.3. Prerequisites: CB 271

Types of traverses, closed, open, link, traverse nets and application - Theodolite application, automatic laser level - Longitudinal and grid levelling precise levelling - Mass diagram and hard distance, total stating and application - Setting out construction projects - Geographic information system - Global positioning system - Construction surveying software.

CB 474 - Highway Design and Construction

Cr.3. Prerequisites: CB 472

Highway classification & process of location selections - Horizontal Alignment and details of geometric design - Vertical alignment and details of geometric design - Principles of traffic flow -Highway level of service (LOS) - Capacity of highway segments , multi-lane and two lanes - At grade intersection , types - Channelization - Intersection Control and traffic Signal Design - Interchanges, types, principles of design examples - Soil engineering for highway design - Bituminous Material - traffic load transformation , Equivalent Single Axle load Concept (ESAL) - Design of flexible Pavements , AASHTO method of design , BCBR method of design - Highway construction - Highway Maintenance.

CB 575 - Special Topics in Transportation Engineering

Cr.3. Prerequisites: CB 474

Airport classification & site selection - Wind data analysis - Airport Configuration and main components - Determination of runway basic length & corrections - Aircraft characteristics components of airport system - Overall airport site; Classifications of Airport supporting soil - Design of Airport flexible pavements - Design of Airport Rigid Pavements - Airport lighting - Aircraft refuelling, electrical power, navigation marking - Airport safe surfaces - Airport Air traffic, Control System - Instrument landing System - Railway engineering - Railway system - Railway alignment, track elements, Cross section, Platform, length, switching, signalling - Transportation Management System - Transportation Software.

CB 576 - Special Topics in Railway Engineering

Cr.3. Prerequisites: CB 472

Railway dynamics , Tractive effort and resistances , Acceleration and braking ; Railway Alignment , Longitudinal and cross sections ,Vertical and horizontal curve design ; Structural design of track , Jointed and welded rail design , Sleeper and ballast design ;Turnouts and switches , Switch , Crossover , Diamond crossing , Scissor crossover , slip , Double junction ; Stations and yards , Passenger and freight stations , Locomotive and stabling yard , Sorting and marshalling yards ; Signalling ; Train traffic management , Automatic block system (ABS) , Centralized traffic control (CTC) , Automatic control system (ATC) ; Railway capacity ; Railway cost , Price and subsidy ; Railway renewal and maintenance management.

CB 584 - Special Topics in Hydraulic & Coastal Structures

Cr.3. Prerequisites: CB 483

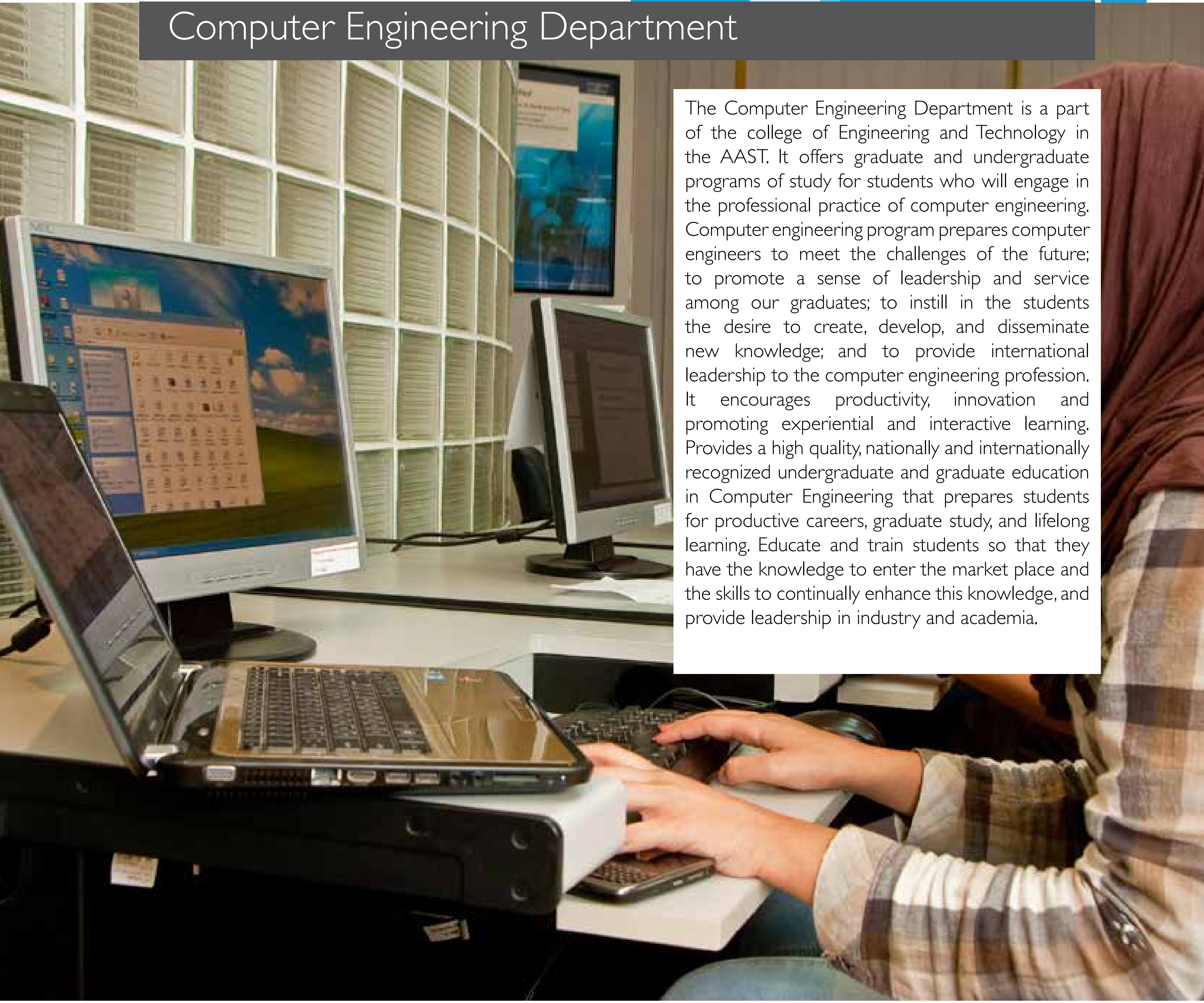
Overview of environmental design parameters related to ambient water, soil and air -Design criteria and construction aspects of major river and estuary structures which include lined open channel, river training, bridge piers, flow control structures, submerged tunnel and storm surge barriers - Design criteria and construction methods of some selected coastal structures are presented which embrace pile-supported structures, bulkheads & quay walls, breakwaters and submarine pipelines.

CB 485 - Design and Construction of Coastal Structures

Cr.3. Prerequisites: CB 281

Ocean environment; wind, tides, wave mechanics - Coastal processes; surf-zone dynamics & coastal sediment transport - Wave & current forces on coastal structures - Port planning and technology - Functional design of coastal structures - Construction aspects of major coastal structures - breakwaters, seawalls, docking facilities, ocean outfalls and submarine pipelines - Field visits to local coastal protection projects

Computer Engineering Department



The Computer Engineering Department is a part of the college of Engineering and Technology in the AAST. It offers graduate and undergraduate programs of study for students who will engage in the professional practice of computer engineering. Computer engineering program prepares computer engineers to meet the challenges of the future; to promote a sense of leadership and service among our graduates; to instill in the students the desire to create, develop, and disseminate new knowledge; and to provide international leadership to the computer engineering profession. It encourages productivity, innovation and promoting experiential and interactive learning. Provides a high quality, nationally and internationally recognized undergraduate and graduate education in Computer Engineering that prepares students for productive careers, graduate study, and lifelong learning. Educate and train students so that they have the knowledge to enter the market place and the skills to continually enhance this knowledge, and provide leadership in industry and academia.

In this specialization, the student will learn to:

- Write compter programs and software packages for varios applications.
- Design web-based systems and web programming
- Design digital systems.
- Design Mobile applications
- Design Robotic systems
- Design special and general-prpose processors.
- Design commnications' protocols for the Internet.
- Design systems for data acqisition.
- Design Microcontroller-based applications.
- Design Embedded systems and smart platforms

The responsibilities of the gradate of the Compter Engineering program encompass:

- Specifying the most sitable compter eqipment for certain fnctions.
- Designing and implementation of software packages for varios compter and inter-network applications.
- Designing and implementing Web-based systems for different applications.
- Designing and implementation Mobile Applications for varios mobile platforms
- Working in the area of embedded systems
- Designing and implementing database and information systems in market place applications
- Offering opinion and consltation in the field, spervising compter installations and operations, planning their sites and environment.
- Working in the area of networking, data commnication and secrity systems.
- Designing and implementing special prpose processors and interface cards.
- Ability to design and condct experiments, as well as to analyze and interpret data.
- Ability to design a system, component, or process to meet desired needs within realistic constraints sch as economic, environmental, social, political, ethical, health and safety, manfactrability, and sstainability.
- Ability to fnction on mltidisciplinary teams
- Understanding of professional and ethical responsibility.
- Ability to commnicate effectively the broad edcation necessary to nderstand the impact of engineering soltions in a global, economic, environmental, and societal context.
- Recognition of the need for, and an ability to engage in lifelong learning.
- Ability to se the techniqes, skills, and modern engineering tools necessary for engineering practice.
- Clearly defined career objectives, and be able to market themselves via an effective, professional resme and behavior-based interview techniqes.

The outcome of the Computer Engineering program for undergraduates includes:

- Prepare students to become computer engineers that implements latest technologies in the field.
- Equipping the department's graduates with the capabilities of developing advanced software and hardware systems.
- Qualify graduates to be responsible for the maintenance and performance boosting of existing systems.
- Prepare students to Enter high technology workforce, and make significant contributions to Computer Engineering through the research, design and development of a wide range of embedded systems and system-on-chip applications.
- Qualify students to function effectively as a team member and/or leader in multidisciplinary and multicultural environments.
- Practice computer engineering using the highest standards of ethical and professional responsibility.
- Prepare students to understand professional and ethical responsibilities.
- Pursue lifelong learning through such activities as professional training and membership in professional societies and to be able to adapt to new engineering tools
- Demonstrate technical competence in the principles and practice of computer engineering.
- Demonstrate peer- recognized expertise together with the ability to articulate that expertise and use it for contemporary problem solving in the analysis, design, and evaluation of computer and software systems, including system integration and implementation.
- Demonstrate engagement in the engineering profession, locally and globally, by contributing to the ethical, competent, and creative practice of engineering or other professional careers.
- Demonstrate sustained learning and adapting to a constantly changing field through graduate work, professional development, and self study.
- Demonstrate a commitment to teamwork while working with others of diverse interdisciplinary backgrounds.
- Demonstrate leadership and initiative to ethically advance professional and organizational goals, facilitate the achievements of others, and obtain substantive results.

The department's graduates can find jobs in various fields of applications

Hardware-oriented applications

- Design and Implementation of Interface/control cards
- Special-purpose processor design and implementation using FPGA and ASIC
- Realization of embedded systems used in control applications
- Robotic systems
- Data Acquisition Systems
- Computer-based digital control
- Computer-based security systems

Software-based applications

- Analysis, design and implementation of Web-based Applications
- Smart electronic systems
- Analysis, design and implementation of Data Base systems
- Intelligent Systems analysis and design
- Applications of Artificial Neural Networks
- Analysis and design of Local Area Networks
- Internet-based applications and web programming
- Micro-controller programming
- Digital signal processing and biomedical applications
- Data Security

Networking-oriented applications

- Data communication and Internet protocols
- Wired and wireless communication
- Advanced network applications
- Network Security

Academic Program Sheet

Year 1			
Semester 1		**Semester 2**	
BA 113	Physics 1	BA 114	Physics 2
BA 123	Mathematics 1	BA 118	Chemistry
BA 141	Engineering Mechanics 1	BA 124	Mathematics 2
CC 111	Introduction to computers	BA 142	Engineering Mechanics 2
IM 111	Industrial Relations	CC 112	Structured Programming
LH 131	English for Special Purposes 1	IM 112	Manufacturing Technology
ME151	Eng. Drawing & Descriptive Geometry	LH 132	English for Special Purposes 2
Year 2			
Semester 3		**Semester 4**	
BA 223	Mathematics III	BA 224	Mathematics IV
CC 212	Applied Programming	CC 215	Data Structure
CC 218	Discrete Mathematics	CC 216	Digital Logic Design
EE 231	Electrical Circuits I	EC 218	Measurements & Instrumentations
LH 231	Technical Report Writing	EC 238	Electronics I
NE XXX	1 College elective course	EE 232	Electrical Circuits II
Year 3			
Semester 5		**Semester 6**	
BA 323	Mathematics V	BA 326	Mathematics VI
CC 317	Digital Systems Design	CC 311	Computer Architecture
CC 319	Advanced Programming	CC 316	Object-Oriented Programming
EE 328	Electrical Power & Machines	CC 331	Data and Computer Communications
EC 339	Electronics II	CC 341	Digital Electronics
EC 320	Communications Theory	NE 364	Engineering Economy

Year 4			
Semester 7		**Semester 8**	
CC 410	Systems Programming	CC 415	Data Acquisition Systems
CC 419	Numerical Methods	CC 416	Computer Graphics
CC 414	Database Systems	CC 418	Operating Systems
CC 421	Microprocessors Systems	CC XXX	Department Restricted Elective
CC XXX	Department Restricted Elective	CC 431	Computer Networks
EE 418	Automatic Control Systems	IM 400	Practical Training
		IM 423	Operations Research

Year 5			
Semester 9		**Semester 10**	
CC 501	Project I	CC 502	Project II
CC 511	Artificial Intelligence	CC 513	Computing Systems
CC 531	Advanced Networks	CC XXX	Department Restricted Elective
CC XXX	Department Restricted Elective	CC XXX	Department Restricted Elective
CC XXX	Department Restricted Elective	IM 535	International Operations Mgt.
NE XXX	1 College elective course		

College Electives	
NE 264	Scientific Thinking
NE 465	Creative Awareness
NE 466	Environmental Science and Technology

Department Restricted Electives			
CC 412	Computing Algorithms	CC 525	Intelligent Robotics
CC 417	Assembly Language	CC 527	Computer Aided Design
CC 420	Optimization and Data Analytics	CC 528	Computer Systems Performance Analysis
CC 447	Multimedia and Virtual Reality	CC 529	Distributed and parallel systems
CC510	Embedded Systems Design	CC 532	Cloud Computing
CC 514	Intro. to Big Data Management	CC 535	Internetwork Security
CC 515	Intro. to Software Engineering	CC 536	Cyber Security
CC 516	Image Processing & Pattern Recognition	CC 537	Computer Forensics
CC 517	Modelling & Simulation	CC 539	Selected Topics in Networks
CC 518	Data Security	CC 540	Computer Systems Engineering
CC 519	Introduction to Data Mining	CC 550	Selected Topics in Computing
CC 521	Microcomputer Based Design	CC 552	Web Engineering
CC 523	Computer Design & Performance Evaluation	CC 553	Mobile Applications
CC 524	Neural Networks		

Graduation Requirements

College Requirements					
A total of 66 credit hours are required by the college as per the following table:					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
Compulsory Courses A total of 23 Courses (60 Cr. Hr.) of the following compulsory courses					
BA	1	BA113	Physics (1)	3	None
	2	BA114	Physics (2)	3	BA 113
	2	BA118	Chemistry	2	None
	1	BA123	Mathematics (1)	3	None
	2	BA124	Mathematics (2)	3	BA 123
	1	BA141	Engineering Mechanics (1)	3	None
	2	BA142	Engineering Mechanics (2)	3	BA 141
	3	BA223	Mathematics (3)	3	BA 124
	4	BA224	Mathematics (4)	3	BA 223
	5	BA323	Mathematics (5)	3	BA224
	6	BA326	Mathematics (6)	3	BA224
CC	1	CC111	Introduction to Computers	3	None
	2	CC112	Structured Programming	3	CC 111
IM	1	IM111	Industrial Relations	2	None
	2	IM112	Manufacturing Technology	2	None
	8	IM400	Practical Training	0	90 Cr. Hr.
	8	IM423	Operations Research	3	90 Cr. Hr.
	10	IM535	International Operations Management	3	126 Cr. Hr.

College Requirements					
A total of 66 credit hours are required by the college as per the following table:					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
Compulsory Courses A total of 23 Courses (60 Cr. Hr.) of the following compulsory courses					
LH	1	LH131	English (1)	2	None
	2	LH132	English (2)	2	LH 131
	3	LH231	English (3)	3	LH 132
ME	1	ME151	Eng. Drawing and Descriptive Geometry	2	None
NE	6	NE 364	Engineering Economy	3	54 Cr. Hr.

College Non Engineering Electives					
Two courses (6 Cr. Hr.) from the following list of the college electives					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
NE	3	NE 264	Scientific Thinking	3	None
	3	NE 465	Creative Awareness	3	None
	3	NE 466	Environmental Science and Technology	3	None

Department Requirements

A total of 114 credit hours are required by the department, which are distributed as follows:

- 96 credit hours of compulsory courses.
- A minimum of 18 credit hours of department restricted electives.

The required compulsory and restricted elective courses are listed in the following table.

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 31 Courses (96 Cr. Hr.) of the following compulsory courses					
CC	3	CC212	Applied programming	3	CC 112
	3	CC218	Discrete mathematics	3	CC 111
	4	CC215	Data Structure	3	CC 213
	4	CC216	Digital Logic Design	3	CC 111
	5	CC317	Digital Systems Design	3	CC 216
	5	CC319	Advanced Programming	3	CC 215
	6	CC311	Computer Architecture	3	CC 317
	6	CC316	Object-Oriented Programming	3	CC 319
	6	CC341	Digital Electronics	3	EC 238
	6	CC331	Data and Computer Communications	3	EC 320
	7	CC410	Systems Programming	3	CC 319
	7	CC421	Microprocessors Systems	3	CC 311
	7	CC419	Numerical Methods	3	CC 112, BA 323
	7	CC414	Database Systems	3	CC 319
	8	CC415	Data Acquisition System	3	CC 421
	8	CC416	Computer Graphics	3	CC 319
	8	CC418	Operating Systems	3	CC 410
	8	CC431	Computer Networks	3	CC 331

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 31 Courses (96 Cr. Hr.) of the following compulsory courses					
CC	9	CC501	Project I	3	GPA 2.0 and Cr.Hrs 138, S. S.*
	9	CC511	Artificial Intelligence	3	CC 218, CC 319
	9	CC531	Advanced Networks	3	CC 431
	10	CC502	Project II	6	Project I
	10	CC513	Computing Systems	3	CC 418, CC 421
EC	4	EC238	Electronics I	3	EE 231
	4	EC218	Measurements & Instrumentation	3	EE 231
	5	EC320	Communications Theory	3	BA 224, EE 231
	5	EC339	Electronics II	3	EC 238
EE	3	EE231	Electrical Circuits I	3	BA124
	4	EE232	Electrical Circuits II	3	EE 231
	5	EE328	Electrical Power & Machines	3	EE 232
	7	EE418	Automatic Control Systems	3	EE328 or EE218

Department Restricted Electives

6 courses (18 Cr. Hr.) from the following list of the college electives

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
CC	7 – 10	CC 412	Computing Algorithms	3	CC 319
	7 – 10	CC 417	Assembly Language	3	CC 421
	7 – 10	CC 420	Optimization and Data Analytics	3	CC419
	7 – 10	CC 447	Multimedia and Virtual Reality	3	CC319
	7 – 10	CC 510	Embedded Systems Design	3	CC421, CC418
	7 – 10	CC 514	Intro. to Big Data Management	3	CC414, CC418
	7 – 10	CC 515	Introduction to Software Engineering	3	CC 319, CC414
	7 – 10	CC 516	Image Processing & Pattern Recognition	3	CC 416, CC326
	7 – 10	CC 517	Modelling & Simulation	3	CC 319, BA 326
	7 – 10	CC 518	Data Security	3	CC 319
	7 – 10	CC 519	Introduction to Data Mining	3	BA326 , CC511
	7 – 10	CC 521	Microcomputer Based Design	3	CC 415
	7 – 10	CC 523	Computer Design and Performance Eval.	3	CC311
	7 – 10	CC 524	Neural Networks	3	BA 323, CC112
	7 – 10	CC 525	Intelligent Robotics	3	CC 319, EE 418
	7 – 10	CC 527	Computer Aided Design	3	CC 311 , CC 341
	7 – 10	CC 528	Computer Systems Performance Analysis	3	Senior Standing (Cr. Hrs. 138)
	7 – 10	CC 529	Distributed and parallel systems	3	CC418, CC 431
	7 – 10	CC 532	Cloud Computing	3	CC431, CC414
	7 – 10	CC 535	Internetwork Security	3	CC 431
	7 – 10	CC 536	Cyber Security	3	CC431 & CC418

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
CC	7 – 10	CC 537	Computer Forensics	3	Cr. Hrs. 138
	7 – 10	CC 539	Selected Topics in Networks	3	CC 531
	7 – 10	CC 540	Computer Systems Engineering	3	Cr. Hrs. 138
	7 – 10	CC 550	Selected topics in Computing	3	Cr. Hrs. 138
	7 – 10	CC552	Web Engineering	3	CC212
	7 – 10	CC553	Mobile Applications	3	CC414, CC316

Course Description

CC 111 – Introduction to Computers

Cr.3. Prerequisite: None

This course provides an introduction to computers and computing .Topics of interest include the impact of computers on society, ethical issues, and hardware /software applications, including internet applications, system unit, storage and input/output devices, numbering systems, system and application software, presentation skills, program development, programming languages, and flow charts, Visual Basic, web page design using HTML, and communications and networks

CC 112 – Structured Programming

Cr.3. Prerequisite: CC 111

An introduction to C-language Programming is provided in this course, Variable/Constant definitions, Basic Programmes, Sequential Programming, Conditional Programming, Looping and repetitions, Functions, Arrays.

CC 114– Introduction to programming

Cr.3. Prerequisite: CC 111

Introduction to Programming and Problem Solving-Variables- Memory Concepts-Assignment Statements-Arithmetic Operations-Logical Operations-Conditional Statements-Selection Control Structures-Multiple-Selection Statement-Loops-One-Dimensional Arrays-Two-Dimensional Arrays-Control events in windows applications-Functions and Procedures

CC 212 – Applied Programming

Cr.3. Prerequisite: CC 112

An advanced C-language Programming is provided in this course: two dimensional arrays, strings, pointers, recursion, structures, bitwise-operators, input-output interfacing, graphics, mouse interfacing as well as text and binary files are covered in details. Projects are required from students to increase their skills in C programming.

CC 213 – Programming Applications

Cr.3. Prerequisite: CC 112

An advanced C-language Programming is provided in this course: two dimensional arrays, strings, structures, bitwise-operators as well as text and binary files are covered in details.

CC 215 – Data Structures

Cr.3. Prerequisite: CC 212

Difference between static data type and dynamic data types - the concept of pointers & dynamic memory allocation - programming practice using dynamic structures.

CC 216 – Digital Logic Design

Cr.3. Prerequisite: CC 111

The course introduce the concepts of number systems - binary arithmetic and codes - logic gates - Boolean algebra and logic simplifications - Design and realization of combinational circuits - Functions of combinational circuits logic- Sequential Logic (Flip-Flops, latches, synchronous /Asynchronous counter designs) . Finally, design analysis and realization of counters and shift registers are covered.

CC 218 – Discrete Mathematics

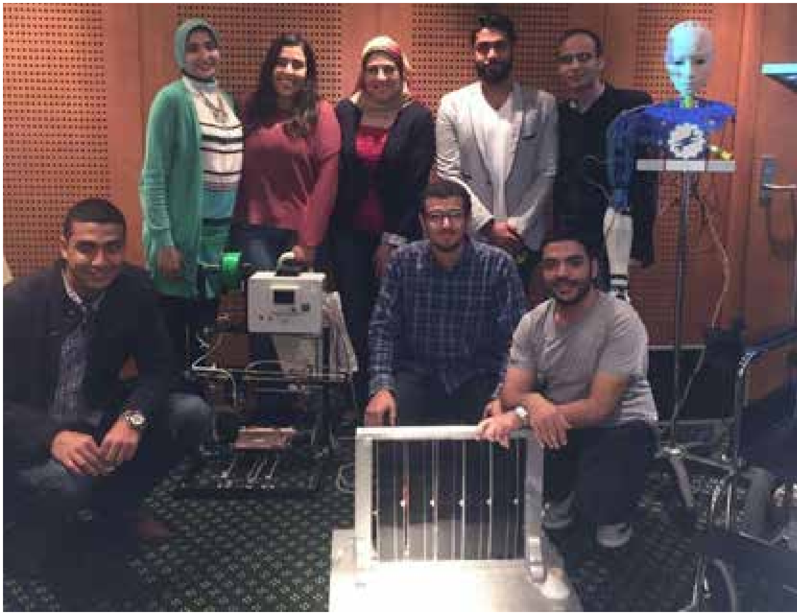
Cr.3. Prerequisite: CC111

The logic of statements - logical form and equivalence - logic implementation – arguments – predicates - number theory - counting methods – function – relation - methods of proof.

CC 311 – Computer Architecture

Cr.3. Prerequisite: CC 317

Basic Computer Organization - Arithmetic Logic Unit - High Speed Arithmetic – The MIPS Architecture – Performance Evaluation Techniques - The Memory Element - Memory Organization - Computer Input/ Output Organization – The Hardwired Control Unit - Microprogramming and typical Computer Architectures – CISC and RISC Paradigms.



CC 312 – Computer Organization*

Cr.3. Prerequisite: CC 216

Computer interconnection structures - computer components - computer function interconnection structures - bus interconnection. - Internal and external memory - computer memory system overview - semiconductors main memory - cache memory - magnetic tape - optical memory - Input / Output - I/O modules - programmed I/O - interrupt-driven I/O - direct memory ACCess - Operating system - Operating systems overview – scheduling - memory management - The central processing unit - Computer Arithmetic - characteristics and functions of instruction sets - addressing modes - processor organization - the instruction cycle - instruction pipelining - Control unit Micro-operation - hardware implementation - Control Functions.

CC 316 – Object Oriented Programming

Cr.3. Prerequisite: CC 319

Object oriented modelling and development - classes – objects – inheritance – GUI interfaces – applets – multithreading.-networking.

CC 317 – Digital System Design

Cr.3. Prerequisite: CC 216

Introduction to digital design, combinational digital design and realization using: decoders, encoders, buffer, multiplexers, comparators, adders, and ALU, sequential design and realization using: latches, flip-flops, counters, and shift registers, memories, CPLD, and FPGA. Synchronous analysis and design using algorithmic state machines ASM, Digital design practice, CAD, using FPGA and CPLD.

CC 319 – Advanced Programming

Cr.3. Prerequisite: CC 215

C# language constructs data types – input/ output & control statements – modularity – arrays – strings – files – classes and objects – Inheritance – Polymorphism – Interfaces.

CC 331 – Data and Computer Communications

Cr.3. Prerequisite: EC 320

The goal of the course is to provide a background and context for the concept of computer networks. The broad range of topics that are encompassed in the field of data and computer communications is introduced, and the fundamental concepts of protocols and protocol architectures are examined. Also the course deals with the fundamental concepts of signal, medium, and encoding. Also deals with other aspects of data communications: reliability and efficiency. Error detection and correction in case of errors during transmission will be covered. A variety of multiplexing techniques can be used to provide for efficient use of the medium. Transmission media is discussed included guided and unguided media. Signal encoding techniques are discussed. Data link control protocols are studied.

CC 341 – Digital Electronics

Cr.3. Prerequisite: EC 238

Overview of electric and electronic circuit analysis. Linear wave shaping with simple low pass and high pass filters. Non-linear wave shaping with diodes and transistor switching. Analysis and design of basic logic gates with bi-junction and MOS technologies. Analysis and design of a stable, monostable and bistable mutivibrators. Logic families performance characteristics.

CC 410 – Systems Programming

Cr.3. Prerequisite: CC 319

Introduction to system programming - machine architecture - machine language - assembly language - two pass assemblers - one pass assemblers - macro facilities - conditional macros - macro processors – loaders – linkers - introduction to formal languages - compilers and interpreters.

CC 411 – Introduction to Microprocessors*

Cr.3. Prerequisite: CC 312 or CC216

Numbering and coding Systems – Internal Organization of Computers–Reduced Instruction Set computer (RISC) architecture Vs Complex Instruction Set computer (CISC) architecture - Evolution from 8080 to 80486. Pipelining- 8086 Registers- Program Segments- Logical Address-Physical Address- Little Endian Convention- Stack- Flag Register- Addressing Modes- Control transfer Instructions- Data Types and Data Definition-Arithmetic and Logic instructions and Programs- 8088 Microprocessor-8284 and 8288 supporting chips- Local bus Vs System Bus- DMA- Memory Capacity-Memory Organization-ROM(PROM-EPROM-EEPROM –Flash memory-Mask ROM) -RAM (SRAM, DRAM, NV-RAM)- Memory Address Decoding- 8088 I/O Instructions- 8255 PPI Chip

CC 412 – Computing Algorithms

Cr.3. Prerequisite: CC 319

Analyze the asymptotic performance of algorithms - demonstrate a familiarity with major algorithms and data structures - synthesize efficient algorithms in common engineering design situations

CC 413 – Numerical Analysis

Cr.3. Prerequisite: CC 112-BA323

Introduction to numerical methods and their applications - Solving Equations, error analysis, solving system of linear algebraic equations, numerical differentiation & integration, Interpolation.

CC 414 – Database systems

Cr.3. Prerequisite: CC 319

Relational Database analysis – design - normalization and implementation - implementation skills using Oracle developer - Concurrent transactions – XML data management.

CC 415 – Data Acquisition Systems

Cr.3. Prerequisite: CC421

Data Acquisition, Definitions & Applications, Data Acquisition channel structure components, Sensors and Transducers: Types, applications, structural classifications, Signal conditioning, Amplifications reshaping, and filtration, Data conversion, principles, devices and limitations, Introduction to data Analysis and elementary control, Case studies, Student Projects.

CC 416 – Computer Graphics

Cr.3. Prerequisite: CC 319

History and survey of graphics applications – Overview of graphics systems and input-output devices – Drawing Algorithms for points, lines, circles and area filling. Introduction to spline representation and application. Two-dimensional transformation. Windowing and clipping. Interactive input methods – introduction to three-dimensional graphics. Introduction to computer graphics pipeline and graphical processing unit. Programming with Open GL.

CC 417 – Assembly Language

Cr.3. Prerequisite: CC 421

In this course, students gain knowledge in PC hardware, and in using assembly language, including what needed to write, link and execute a program written in assembly language. The course will also introduce the Intel family of computers, its associated components, and how the operating system controls these components. The formal logic machine,, instruction addressing and execution, computer memory, basics of assembly language, linking and running a program will be addressed. In addition, the course enables students to analyze and implement many practical problems with Assembly language. The course includes a project that teaches students how to deal with various topics in the course.

CC 418 – Operating Systems

Cr.3. Prerequisite: CC 410

Introduction to modern operating systems - the concepts, structure, design principles, implementation issues, and mechanisms of operating systems.

CC 419– Numerical methods

Cr.3. Prerequisite: CC 112-BA323

Introduction to numerical methods and their applications - Solving Equations, error analysis, solving system of linear algebraic equations, Optimization, integration, Interpolation and Least square error and regression.

CC 420– Optimization and Data Analysis

Cr.3. Prerequisite: CC 419

This course presents fundamentals of optimization and data analytics to students with limited knowledge of the topic. The students shall learn how to formulate an optimization problem, apply different optimization methods to solve real life problems. Implementations of different optimization techniques will be developed using Python. In addition, students will be able to describe, analyze data, and use advanced statistical tools to make decisions. Python data analytics toolkits will be used to provide hands on experience to the students. Topics include deterministic and stochastic optimization methods and data analysis techniques. Examples of optimization approaches include probabilistic and evolutionary approaches. The course offers a range of theoretical and practical topics to help the students handle emergent practical problems.

CC 421 – Microprocessors Systems

Cr.3. Prerequisite: CC 311

Numbering and coding Systems – Internal Organization of Computers–Reduced Instruction Set computer (RISC) architecture Vs Complex Instruction Set computer (CISC) architecture - Evolution from 8080 to 80486. Pipelining- 8086 Registers- Program Segments- Logical Address-Physical Address- Little Endian Convention- Stack- Flag Register- Addressing Modes- Control transfer Instructions- Data Types and Data Definition-Arithmetic and Logic instructions and Programs- 8088 Microprocessor-8284 and 8288 supporting chips- Local bus Vs System Bus-DMA- Memory Capacity-Memory Organization-ROM(PROM-EPROM-EEPROM –Flash memory-Mask ROM) -RAM (SRAM, DRAM, NV-RAM)- Memory Address Decoding- 8088 I/O Instructions- 8255 PPI Chip

CC 431 – Computer Networks

Cr.3. Prerequisite: CC 331

Introduction – Computer Networks and the Internet – Networking protocol layers OSI and TCP/IP-Application Layer Principles of net applications, web and HTTP, FTP, electronic mail, DNS and Peer to Peer applications. Transport layer, Multiplexing and demultiplexing, Connectionless Transport and UDP – reliable data transfer and connection oriented transport TCP, congestion control. Network layer forwarding and routing, IP protocol, routing algorithms, Broadcast and Multicast routing. Data Link layer, introduction and services, error detection and correction techniques, Multiple aCCess protocols and Link layer addressing, Ethernet and PPP.

CC 442 – Digital Design and Introduction to Microprocessor*

Cr.3. Prerequisite: CC 112-CC114

The course serves as an introduction to basic digital operations and digital circuits. Topics included are number systems, logic gates, Boolean algebra, combinational logic, flip flops, registers, memories, and an introduction to microprocessors. . It demonstrates concepts through the design of a variety of logic circuits such as adders, comparators, decoders, encoders, Multiplexers, Demultiplexers, counters, registers, and microprocessors.

CC 447 – Multimedia and Virtual Reality

Cr.3. Prerequisite: CC 319

This course focuses on topics in multimedia information representation and relevant signal processing aspects, and multimedia standards especially on the audio, image and video compression. All these topics are important in multimedia industries. Through this course, students are expected to achieve a basic understanding of multimedia and VR systems. With such background equipment, students would be able to evaluate more advanced or future multimedia systems. This course will also arouse students' interest in the course and further motivate them towards developing their career in the area of multimedia and internet applications. By the end of this course, the learner will have created and deployed a VR application. Student will understand the physical principles of VR

and you will use that knowledge to create a comfortable, high performance VR application using Unity. Students will get experiencing on design 3D Models, Graphic User Interfaces (GUI), and Experiencing development environment and toolset using Unity a popular industry standard game engine. VR development is an amazing career, with both demand and salaries rising.

CC 509 – Introduction to Embedded Systems

Cr.3. Prerequisite: CC411

The aim of this course is to provide an introduction to embedded systems, Microcontrollers, and comparison with conventional computing systems. The course covers the embedded systems building blocks, interfacing, memory, I/O modules, and different design issues. It covers the embedded systems programming and operation systems. It also introduces the different implementation, development and testing issues.

CC 510 – Embedded Systems Design

Cr.3. Prerequisite: CC 421 – CC418

The course introduces an introduction to embedded systems, covers fundamentals of microcontrollers, Interfacing, Memory, and I/O modules. Develop an understanding of the technologies behind Embedded Systems Design issues, embedded hardware Building Blocks, embedded processors, memory addressing and interfacing.The course Covers Embedded Systems programming, embedded operating systems, design, development, implementation and testing.

CC 511 – Artificial Intelligence

Cr.3. Prerequisite: CC 218 - CC319

History and Goals – Representation and search – Knowledge based systems – Logic (Propositional and Predicate) as a representation language – Problem Solving Strategies, Game playing Trees (MinMax, alpha-beta pruning), Iterative improvement search, Generic algorithms, Introduction to Perceptron Neural networks & feed forward networks, First order logic, Propositional logic and Expert systems.

CC 513 – Computing Systems

Cr.3. Prerequisite: CC 418 – CC 421

High performance computing, ILP, RISC architecture, Memory hierarchy, Pipelining, Vector processing, Array processing, Massively parallel processors, Multiprocessor architecture, Data flow computers. Different Parallel computing models, Shared and Distributed Memory Systems, Analyse the use of virtual and cache memory and evaluate their effects on computer systems.

CC 514 – Intro. To Big Data Management

Cr.3. Prerequisite: CC414– CC 418

This course helps the students to understand the different research methodologies. It introduces the students to the era of Big Data and its main characteristics, explains the reasons behind evolving new Big Data platforms from the perspective of Big Data management systems and analytical tools. This course gets the students familiar with the recent related technologies and tools used in the analysis, storage and management of Big Data, by providing an introduction to one of the most common frameworks, Hadoop, MapReduce and Hadoop ecosystem that has made big data analysis easier and more aCCessible.

CC 515 – Introduction to Software Engineering

Cr.3. Prerequisite: CC 319, CC414

Introduction to software engineering disciplines with emphasis on software life cycle - project management – verification - validation and testing of software.

CC 516 –Image Processing & Pattern Recognition

Cr.3. Prerequisite: CC 416 , BA 326

Smoothing operations - edge detection algorithms - the connected component methodology - shape detection and morphological operations - statistical decision - other paradigms in pattern recognition include hierarchical and partitional clustering - feed-forward and feed-backward neural networks.

CC 517 – Modelling and simulation

Cr.3. Prerequisite: CC319 – BA326

Review of Probability, random variables and distributions - random Processes - discrete and continuous markov Processes - queuing systems - stochastic petri nets - computer generation of random numbers - simulation of an M/M/1 queuing system.

CC 518 – Data Security

Cr.3. Prerequisite: CC 319

This course provides an introduction to the fundamental principles of cryptography and its applications on the network security domain. The course covers a broad variety of important security topics, such as cryptography, authentication, network vulnerabilities and attacks, network intrusion detection and tools to defend against network attacks. The course introduces also the applications of discrete mathematics and number theory in the design of modern cryptographic algorithms.

CC 519 – Introduction to Data Mining

Cr.3. Prerequisite: BA 326 – CC 511

The course introduces data mining making students familiar with techniques for preprocessing data before mining. Methods are presented for mining frequent patterns, associations, and correlations. Also, the course covers methods for data classification, prediction and data-clustering approaches. Students are to apply the new concepts on real life data sets, learn and use Python software to perform data mining tasks.

CC 521 – Micro-Computer Based Design

Cr.3. Prerequisite: CC 415

Need for micro based systems, Design cycle for micro based system, Different platforms for embedded systems, FPGAs as a platform for micro based systems, Comparing between microprocessors and micro-controllers. I/O interfacing, Programming of micro controllers embedded systems, Hardware / software portioning and Integration

CC 523 – Computer Design and Performance Evaluation

Cr.3. Prerequisite: CC 311

Comparison between the two major design methodologies based on ISA (Instruction Set Architecture) and ASA (Application Specific Architecture). The course covers the topics of queuing theory and Markov processes as a tool for computer system performance evaluation. Moreover, the students are introduced to operational analysis techniques regarding performance of computer systems.

CC 524 – Neural Networks

Cr.3. Prerequisite: CC 112 – BA 323

Introduction to basic concepts of neural networks -The basic neuron - The multilayer perceptron - Artificial neural networks – applications - learning – architecture - Competitive neural networks - Kohonen self-organizing networks - Adaptive reasoning theory (ART) - Hopfield neural networks - Neural networks implementation - Neural networks applications - Introduction to MATLAB environment - Single perceptron - Multilayer perceptron - Competitive networks - Kohonen networks - ART networks - Hopfield networks using MATLAB.

CC 525 – Intelligent Robotics

Cr.3. Prerequisite: CC 319 – EE 418

Introduction – History – Applications - Object rotation - General transformations - Forward Kinematics - Inverse kinematics - Machine intelligence - trajectory generation – Control - Applications - practical Considerations.

CC 527 – Computer Aided Design

Cr.3. Prerequisite: CC 311-CC341 or CC 312

To introduce fundamental algorithms and techniques for computer aided integrated circuit design - covers aspects of design flow - physical design - logic optimization - timing analysis and verification - synthesis for testability.

CC 528 – Computer Systems Performance Analysis

Cr.3. Prerequisite: Senior Standing credits 138

The purpose of this course is to introduce the student to the principles and techniques of performance measurement in the analysis of computer systems. Such techniques are used to detect bottlenecks, measure the efficiency of computer systems and applications

CC 529 – Distributed and Parallel Systems

Cr.3. Prerequisite: CC 431 , CC418

This course studies the fundamental aspects of distributed systems and applications. Early foundations and recent developments in distributed systems will be investigated. Both client-server and peer-to-peer application designs will be discussed. Other topics include sockets, reliability, replication, group membership protocols, clock synchronization, and logical timestamps.

CC 531– Advanced Networks

Cr.3. Prerequisite: CC 431

This course covers a set of advanced topics in computer networks. The focus is on principles, architectures and protocols used in Switched Local Area Networks, Wireless, Mobile ad hoc NETworks, and multimedia networks. Topics include: LAN Multiple ACCess Protocols, Link Layer Error Detection and Correction Techniques, Link Layer Addressing and switches- ARP-CDMA-WiFi: architecture, CSMA/CA-Frame Format-Mobility Management: addressing and Routing-Mobile IP-Multimedia Networking Applications,-VoIP-RTP-SIP-QoS- Diffserv.

CC 532– Cloud Computing

Cr.3. Prerequisite: CC 431 – CC 414

To get the students familiar with fundamental concepts related to cloud computing technologies. Also, to get familiar with different cloud service and deployment models, different architectural styles and design patterns for cloud computing, the classification of virtualization techniques. The concept of HPC and how it could be used in cloud computing. Understand the use of container service to deploy your application in the cloud and the use of DevOps in configuration management.

CC 535– Internetwork Security

Cr.3. Prerequisite: CC 431

Hacking and the Law, Network Mapping, Vulnerability Assessment, Network Mapping tools,Vulnerability Scanners, Sniffing, Defenses, Denial of Service Techniques using address spoofing, Man-in-the-middle, Defenses, Stack-Based Buffer Overflow Attacks and Password Attacks and Cracker tools, Web Attacks, RootKits, Trojans and Backdoors, Intrusion Detection tools, Writing new intrusion detection signatures, HoneyNets, Forensics.

CC 536– Cyber Security

Cr.3. Prerequisite: CC 431 – CC 418

This course introduces the importance of security across different domains and applications such as network, software, big data management, operating systems and cloud. Student will learn to analyze and resolve security issues in networks and computer systems to secure an IT infrastructure.

The course covers a variety of topics including Cryptography concepts – Malicious Software- Local host security- Transport layer security and HTTPS- Application layer security and PGP- Cyber security attacks and vulnerabilities-Social Engineering Cybersecurity-Ethical Hacking.

CC537 - Computer Forensics

Cr.3. Prerequisite: Senior Standing credits 138

Conducting a computer forensics investigation- Examining the layout of a network- Finding hidden data- Capturing images- Identifying, collecting, and preserving computer evidence- Understanding encryption and examining encrypted files- Documenting the case- Evaluating common computer forensic tools- Presenting and analyzing computer evidence.

CC539 - Selected Topics in Networks

Cr.3. Prerequisite: CC531

Selected Topics in Networks - Wireless Networking -Mobile Networks – Sensor Networks – Content-Based Networking – Autonomic Networks - Network Optimization.

CC540 - Computer Systems Engineering

Cr.3. Prerequisite: Senior Standing credits 138

The course objective is to integrate key topics from algorithms, computer architecture, operating systems, compilers, and software engineering, in one unified framework.This will be done constructively, by building a general-purpose computer system from the ground up. In the process, many ideas and techniques used in the design of modern hardware and software systems are explored, and major trade-offs and future trends are discussed. Throughout the course, the student gains many cross-section views of the computing field, from the bare bone details of switching circuits to the high level abstraction of object-based software design.

CC 550– Selected Topics in Computing

Cr.3. Prerequisite: CC 311 credits 138

Fundamental concepts and issues related to the design and analysis of advanced computing which includes multithreaded, parallel, and distributed computing. This course introduces a discussion of programming techniques, applications, implementations, and performance issues. In addition, selected topics from the following list will also be covered: load balancing, task scheduling, fault-tolerance, coordination & agreement, distributed objects & remote invocation, and distributed transactions & concurrency control. It also gives an introduction to real-time systems, reconfigurable computing, and some advanced topics.

CC 552– Web Engineering

Cr.3. Prerequisite: CC212

Provides an introduction to the discipline of Web Engineering. This course aims to introduce the methods and techniques used in Web-based system development. This course draws upon previous programming and computing experience to develop practical web development and maintenance skills. The course teaches the students the Object Oriented techniques, Design, Analysis using HTML, CSS, Java Script, PHP, MYSQL, ASP.NET, and Ajax. This course is intended for students with knowledge of both Internet communication concepts and an introductory programming knowledge.

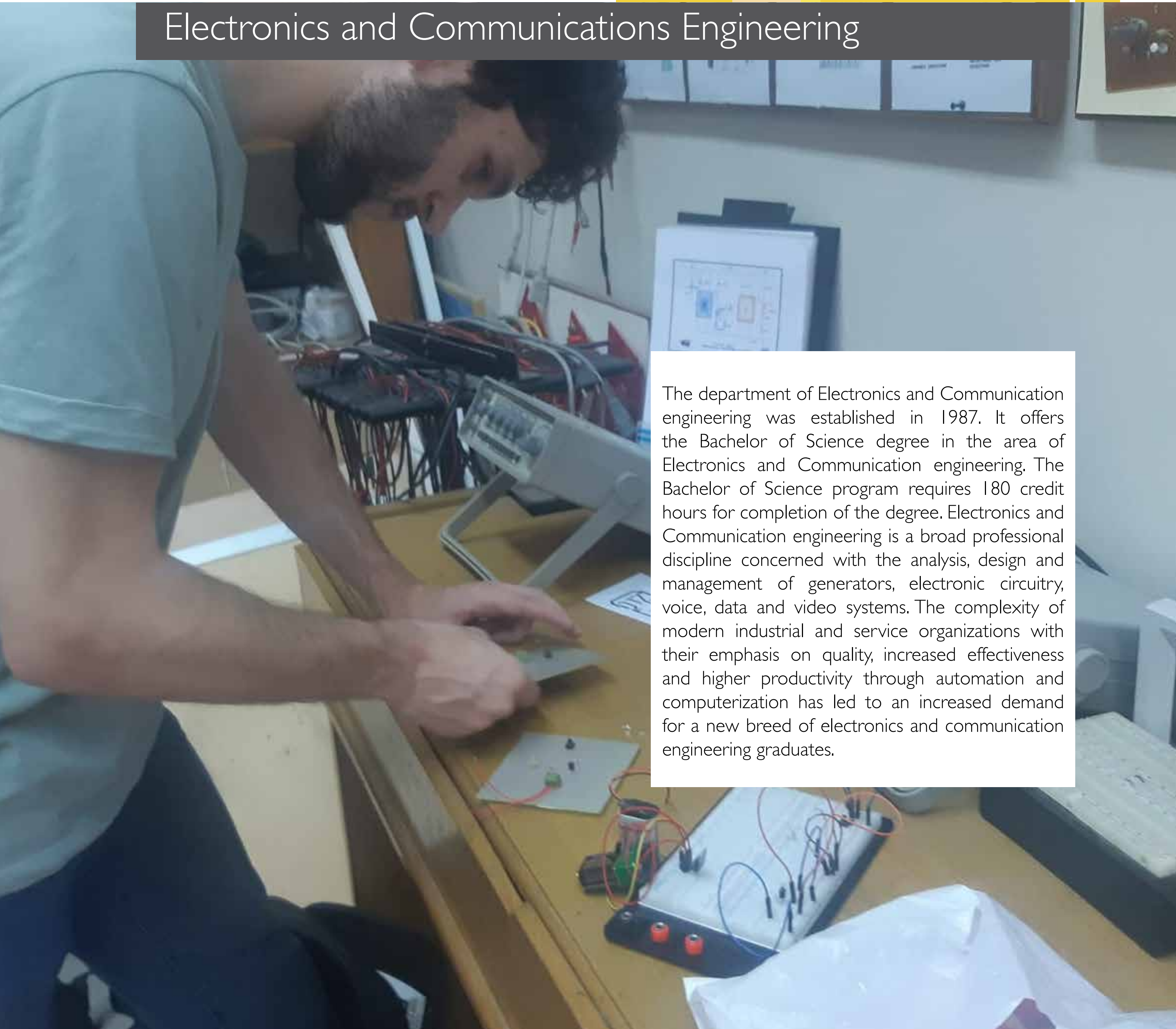
CC 553– Mobile Applications

Cr.3. Prerequisite: CC 414, CC316

This course introduces MOBILE APPLICATION DEVELOPMENT to students who are already familiar with java Programming language and database systems. Advanced features of MOBILE APPLICATION DEVELOPMENT will be introduced through applications. Among those advanced features: Building Graphical User Interface (GUI), ACCess mobile resources (Camera, Sensors, and Bluetooth), processing Multimedia resources (Video and Audio processing), Location tracking and map allocation, Android storage options and data management (database connectivity using SQLite), and Animations applications.

The course also covers mobile application fundamentals, application components, intents, application anatomy compression between multiple mobile operating system and define android architecture and its platform.

Electronics and Communications Engineering



The department of Electronics and Communication engineering was established in 1987. It offers the Bachelor of Science degree in the area of Electronics and Communication engineering. The Bachelor of Science program requires 180 credit hours for completion of the degree. Electronics and Communication engineering is a broad professional discipline concerned with the analysis, design and management of generators, electronic circuitry, voice, data and video systems. The complexity of modern industrial and service organizations with their emphasis on quality, increased effectiveness and higher productivity through automation and computerization has led to an increased demand for a new breed of electronics and communication engineering graduates.

The Electronics and Communication Engineering department program is oriented towards several objectives:

- Stress on the role of Electronics and Communication engineers.
- Enhance the notion that engineers are builders, doers, and decision-makers.
- Train students to design, make, inspect, and manage electronics and communication systems that generate, transmit, and utilize signals.
- Enable graduates to design and coordinate the design of man-machined systems, computer controlled systems.
- Incorporate in the curricula the latest front-line topics.
- Plan the degree program such that it satisfies the requirements of the Higher Supreme Education Council for the Egyptian Universities and the ABET.

Several goals are targeted by the department that includes:

- Impart to students advanced technical and engineering knowledge.
- Prepare electronic and communication engineers who are capable of making a positive contribution their communities.
- Satisfy the growing need of the national industries (both governmental and private).
- Enable graduates to rapidly assimilate the rapid technological advancements.

Quick survey of engineering job vacancies at the daily newspaper reveals that Electronics and Communication Engineering would collect almost 40% of the total engineering opportunities available.
In fact, Electronics and Communication Engineering department main objectives are to introduce a qualified engineer to serve in the field of:

- Wireless and Mobile Communication Systems.
- Network Engineering.
- Analog Integrated Circuit Design.
- FPGA Design.
- Microcontrollers and Embedded Systems.
- Biomedical Engineering.
- Analogue or Digital Signal Processing based systems.
- Automated industrial systems where computer-controlled systems are used.
- Antennas and Wave Propagation Applications.

Academic Program Sheet

Year 1			
Semester 1		**Semester 2**	
LH131	ESP I	LH 132	ESP II
BA123	Mathematics I	BA124	Mathematics II
BA113	Physics I	BA114	Physics II
CC111	Introduction to Computers	CC112	Structured Programming
ME151	Eng. Drawing & Descriptive Geometry	IM112	Manufacturing Technology
BA141	Engineering Mechanics I	BA142	Engineering Mechanics II
IM111	Industrial Relations	BA118	Chemistry
Year 2			
Semester 3		**Semester 4**	
LH231	Technical Report Writing	BA224	Mathematics IV
BA223	Mathematics III	NE264	Scientific Thinking
EC210	Solid State Electronics	EC233	Electronic Devices I
CC213	Programming Applications	EC217	Measurements & Instrumentation
NE465	Creative Awareness	CC216	Digital Logic Design
EE231	Electrical Circuits I	EE232	Electrical Circuits II
Year 3			
Semester 5		**Semester 6**	
BA323	Mathematics V	BA325	Mathematics VI
EC334	Analogue & Digital-Circuit Analysis	EC333	Electronic Amplifiers
EE328	Electrical Power & Machines	EC341	Electromagnetics
CC312	Computer Organization	EC322M	Intro. to Communication Sys.
EC332	Electronic Devices II	CC413	Numerical Analysis
EC321M	Signals and Systems	EC311	Electronic Materials

Year 4			
Semester 7		**Semester 8**	
EC432	Microelectronic Circuits	EC434	Analogue Signal Processing
EC421M	Statistical Communication Theory	EC422	Introduction to Digital Communications
EC342	Electromagnetic Wave Propagation	EC443	Electromagnetic Transmitting Media
CC411	Introduction to Microprocessors	NE364	Engineering Economy
IM423	Operation Research	EE419	Modern Control Engineering
EE418	Automatic Control Systems	EC410	Electronic Measurements
		IM400	Practical Training
Year 5			
Semester 9		**Semester 10**	
EC546	Microwave Technology	EC523M	Advanced Communication Sys.
EC544	Antennas Engineering	EC533	Digital Signal Processing
EC501	Project I	EC503	Project II
ECXXX	Elective Course	ECXXX	Elective Course
ECXXX	Elective Course	ECXXX	Elective Course
ECXXX	Elective Course		

Graduation Requirements

College Requirements					
A total of 60 credit hours are required by the college as per the following table					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
College Courses A total of 60 Cr. Hr. of the following courses					
	1	BA 113	Physics I	3	None
	2	BA 114	Physics II	3	BA 113
	2	BA 118	Chemistry	2	None
	1	BA 123	Mathematics I	3	None
	2	BA 124	Mathematics II	3	BA 123
	1	BA 141	Engineering Mechanics I	3	None
	2	BA 142	Engineering Mechanics II	3	BA 141
	3	BA 223	Mathematics III	3	BA 124
	4	BA 224	Mathematics IV	3	BA 223
	1	CC111	Introduction to Computer	3	None
	2	CC112	Structured Programming	3	CC111
	3	EE231	Electrical Circuits I	3	BA124
	4	EE232	Electrical Circuits II	3	EE231
	1	IM111	Industrial Relations	2	None
	2	IM112	Manufacturing Technology	2	None
	1	LH 131	English for Special Purposes I	2	None
	2	LH 132	English for Special Purposes II	2	LH 131
	3	LH 231	Technical Report Writing	3	LH 132
	1	ME 151	Eng. Drawing and Projection	2	None

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
College Courses A total of 60 Cr. Hr. of the following courses					
	3	NE 264	Scientific Thinking	3	54 Cr. Hr.
	4	NE 465	Creative awareness	3	None
	8	NE364	Engineering Economy	3	54 Cr. Hr.

Department Requirements

A total of 120 credit hours are required by the department, which are distributed as follows:

- 33 credit hours of compulsory courses from other departments.
- 72 credit hours of compulsory EC courses.
- 15 credit hours of elective courses.

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
College Courses A total of 33 Cr. Hr. of the following courses					
	5	BA 323	Mathematics V	3	BA 224
	6	BA 325	Mathematics VI	3	BA 224
	3	CC213	Programming Applications	3	CC112
	4	CC216	Digital Logic Design	3	CC111
	5	CC312	Computer Organization	3	CC216
	6	CC413	Numerical Analysis	3	BA224, CC112
	7	CC411	Introduction to Microprocessors	3	CC312orCC216
	5	EE328	Electrical Power and Machines	3	EE232
	7	EE418	Automatic Control Systems	3	EE328
	8	EE419	Modern Control Engineering	3	EE418
	7	IM423	Operations Research	3	90 Cr. Hr.

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
College Courses A total of 33 Cr. Hr. of the following courses					
	5	EE328	Electrical Power and Machines	3	EE232
	7	EE418	Automatic Control Systems	3	EE328
	8	EE419	Modern Control Engineering	3	EE418
	7	IM423	Operations Research	3	90 Cr. Hr.

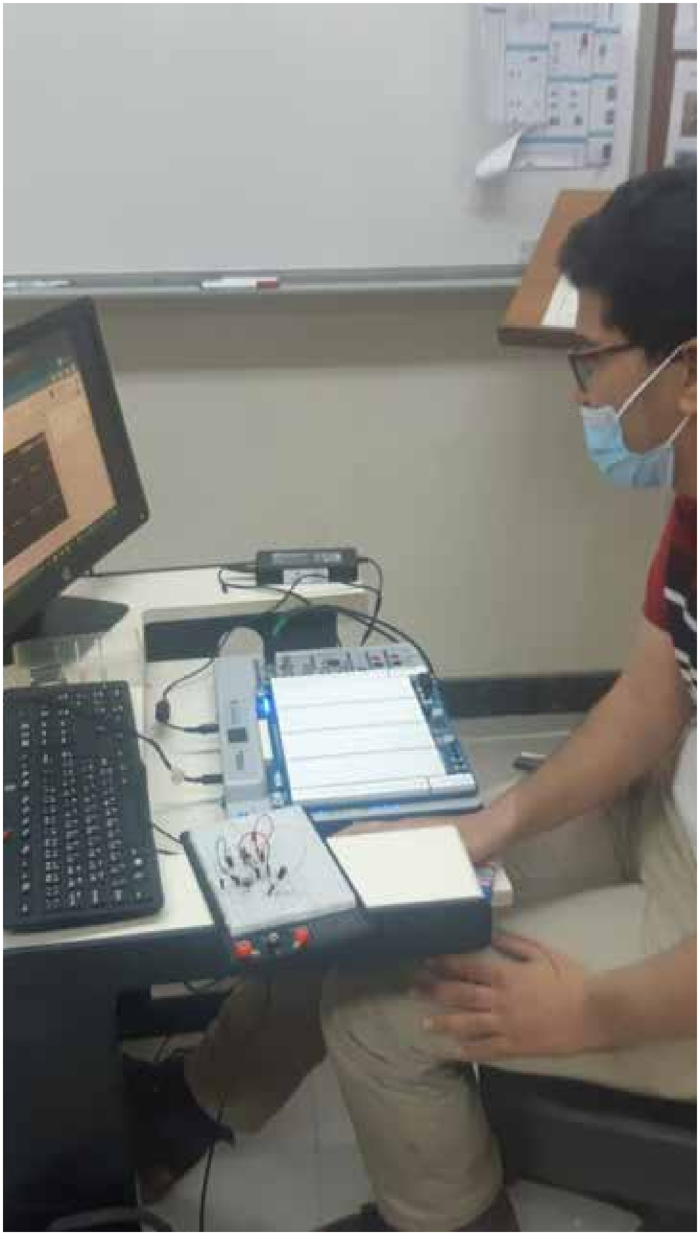
Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory EC Courses A total of 72 Cr. Hr. of the following compulsory EC courses					
Group 1	3	EC210	Solid State Electronics	3	BA114
	4	EC217	Measurements & Instrumentation	3	EE231
	6	EC311	Electronic Materials	3	EC210
	8	EC410	Electronic Measurements	3	EC432
Group 2	5	EC321M	Signals and Systems	3	BA224, EE231
	6	EC322M	Introduction to Communication Systems	3	BA323, EC321M
	7	EC421M	Statistical Communication Theory	3	EC322M, BA325
	8	EC422	Introduction to Digital Communications	3	EC421M
	9	EC523M	Advanced Communication Systems	3	EC422
Group 3	4	EC233	Electronic Devices 1	3	EC210
	5	EC332	Electronic Devices 2	3	EC233, EE232
	6	EC333	Electronic Amplifiers	3	EC332, EC217
	5	EC334	Analog and Digital Circuit Analysis	3	EE232
	7	EC432	Microelectronic Circuits	3	EC333

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory EC Courses					
A total of 72 Cr. Hr. of the following compulsory EC courses					
Group 3	8	EC434	Analog Signal Processing	3	EC432
	10	EC533	Digital Signal Processing	3	EC434
Group 4	5	EC341	Electromagnetics	3	BA114, BA224
	6	EC342	Electromagnetics Wave Propagation	3	EC341
	7	EC443	Electromagnetics Transmitting Media	3	EC342
	8	EC444	Antenna Engineering	3	EC443
	10	EC546	Microwave Technology	3	EC434, EC443
Project	9	EC501	Project I	3	132 Cr. Hr.
	10	EC503	Project II	6	EC501

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory EC Courses					
A total of 15 Cr. Hr. of the following compulsory EC courses					
Group 1	9 – 10	EC530	Micro-Electromechanical Systems MEMS	3	EC434
	9 – 10	EC531	Embedded Systems	3	CC213, CC411
	9 – 10	EC532	Power Electronics	3	EC434
	9 – 10	EC535	Digital VLSI Design	3	EC432, CC216
	9 – 10	EC536	VLSI Fabrication & Testing	3	EC535
	9 – 10	EC537	Biomedical Electronics	3	EC434
	9 – 10	EC538	Selected Topics in Electronics	3	EC434
	9 – 10	EC539	Photonic Devices	3	EC233
	9 – 10	EC560	Electronic Circuits for Communications	3	EC434

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory EC Courses					
A total of 15 Cr. Hr. of the following compulsory EC courses					
Group 2	9 – 10	EC520	Satellite Communications	3	EC422
	9 – 10	EC521	Communication Networks	3	EC422
	9 – 10	EC522	Acoustics	3	EC341
	9 – 10	EC523M	Optical Communications	3	EC422
	9 – 10	EC525	Information Theory & Coding	3	EC422
	9 – 10	EC526	Mobile Communications	3	EC422
	9 – 10	EC527	Applied Telecommunication Systems	3	EC322M
	9 – 10	EC528	Data Communication	3	EC422
	9 – 10	EC529	Modern wireless Communications	3	EC422
	9 – 10	EC550	Selected Topics in Communications	3	EC422
	9 – 10	EC551	Telecommunication Systems Engineering	3	EC422
	9 – 10	EC553	Media & Entertainment Engineering	3	EC422, EC434
3	9 – 10	EC545	Advanced Antennas Systems	3	EC443
College Electives					
CC	9 – 10	CC524	Neural Networks	3	BA323,CC112
	9 – 10	CC527	Computer Aided Design	3	EC333
EE	9 – 10	EE512	Automated Industrial Systems I	3	EE418
IM	9 – 10	IM535	International Operations Management	3	None

Group 1: Solid State Electronics Courses
Group 2: Communications Courses
Group 3: Electronics Courses
Group 4: Electromagnetics and Antennas Courses



Course Group: Solid State Electronics and Measurements

EC 210 – Solid State Electronic

Cr.3. Prerequisite: BA 114

Elementary material science concepts: Atomic structure- Bonding and types of solids- the crystalline state -Lattice vibrations.The Hall Effect and Hall effect devices. Quantum mechanics: photons- Particles and waves- the electron as a wave- infinite potential well- Heisenberg's uncertainty principle- Tunnelling phenomenon (potential barrier). The band theory of solids: E-K diagram- energy bands diagram- Electrons and holes- effective mass. Semiconductors: Intrinsic semiconductors- Extrinsic semiconductors(n-type doping- p-type doping- compensation doping)- Electronics and hole Concentrations- Fermi energy level position- Conductivity of a semiconductor- Diffusion and conduction currents equations.

EC 217 – Measurements & Instrumentations

Cr.3. Prerequisite: EE 231

Measurements of errors- Accuracy- Precision- Resolution- Sensitivity. Statistical analysis (Mean- Deviation- Standard Deviation- Variance). Units and standards of measurement. Electromechanical indicating instruments. Analog Instruments (DC Ammeter (Ayrton Shunt)- DC Voltmeter- Ohmmeter (Series type- Shunt Type)- AC- Instruments with Rectifiers(full wave and half wave rectifiers)- Bridge measurements (AC Bridges(Maxwell bridge- Wien bridge- Schering bridge)- DC Bridges(Wheatstone bridge))- Digital instruments for measuring True RMS Voltmeter- Q-meter- oscilloscope techniques.

EC 218 – Measurements & Instrumentations (Computer Engineering Program)*

Cr.3. Prerequisite: EE 231

Measurements of errors- Accuracy- Precision- Resolution- Sensitivity. Statistical analysis (Mean Deviation- Standard Deviation- and Variance). Units and standards of measurement. Electromechanical indicating instruments. Analog Instruments (DC Ammeter (Ayrton Shunt)- DC Voltmeter- Ohmmeter (Series type- Shunt Type)- AC- Instruments with Rectifiers (full wave and half wave rectifiers)- Bridge measurements (AC Bridges(Maxwell bridge- Wien bridge- Schering bridge)- DC Bridges(Wheatstone bridge))- Digital instruments for measuring True RMS Voltmeter- Q-meter- oscilloscope techniques.

EC 311 – Electronic Materials

Cr.3. Prerequisite: EC 210

Free electron model- Electric conductivity- and Dielectric properties: Microscopic electric field Dielectric constant and polarisability- local electric field at an atom. Magnetic materials and Ferro electric Crystals. Diamagnetism and Para-magnetism- Ferromagnetic order. Anti-Ferro magnetic order. Ferromagnetic domains- superconductivity. Destruction of superconductivity by magnetic fields- Meissner effect.

EC 410 – Electronic Measurements

Cr.3. Prerequisite: EC 432

Ac signal sources- Oscillators- Selection of an Oscillator- Barkhausen criteria. Audio frequency oscillator (Wien bridge oscillator- Phase shift oscillator)- Radio frequency oscillator (Colpitts oscillator- Hartley oscillators)- Crystal oscillator. Signal Generator- Sweep frequency generator- Pulse and Square wave generator- Function Generator- Attenuators. Harmonic analysis- Frequency spectrum of waveform- Harmonic distortion analysis using Fourier transformer. Harmonic Analyzing Instruments- Harmonic distortion analyzer. Wave analyzer- spectrum analyzer. Transducers- classification of transducers- Selecting of Transducer- Strain gauge transducer- Displacement Transducer- Capacitive Transducer- Inductive Transducers- Piezoelectric Transducer- Temperature Transducers- Photoelectric Transducers. Data acquisition system- Signal conditioning circuit- Digital to Analog and Analog to Digital converters. Data acquisition system and Computerized control measurements.

Course Group: Communications

EC 320 : Communication Theory (Computer Engineering Program)*

Cr.3. Prerequisite: BA 224 – EE 231

Introduction to communication theory. Review of Fourier series and Fourier transform as a mathematical tool for spectral analysis. Concept of power and energy spectral densities and correlation between waveforms. Transmission through linear filters and channels. Hilbert transform and Amplitude Modulation techniques.

EC 323 : Introduction to Communication Systems (Electrical Engineering Program)*

Cr.3. Prerequisite: BA 224

Analog communication systems (Amplitude Modulation – Frequency Modulation). Analog Pulse Modulation (Pulse Amplitude Modulation – Pulse Width Modulation – Pulse Position Modulation). Pulse Code Modulation Systems - Digital Modulation - Domestic wire and wireless communication technologies -Industrial communication technology

EC 321M – Signals and Systems

Cr.3. Prerequisite: BA 224 – EE 231

Introduction to communication theory. Fourier transform as a mathematical tool for spectral analysis. Sampling Theory, Convolution of continuous and discrete signals, Correlation, Concept of power and energy spectral densities and correlation between waveforms. Transmission through linear filters and channels. Hilbert transform and Positive pre-envelope and complex envelope. Response of LPF and BPF to signals.

EC 322M – Introduction to Communication Systems

Cr.3. Prerequisite: BA 323 – EC 321M

Base band communication of Analog signals. FDM Concepts. Amplitude modulation, mathematical description and spectral characteristics of full carrier AM, DSB-SC, SSB-SC, and VSB. Multiplexing techniques (QAM and FDM). Angle modulation (FM and PM); generation and detection of CW modulation. Sampling theory. PAM, PWM and PPM generation and detection.

EC 421M – Statistical Communication Theory

Cr.3. Prerequisite:-EC 322M

Review of probability- Random processes: Stationarity, Ergodicity - AWGN channels and band-pass noise - AM/ FM with the presence of noise - Noise effect on analog pulse modulation - Noise effect on PCM – Wireless Fading Channel modeling.

EC 422 – Introduction to Digital Communications

Cr.3. Prerequisite: EC 421M

Bandpass data transmission - Gram Schmidt orthogonalization procedure, Geometric representation of signals in signal space - Noise effect in signal space, Decision regions and related probability of error - binary modulation techniques (CB-ASK, CB-FSK, CB-PSK) - Optimum FSK, MSK , Non-Coherent Detection, NC-FSK – DPSK

EC 523M – Advanced Communication Systems

Cr.3. Prerequisite: EC 422

Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA). OFDM, OFDMA- Examples of FDMA, TDMA, and CDMA systems, and their applications. Source and channel coding. Channel Capacity

EC 520 – Satellite Communications **

Cr.3. Prerequisite: EC 422

Orbits and Earth Coverage: Orbital parameters-circular and elliptical orbits-GEO-MEO-LEO. Link budget- atmospheric Losses- frequency bands. Satellite construction (payload- platform) - Radio system technology (Antennas. Mobile satellite communication systems. Direct satellite broadcasting - VSAT) – Channel coding techniques.

EC 521 – Communication Networks**

Cr.3. Prerequisite: EC 422

Basic Concepts of a Network - Physical Layer - Internet Protocol and subnetting - Network address translation protocol and IPv6 - Routing algorithms - Routing standards - Local Area Network topologies - Wireless LANs - Networking and Internetworking Devices - VOIP - Transport Layer - New trends in networking

EC 522 – Acoustics **

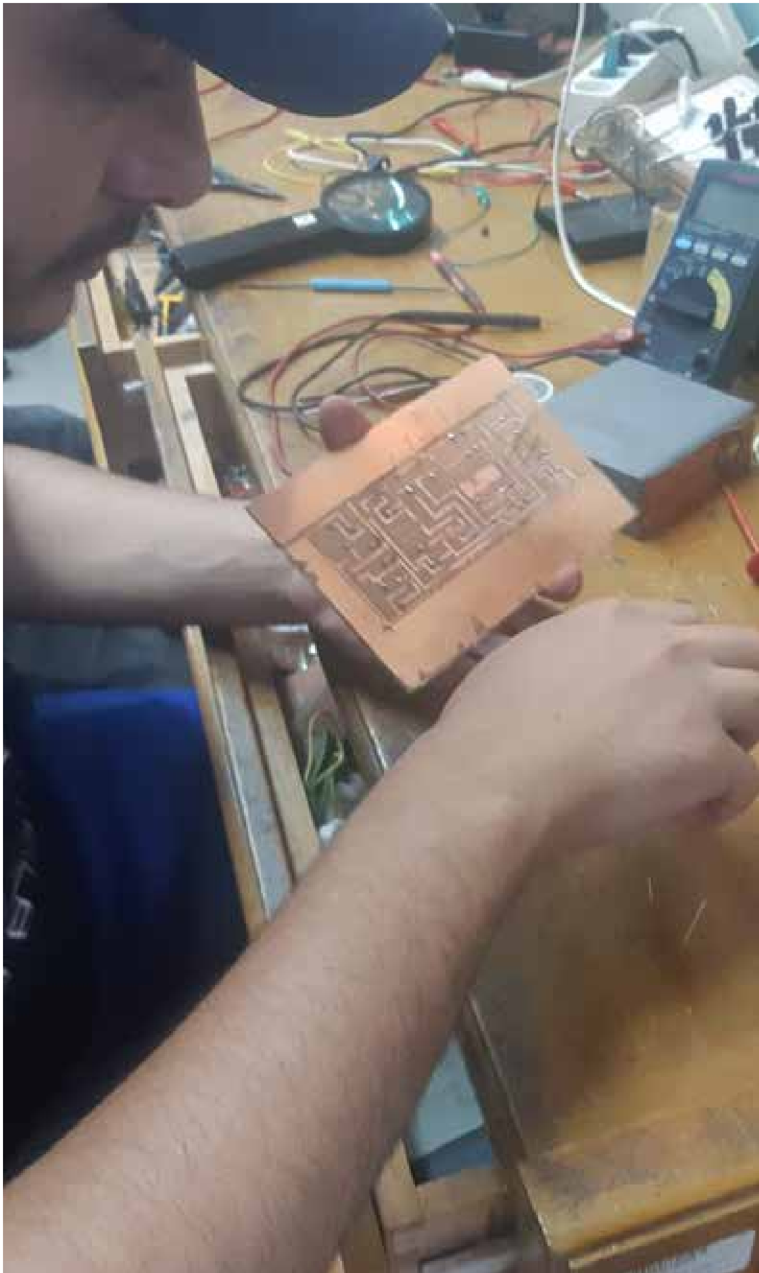
Cr.3. Prerequisite: EC 341

Acoustic wave and velocity of sound - The one-dimensional wave equation - Impedance of mediums - Three-dimensional wave equation and spherical wave - Sound intensity and power - Energy density and levels - Multiple sources and loudness - Environmental acoustics - Equivalent sound pressure level and assessment of noise - Analogy between acoustical and electrical circuits - Transducers and sensitivity of MICs and loudspeakers - Hi-fi system and introduction of underwater acoustics - Velocity profiles and SONAR

EC 552 – Optical Communications **

Cr.3. Prerequisite: EC 422

Historical development - Optical Fiber Waveguide - Electromagnetic theory for optical propagation – Normalized frequency of the optical fiber - Linearly polarized modes in optical fibers - Transmission Characteristics in Optical Fibers - Dispersion modified single-mode optical fibers - Fiber Fabrication – Fiber Cable Design – Fiber Connection - Optical Sources – Laser - Wavelength Converter – Optical Amplifiers - Light Detectors - Optical Transmitter and Receiver - Optical fiber systems - Optical Fiber Communication Systems.



EC 525 – Information Theory and Coding **

Cr.3. Prerequisite: EC 422

Review of probability theory - Concept of information theory and coding - Average information & Entropy – Mutual information - Channel capacity - Bandwidth and S/N of a channel - Source Coding - Turbo Codes - Iterative decoding - Performance of different coded modulation in AWGN channels.

EC 526 – Mobile Communications **

Cr.3. Prerequisite: EC 422

Difference between conventional mobile and cellular mobile- Overview on different cellular generations - Cellular radio design principles - Concept of frequency reuse/cellular block diagram - Co channel interference/adjacent channel interference - Multipath propagation - Speech coding in GSM - Channel coding and interleaving in GSM - GSM mobile station block diagram - Multiple access techniques - Control channels in GSM - Location updating\ security management.

EC 527 – Applied Telecommunications **

Cr.3. Prerequisite: EC 322M

Introduction to radar system - Classification and principles of the radar system - The radar equation – Probability of detection - The digital radar- terminals- transmission and switching. Analog and Digital telephone networks.

EC 528 – Data Communications **

Cr.3. Prerequisite: EC 422

This course covers the fundamental issues impacting all data networks and reviews virtually most of the important new standard and technological development- offering especially Comprehensive coverage of the physical layer and packet switching techniques.

EC 529 – Modern Wireless Communications **

Cr.3. Prerequisite: EC 422

Radio Wave Propagation - Digital Modulation Techniques - OFDMA- SC-FDMA and their applications - Cellular systems – speech coding - Equalization & Diversity – MRC – RAKE Receiver – Channel coding : block codes- convolutional codes- and turbo codes.

EC 550 – Selected Topics in Communications **

Cr.3. Prerequisite: EC 422

Characteristics of Multipath Fading Channels - Applications of OFDM Digital Audio Broadcasting Terrestrial Digital Video Broadcasting - Bluetooth: Basic concepts-Protocol Architecture -Encryption & Security -Link Management -Logical link control -Ultra Wideband: Basic properties of UWB signals and systems -Generation of UWB -UWB channel modelling - UWB Communications - Modulation methods for UWB -UWB Transmitter -UWB Receiver.

EC 551 – Telecommunication Systems Engineering**

Cr.3. Prerequisite: EC 422

Principles- Technologies- system architectures- standards of GSM- GPRS- UMTS- WLAN- 802.16 and WiMAX - QoS in telecommunication systems - Internet Telephony - Resource allocation and management - Sensor networks.

EC 553 – Media and Entertainment Engineering **
Cr.3. Prerequisite: EC 422 – EC 434

Stereophonic broadcasting systems - TV scanning and broadcasting - Detailed block diagram of a TV transmitter and receiver - Colour TV fundamentals - NTSC-PAL- and SECAM systems - Digital TV - HDTV and Satellite TV - Audio recording analog and digital - Compact disc and CD player - Reflection and ray tracing theory - Acoustical treatment and studio design.

* *Courses for other departments*
** *Elective Course*

Course Group: Electronics

EC 134 – Fundamentals of Electricity and Electronics (Computer Science Program)*
Cr.3. Prerequisite: BA 113

This course provides an introduction to the basic concepts of electricity and electronics concepts. This is useful in understanding the operations of robotics. The topics of interest include the basics of electricity and electrical circuit's components. It covers also the basic DC and AC circuits' analysis, power and resonance, and transformers. The electronic topics include semiconductors diodes and transistors. The course covers practical and applications of the studied topics in the operations of amplifiers and oscillators.

EC 233 – Electronic Devices I
Cr.3. Prerequisite: EC 210

P-N junction diode- current components- junction capacitance- junction diode- as a circuit element- special types of P-N junctions. P-N junction diodes- current components- junction capacitance- junction diode as a circuit element.

EC 238– Electronics I (Computer Eng. Program + Mechatronics Eng. Program)*
Cr.3. Prerequisite: EE231

Semiconductors - p-n junction - diode current components - junction capacitance - junction diode as a circuit element - special p-n junctions - bipolar junction transistor and field effect transistor: structure-operation – I-V characteristics - large and small analysis.

EC 237 – Electronics Engineering (Electrical & control Engineering Program)*

Cr.3. Prerequisite: EE 231

Semiconductors - p-n junction - diode current components - junction diode as a circuit element - special p-n junctions - bipolar junction transistor and field effect transistor: structure, operation – I-V characteristics – Sinusoidal and Square-Wave Oscillators.

EC 332– Electronic Devices II

Cr.3. Prerequisite: EE232 – EC 233

Operation of BJT - DC Analysis - BJT Base Width Modulation - AC Analysis of BJT - Common Emitter, Collector, and Base Amplifiers - BJT as a Switch - Operation of JFET - DC and AC Analysis - MOS-Structure - Operation of MOSFET - Depletion/Enhancement Mode MOSFETs - DC Analysis of MOSFET - Channel Length Modulation - Body Effect - MOSFET Capacitances - AC Analysis of MOSFET - Common Source, Drain, and Gate Amplifiers - MOSFETs Amplifiers using Active Loads - Schockley, Diac, SCR, Triac, UJT, and PUT Circuits

EC 333– Electronic Amplifiers

Cr.3. Prerequisite: EC 332 – EC 217

Revision on Single Stage BJT Amplifiers - Cascode - MOSFET Common Source, Source Follower and Common Gate Amplifier – Cascode and Folded Cascode Amplifier - Frequency Response of MOSFET Circuits - Feedback Amplifiers - Feedback Topologies - Stability - Ring Oscillator and LC Oscillators - Voltage Controlled Oscillators - Power Amplifier - Tuned Amplifiers

EC 334– Analog and Digital Circuits Analysis

Cr.3. Prerequisite: EE232

Review of basic circuit theorems - Two-Port Networks - The transfer function -Phase and Time Responses - Bode Plot - Phase and Group Delays - Computer-Aided Analysis Packages - Integrated Digital Logic Families, Definitions (Propagation Delay, Fan-in, Fan-out) - RTL, DTL, TTL Logic Families - Analysis of TTL gates - ECL Family and Examples - CMOS Digital Circuits and Logic Families Comparison

EC 339– Electronics II (Computer Eng. Program + Mechatronics Eng. Program)*

Cr.3. Prerequisite: EC 238

Electronic amplifier theory- power amplifiers- Differential amplifiers- Operational amplifiers-filters and Oscillators.

EC 432– Microelectronic Circuits

Cr.3. Prerequisite: EC 333

Differential Amplifiers - Current Mirrors - Noise in Electronic Circuits - Operational Amplifiers - Phase Locked Loops - Switched Capacitor Circuits - IC Fabrication Steps

EC 434– Analog Signal Processing

Cr.3. Prerequisite: EC 432

Linear and nonlinear wave shaping- sinusoidal and relaxation oscillators- sweep generators- analog filters.

EC 533– Digital Signal Processing

Cr.3. Prerequisite: EC 434

ADC's and DAC's, DFT, FFT and DCT, the Z-transform, discrete time transfer function, realization topologies, FIR filter design using windowing, Optimal method, frequency sampling method , least path norm method using MATLAB . IIR filter design, stability, bilinear transform, least path norm method using MATLAB. Applications of DSP e.g. data compression Data acquisition systems….etc

EC 534– Analog and Digital Signal Processing (Mechtronics Engineering Program)*

Cr.3. Prerequisite: EC 331

Simple analog wave shaping circuits- Sinusoidal and square wave generators. Design of RC active filters- ADC's and DAC's. Discrete transforms. Digital filter design.

EC 530– Micro – Electromechanical Systems MEMS **

Cr.3. Prerequisite: EC 434

MEMS technology- revolution and advantages of MEMS technology. Description of the MEMS applications- and its fabrication techniques. Studying the nature of the piezoelectricity and piezoresistivity. Description of the microsensors- microactuators- different system issues and the scaling effect. Finally describing the Microassembly and an overview on Microrobotics.

EC 531 – Embedded Systems**

Cr.3. Prerequisite: CC213, CC411

A course that integrates embedded operating systems, computer hardware and embedded programming, real time processes for use in control and instrumentation. Introduces the process of designing and implementing software/hardware systems to implement instrumentation, control and communications/DSP protocols for real-life systems. This includes the development, debugging and verification processes.

EC 532 – Power Electronics**

Cr.3. Prerequisite: EC 434

A course which integrates power semiconductors and industrial electronics for energy conversion and process control. It also links areas such as renewable energy, high voltage/high current semiconductors, power supplies and industrial process control.

EC 535 – Digital VLSI Design **

Cr.3. Prerequisite: EC 432 – CC 216

Design of VLSI digital circuits- Stick diagrams- design rules- CAD system- speed and power considerations- floor planning- layout techniques

EC 536 – VLSI Fabrication and Testing of Integrated Circuits **

Cr.3. Prerequisite: EC 535

Choice of technology- different fabrication processes of VLSI integrated circuits: crystal growth- thermal oxidation- chemical etching- diffusion and ion implantation- epitaxy and chemical-vapor deposition- metallization- and process integration. Testing techniques. Design for testability.

EC 537 – Biomedical Electronics **

Cr.3. Prerequisite: EC 434

Introducing basic concepts in biomedical engineering and applications of electronics in patient care medical – equipment.

EC 538 – Selected Topics in Electronics**

Cr.3. Prerequisite: EC 434

A Selection from modern topics in electronics.

EC 539 – Photonic Devices **

Cr.3. Prerequisite: EC 233

Introduction to the most significant devices employed in all-optical communications and networks. Introducing and identifying all-optical switching, routing and networking. Light production and the processes that occur during light propagation. Optical sources: light emitting diodes (LEDs) and lasers. Optical detectors: photoconductors, photodiodes and phototransistors. Photonic devices that can employ different functions within the network or link:gratings and optical amplifiers. Fibre Bragg Gratings (FBGs): Construction, types, characteristics and applications. In-line amplifiers: Erbium doped fibre amplifier (EDFA), and waveguide amplifiers: semiconductor optical amplifier (SOA) comparisons, operations, characteristics and applications.

EC 560 – Electronic Circuits for Communications **

Cr.3. Prerequisite: EC 434

Electronic circuits used in modern communications- including RF amplifiers- oscillators- modulators- Noise- transmitter circuits- receiver circuits- frequency and phase modulation- phase-locked loops and frequency synthesizers- pulse and digital modulation- data communication techniques- wireless and digital communications circuits.

* *Courses for other departments*

** *Elective Course*

Course Group: Electromagnetics and Antennas

EC 341 – Electromagnetics

Cr.3. Prerequisite: BA 114 – BA 224

Review of vector analysis- electromagnetic fields: Coulombs law- electric field and flux density- Gauss's law- electric potential- conductors and semi-conductors- dielectric and capacitance- polarization- magnetic field and flux density- Biot Savart law- Ampere's law- magnetic potential- Maxwell's equations and magnetization vectors- Faraday's law- displacement vector- analogy between electrostatics & magneto static- boundary conditions.

EC 342 – Electromagnetic Wave Propagation

Cr.3. Prerequisite: EC 341

Wave equation- Uniform plan waves- Wave propagation in free space- perfect dielectric- lossy and good conductors- skin effect- surface impedance. Normal incidence- reflection coefficient and standing wave pattern. Input impedance- oblique incidence reflection coefficients for horizontal and parallel polarization Brewster angle- and types of polarization. Fundamental parameters of antennas. Linear wire antenna (infinitesimal- small- finite length & half-wavelength dipole). Ground wave propagation. Troposphere wave propagation. Ionosphere wave propagation.

EC 443 – Electromagnetic Transmitting Media

Cr.3. Prerequisite: EC 342

Transmission line: Types- parameters- voltage and current equations- matched and mismatched lines. Use of Smith chart- single- double- and triple stub matching- quarter wave length transformers- Baluns. Multiple reflection of EM waves between infinite parallel plates- rectangular waveguides. TE and TM modes. Cutoff frequency and propagation parameters. Power transmitted- wall losses- and dielectric losses. Circular waveguides- TE and TM modes. Cutoff frequency and propagation parameters. Power transmitted- wall losses- and dielectric losses. Cavity resonators- modes quality factor- effect of dielectric loss. Circular cavity.

EC 444 – Antennas Engineering

Cr.3. Prerequisite: EC 443

Linear array theory: uniform linear arrays (two-element and N-elements arrays)- types of uniform linear arrays (broadside- end fire- electronic scanning). Non uniform linear arrays (binomial- Chebycheff)- planar arrays- circular arrays. Aperture on conducting and on free space. Horn antennas- E-sectoral- H -sectoral - and pyramidal horns. Parabolic reflectors. Loop antennas. Travelling wave antenna. Rhombic antenna.

EC 545 – Advanced Antennas Systems **

Cr.3. Prerequisite: EC 443

Rectangular Microstrip antenna (definition- analysis- design- radiation pattern- directivity). Circular Microstrip antenna (definition- analysis- design- radiation pattern- directivity). Wide band antennas (analysis of spiral antenna- conical antenna- and cylindrical antenna). Helical antenna (analysis- design- radiation pattern- directivity). Inverted F antenna (analysis- design- radiation pattern- directivity). Log Periodic Antenna (analysis- design- radiation pattern- directivity). Analysis of Lens antenna. Introduction to Smart antenna.

EC 546 – Microwave Technology

Cr.3. Prerequisite: EC 443 – EC 434

Comprehensive knowledge of microwave hardware. This includes passive and active components. The study extends to the design and analysis of all generating and amplifying devices and Microwave Mixers. Investigating the Microwave Integrated Circuits and Introducing the Nanotechnology, Top Down and Bottom up Technologies and Carbon Nanotube Transistors. Also exploring the different measuring techniques used at such frequency range as well as the related measuring techniques, Microwave Network, and Spectrum Analysis..

** *Elective Course*

Course Group: Project Courses

EC 501 – Projects I

Cr.3. Prerequisite: None

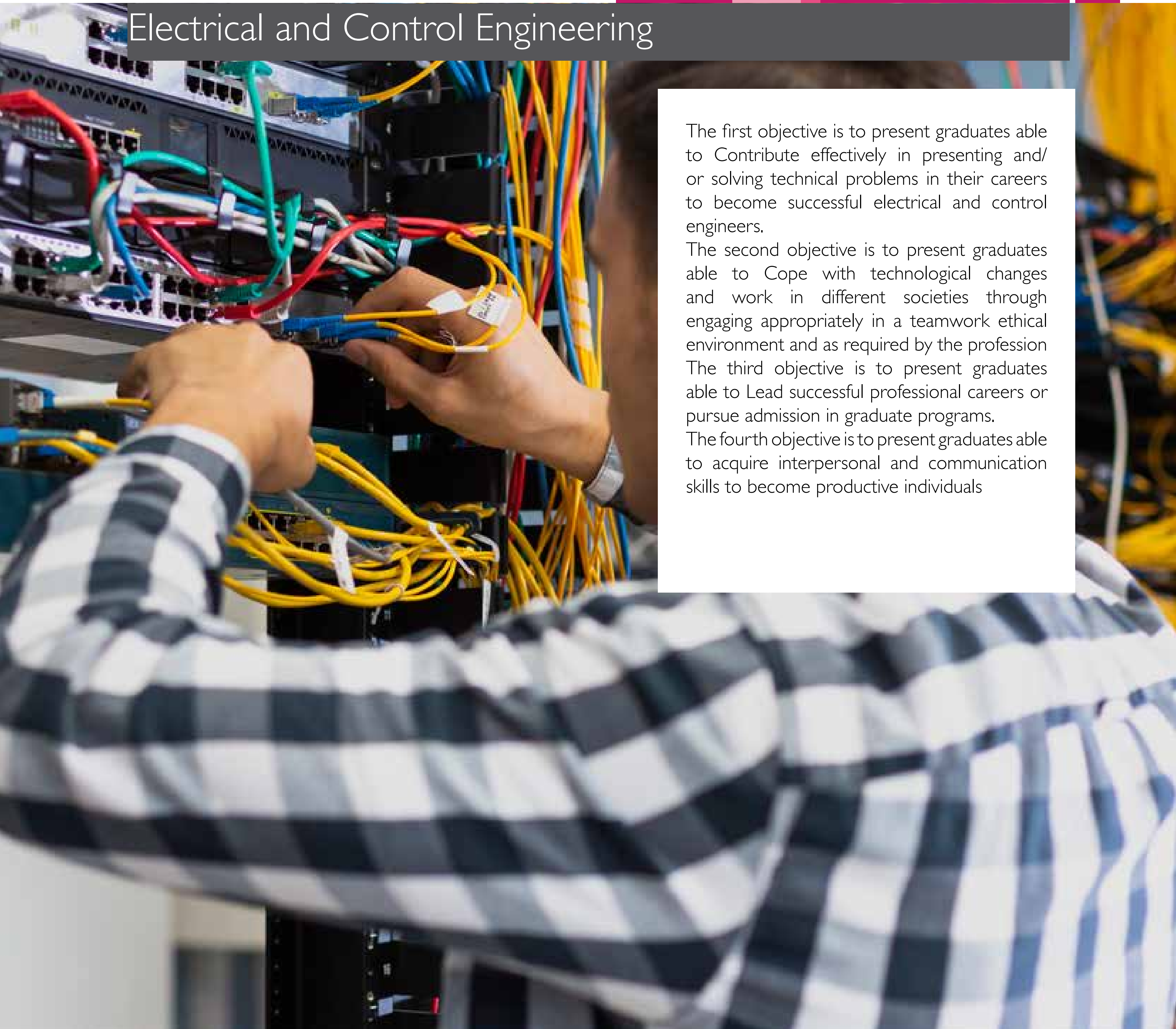
The final year project extends over two semesters, EC501 is part one of the project. Topics will depend on student's and supervisor's interest. They flay include data acquisition and interpretation- computer models and simulation or design and experimentation. Students are required to give a seminar to discuss the project idea, steps and submit a report.

EC 503 – Project II

Cr.6. Prerequisite: EC 501

The final year project extends over two semesters, EC503 is part two of the project. Topics will depend on student's and supervisor's interest. They flay include data acquisition and interpretation- computer models and simulation or design and experimentation. Students are required to give a seminar to discuss the project results and submit a final report.

Electrical and Control Engineering



The first objective is to present graduates able to Contribute effectively in presenting and/or solving technical problems in their careers to become successful electrical and control engineers.

The second objective is to present graduates able to Cope with technological changes and work in different societies through engaging appropriately in a teamwork ethical environment and as required by the profession

The third objective is to present graduates able to Lead successful professional careers or pursue admission in graduate programs.

The fourth objective is to present graduates able to acquire interpersonal and communication skills to become productive individuals

An Overview

Electrical and Automatic Control Engineering is an important field of engineering dealing with the study of operation, design and control of power systems, drives and control systems. By covering a range of topics such as power, electronics, control systems and signal processing specific objectives can be achieved.
It is well known that the degree of development of a nation is measured by its per capital consumption of electrical energy i.e. electrical energy utilization. The generation of electricity, its transmission and distribution are thus of primary concern of all developing and rapidly industrializing countries. It is estimated that almost 80% of generated power is used to drive motors, machines, electrical drives and power electronics (form a very important part of electrical power engineering).

The Role Of Electrical And Control Engineers

With electrification projects forging ahead in developing countries and peak demand forecast doubling every ten years, there is a pressing need for expert generation, transmission and distribution engineers. Also, under study by Arab and African countries are projects for the formation of super grids linking all nations from Iraq in the east to Morocco in the west and from North Africa across the continent to South Africa across with eventual interconnection with Europe.The scope of electrical power engineering is thus very wide indeed and power engineers are required to be knowledgeable in both conventional and frontline topics.
Automatic control systems are not only responsible for the modern way of life; they have indeed revolutionized all aspects of both civil and military life. Its industrial applications have speeded up the production and improved the quality of a very large number of manufactured goods. In power systems the wide use of automatic control systems has added to the reliability, stability and economy of generation, transmission and distribution systems.

Career Opportunities For Electrical And Control Engineers

Quick survey of engineering job vacancies at the daily newspaper reveals that Electrical and Control Engineering would collect almost 35% of the total engineering opportunities available. In fact, Electrical and Control Engineering department main objective is to introduce a qualified engineer to serve in the fields of:

- Generation, transmission, distribution and utilization of electrical power for public and private sectors to secure both continuous and emergency demands.
- Electrical power feeding for civil and military marine and aviation utilities.
- Electrical works in construction engineering.
- Renewable stand-alone generation systems for isolated communities.
- Automated industrial systems where computer-controlled systems are applied such as paper industry, steel production and fabrication industries, chemicals, petrochemicals & medicine production industries, spinning & weaving, food production industries … etc.
- Traction and lifting utilities.
- Electrical drives for all aspects of industry.

Academic Program Sheet

Year 1			
Semester 1		**Semester 2**	
BA 113	Physics I	BA 114	Physics II
BA 123	Mathematics I	BA 118	Chemistry
BA 141	Engineering Mechanics I	BA 124	Mathematics II
CC 111	Introduction to computer	BA 142	Engineering Mechanics II
IM 111	Industrial Relations	CC 112	Structured Programming
LH 131	English for Special Purposes I	IM 112	Manufacturing Technology
ME151	Eng. Drawing & Descriptive Geometry	LH 132	English for Special Purposes II
Year 2			
Semester 3		**Semester 4**	
LH 231	Technical Report Writing	BA 224	Mathematics IV
CC 216	Digital Logic Design	EE 233	Electrical and Magnetic Fields I
BA 223	Mathematics III	EE 232	Electrical Circuits II
ME 274	Material Science	EC 237*	Electronics Engineering
CC 213	Programming Applications	EE 211	Electrical Measurements & Inst. I
EE 231	Electrical Circuits I	NE 264	Scientific Thinking
Year 3			
Semester 5		**Semester 6**	
BA 323	Mathematics V	BA 327	Statistics & Numerical Methods
EC 323	Introduction to communication systems	EE 311	Fundamentals of Control Engineering
EE 312	Electrical Measurements & Instrumentation II	EE 333	Electrical and Magnetic Fields II
EE 321	Electrical Machines I	EE 322	Electrical Machines II
EE 341	Introduction to Power Engineering	EE 342	Power Systems I
EE 332	Network Analysis	EE 323	Power Electronics I

Year 4			
Semester 7		**Semester 8**	
CC 441*	Microprocessors Fundamentals	IM 400	Practical Training
ME 439	Thermo-fluids	ME 425	Power Plant Technology
EE 422	Electrical Machines III	NE 364	Engineering Economy
EE 423	Power Electronics II	EE 412	Control Systems II
EE 411	Control Systems I	EE 413*	Microprocessor Based Control
EE 441	Power Systems II	EE 424	Electrical Drives I
		EE 442	Power Systems Protection I
Year 5			
Semester 9		**Semester 10**	
EE 501	Project I	EE 503	Project 2
EE XXX	Restricted Elective (group A)	EE XXX	Restricted Elective (group A, B)
EE XXX	Restricted Elective (group A)	EE XXX	Restricted Elective (group A, B)
EE XXX	Restricted Elective (group B)	EE XXX	Restricted Elective (group A, B)
EE XXX	Restricted Elective (group B)	IM\NE XXX	Restricted Elective (Group C)
IM\NE XXX	Restricted electives (group C)		

Department Restricted Electives			
Group A		**Group B**	
EE 511	Discrete Control Systems	EE 521	Special Electrical Machines
EE 512	Automated Industrial Systems I	EE 522	Electrical Drives II
EE 513	Control Applications in Power Engineering	EE 523	Fundamentals of Renewable Energy
EE 514	Robotics	EE 541	Power System Protection II
EE 515	Computer Control of Dynamic Systems	EE 542	Electrical Power Stations
EE 516	Modern Control Systems	EE 543	Electrical Power Distribution
EE 517	Optimal & Adaptive Control	EE 544	Power Systems III
EE 518	Automated Industrial Systems II	EE 545	High Voltage Engineering
EE519	Industrial Communication Network	EE 546	Electrical Engineering Material
		EE 547	Utilization of Electrical Energy
		EE 548	Electromechanical Systems for Commercial Installation
		EE 549	Computer Applications in Electrical Engineering
Group C			
IM 423	Operation Research		
IM 535	International Operations Management		
NE 467	Management of Energy Resources		

Graduation Requirements

College Requirements					
A total of 81credit hours are required by the college as per the following table:					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
Compulsory Courses A total of 81 Cr. Hr. of the following compulsory courses					
BA	1	BA 113	Physics I	3	None
	2	BA 114	Physics II	3	BA 113
	2	BA 118	Chemistry	2	None
	1	BA 141	Engineering Mechanics I	3	None
	2	BA 142	Engineering Mechanics II	3	BA 141
	1	BA 123	Mathematics I	3	None
	2	BA 124	Mathematics II	3	BA 123
	3	BA 223	Mathematics III	3	BA 124
	4	BA 224	Mathematics IV	3	BA 223
	5	BA 323	Mathematics V	3	BA 224
	6	BA 327	Statistics and Numerical Methods	3	BA 124
CC	1	CC 111	Introduction to computer	3	None
	2	CC 112	Structured Programming	3	CC 111
	3	CC 216	Digital Logic Design	3	CC 111
	3	CC213	Programming Applications	3	CC 112
	7	CC 441*	Microprocessor fundamentals	3	CC 216 and EE 211
EC	4	EC 237*	Electronics engineering	3	EE 231
	5	EC 323	Intro. To communi. Systems	3	BA 224

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 81 Cr. Hr. of the following compulsory courses					
IM	1	IM 111	Industrial Relations	2	None
	2	IM 112	Manufacturing Technology	2	None
	8	IM 400	Practical Training	0	None
ME	1	ME 151	Eng. Drawing and Descriptive Geometry	2	None
	3	ME 274	Material Science	3	BA 114 and BA 142
	7	ME 439	Thermo fluids	3	None
	8	ME 425	Power Plant Technology	3	ME 439
LH	1	LH131	English for Special Purposes I	2	None
	2	LH132	English for Special Purposes II	2	LH 131
	3	LH231	Technical Report Writing	3	LH 132
NE	4	NE 264	Scientific Thinking	3	None
	8	NE 364	Engineering Economy	3	None

Department Requirements

A total of 99 credit hours are required by the department, which are distributed as follows:

- 72 credit hours of compulsory courses.
- A minimum of 27 credit hours of department restricted electives that are selected from the Three main senior standing courses groups as follows:
  - Maximum of five courses equivalent to 15 credit hours from the main area of interest, Group A or B of department restricted elective courses (major).
  - Minimum of two courses, equivalent to 6 credit hours from the other area, Group A or B of department restricted elective courses (minor).
  - Minimum of two courses from group C, equivalent to 6 credit hours (of department free elective courses).

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 72 Cr. Hr. of the following compulsory courses					
EE	4	EE211	Electrical Measurements & Instrumentation I	3	EE231
	5	EE312	Electrical Measurements &Instrumentation II	3	EE211
	6	EE311	Fundamentals of Control Engineering	3	BA224
	7	EE411	Control Systems I	3	EE311
	8	EE412	Control Systems II	3	EE411
	8	EE413*	Microprocessor-Based Control	3	None
	5	EE321	Electrical Machines I	3	EE232
	6	EE322	Electrical Machines II	3	EE321
	7	EE422	Electrical Machines III	3	EE322
	6	EE323	Power Electronics I	3	EC237*
	7	EE423	Power Electronics II	3	EE323
	8	EE424	Electric Drives I	3	EE 423 and EE 422
	3	EE231	Electric Circuits I	3	BA124
	4	EE232	Electric Circuits II	3	EE231

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 72 Cr. Hr. of the following compulsory courses					
EE	4	EE233	Electric & Magnetic Fields I	3	BA223 and EE 231
	5	EE332	Network Analysis	3	EE232
	6	EE333	Electric & Magnetic Fields II	3	EE 233
	5	EE341	Introduction to Power Engineering	3	EE232
	6	EE342	Power Systems I	3	EE341
	7	EE441	Power Systems II	3	EE342
	8	EE442	Power System Protection I	3	EE441
	9	EE 501	Graduation Project: Part (1)	3	S.S.*
	10	EE 503	Graduation Project: Part (2)	6	EE 501

Department Restricted Electives

At least nine courses (27 Cr. Hr.) from the following list of the college electives

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Group A	9 – 10	EE511	Discrete Control Systems	3	EE 412
	9 – 10	EE512	Automated Industrial Systems I	3	EE 411
	9 – 10	EE513	Control Applications in Power Engineering	3	EE 412
	9 – 10	EE514	Robotics	3	EE 412 and CC441*
	9 – 10	EE515	Computer Control of Dynamic Systems	3	EE 411
	9 – 10	EE516	Modern Control Systems	3	EE 412
	9 – 10	EE517	Optimal & Adaptive Control	3	EE 412
	9 – 10	EE518	Automated Industrial Systems II	3	EE 412 & EE 512
	9 – 10	EE519	Industrial Communication Network	3	EE 512
Group B	9 – 10	EE521	Special Electrical Machines	3	EE 422
	9 – 10	EE522	Electrical Drives II	3	EE 424
	9 – 10	EE523	Fundamental of Renewable Energy	3	EE 424
	9 – 10	EE541	Power System Protection II	3	EE 442
	9 – 10	EE542	Electrical Power Stations	3	EE 442
	9 – 10	EE543	Electrical Power Distribution	3	EE 441
	9 – 10	EE544	Power Systems III	3	EE 441
	9 – 10	EE545	High Voltage Engineering	3	EE 441
	9 – 10	EE546	Electrical Engineering Materials	3	EE 442
	9 – 10	EE547	Utilization of Electrical Energy	3	EE 441
	9 – 10	EE548	Electromechanical Systems for Commercial Installa-tion	3	EE 442
	9 – 10	EE549	Computer Applications in Electrical Eng.	3	EE 441

Department Restricted Electives

At least nine courses (27 Cr. Hr.) from the following list of the college electives

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Group C	9 – 10	NE 467	Management of Energy Resources	3	None
	9 – 10	IM 423	Operations Research	3	None
	9 – 10	IM 535	International Operations Management	3	None

Where the Three main course groups are:

- Group A: Automatic Control.
- Group B: Electrical Power and Machines.
- Group C: Free Elective Courses.

EE 211 – Electrical Measurements & Instrumentation I

Cr.3. Prerequisite: EE 231

Accuracy of Measurement and error analysis I - Accuracy of Measurement and error analysis II - Absolute and Secondary instruments - Secondary circuit instrumentation - Moving coil instruments - Moving iron instruments - Dynamometer type instruments and Induction instruments - Measuring of Active power - Measuring of power factor - DC Bridges - AC Bridges - Current transformers - Potential transformers – Oscilloscope

EE 231 – Electrical Circuits I

Cr.3. Prerequisite: BA 124

Basic dc circuit elements, series and parallel Networks - Ohm›s law and Kirchhoff's law - Nodal Analysis - Mesh Analysis - Source Transformation Method - Superposition Theory - Thevenin›s Theorem and Norton Theorem + 7Th week exam - Introduction of Magnetic Circuits - Analysis of Magnetic Circuits - Alternating current Fundamentals and AC generation - RMS value, average value, form factor and crisp factor - Phasor concept - Relation between voltage and current in resistor, capacitor and inductor - Sinusoidal response of RLC circuit - Series Resonance

EE 232 – Electrical Circuits II

Cr.3. Prerequisite: EE 231

Alternating current fundamentals and AC generation - RMS value, average value, form factor - RLC circuits analysis (series, parallel, node voltage)RLC circuits analysis (mesh current, Thevenin equivalent) - Star delta transformation – Resonance - Complex Power Calculations - Maximum Power Transfer - Three Phase Systems and Balanced Y-Y Circuit Y-Δ , Δ-Y, Δ-Δ Phase systems - Power Calculation in three Phase

System - Unbalanced Three Phase Circuits - Natural Response of parallel RLC circuits - Natural Response of series RLC Circuit - Step Response of Parallel RLC Circuits - Step Response of Series RLC Circuits

EE 233 – Electric & Magnetic Fields I

Cr.3. Prerequisite: EE 231 & BA 223

Vector analysis. - Coordinate system. - Coulomb's law - Electric Field intensity – Electrical flux density - Gauss Law - Divergence theorem - Potential difference - Potential gradient - Conductors and Dielectric - Capacitance. Boundary conditions – laplace and poisson equation

EE 311 – Fundamentals of Control Engineering

Cr.3. Prerequisite: BA 224

Introduction to Control Systems - Modeling of Mechanical Systems - Modeling of Electrical Systems Modeling of DC motor - Modeling of AC Servomotors - Block Diagram Reduction - Signal flow Graph Techniques - Time Response Analysis - Error analysis and system type - Stability analysis & Routh-Hurwitz Criterion - Root Locus - Applications

EE 312 – Electrical Measurements & Instrumentation II

Cr.3. Prerequisite: EE 211

Pressure sensors -Temperature Sensors - Flow Sensors - Level Sensors - Displacement Sensors (LVDT) - Ultrasonic sensors and tank gauges - Fundamentals of digital measurements - Data acquisition and A/D conversion - Application of op-amps for signal conditioning - Digital multimeters - Shaft Encoders - Design of signal conditioning and generation - Design of Data Acquisition circuits - Standard calibration - Industrial Application and case study

EE 321– Electrical Machines I

Cr.3. Prerequisite: EE 232

Construction and EMF equation of a DC machine - Definition of the magnetic terms, magnetic materials and the B-H curve - Energy Storage in Magnetic Systems Forces in Magnetic Field Systems - Torque equations in magnetic circuits - DC generators connections, characteristics and theory of operation - Commutation, armature windings, armature reaction and compensation techniques - DC Motor operation, characteristics and speed control - DC Motor starting and braking techniques. - Application and simulation of dc machine

EE 322 – Electrical Machines II

Cr.3. Prerequisite: EE 321

Types, basic theory of operation and construction of transformers - Equivalent circuits of single phase transformers - Voltage regulation and efficiency in transformers - Three phase transformers - Open delta connection - Scott (T) connection Auto transformers, tap changers, phase shifting and transformation methods - Instrument transformers - Parallel operation of transformers - Construction of three phase induction motor (IM)IM equivalent circuit parameters estimation - Power flow, losses and efficiency in 3-phase induction motors Torque/speed characteristics for the 3-phase IM - Starting of three-phase IM – Speed control for the 3- phase IM

EE 323 – Power Electronics I

Cr.3. Prerequisite: EC 237*

Introduction to Power Electronics - Power Diodes - Single phase half wave uncontrolled rectifier - Single phase full wave uncontrolled rectifier - Three phase uncontrolled rectifier - Filtering systems in rectifier circuits – Thyristors Commutation techniques - Line commutated single phase half wave controlled rectifier - Line commutated single phase full wave controlled rectifier Line commutated three phase controlled rectifier Dual Converter - Gate Drive Circuits - Typical and recent applications of rectifiers Recommended Case Studies: Battery Charger DC Drive - Evaluate the end of course project (DC power supply using a diode rectifier)

EE 333 – Electric & Magnetic Fields II

Cr.3. Prerequisite: EE233

The steady magnetic field - Force on a current carrying wire in a magnetic field - Biot Savart Law - Force between two parallel conductors carrying steady current - Magnetic flux and flux density - Magnetic flux over a closed surface - Torque on a loop and magnetic moment - Solenoid and the definition of inductor and its inductance - Inductance of simple geometrics - Ampere's law and its application for thin and thick co-axial cables - Magnetization, Magneto-static potential and Magneto-motive force - Energy and Co-energy in magnetic devices - Magnetic circuits - Time varying fields – Applications

EE 332– Network Analysis

Cr.3. Prerequisite: EE232

Filters - Bode plot - Circuit elements in the s- domain - Circuit analysis in the s-domain - The transfer function in partial fraction expansion – Application - the concept of magnetic coupling - Analysis of magnetically coupled circuits - Linear transformers - Ideal transformers - Two – port networks and it›s different equations form - Evaluation of its parameter - Analysis of terminated two-port circuits - Interconnected two- port networks - Application Case Study

EE 341 – Introduction to Power Engineering

Cr.3. Prerequisite: EE232

Elements of power system - Operating voltage choice - Parameters of overhead transmission lines (R&L) - Parameters of overhead transmission lines (C) - Representation of OHTL (short TL) - Representation of OHTL (medium TL) - Representation of OHTL (long TL) - Voltage regulation - Corona phenomenon and calculations - Mechanical design (sag calculations at same level) - Mechanical design (sag calculations at different level) - Mechanical design (insulators) - Mechanical design (types of poles and towers) - Underground cables (construction, types) - Underground cables (Electric field & insulation measurements)

EE 342 – Power Systems I

Cr.3. Prerequisite: EE 341

Single line diagram of power system– The per unit system– Bus admittance matrix– Bus impedance matrix– Power flow equations– Gauss- Seidel power flow solution– Newton Raphson power flow solution– Synchronous generator for power control– Tap changing transformers– Non-linear function optimization– Economic dispatch neglecting losses and no generator limits– Economic dispatch neglecting losses and including generator limits– Economic dispatch including losses.

EE 411– Control Systems I

Cr.3. Prerequisite: EE 311

Root Locus Revision and Concept of Compensation in Time Domain-Lead Compensation in Time Domain -Lag Compensation and lead-lag Compensator in Time Domain-Theory of P-I-D Controllers-Tuning of P-I-D Controllers-Frequency response analysis & Bode diagrams-Concept of Nyquist Stability Criterion-Polar plots-Relative Stability in Nyquist plot-Lead Compensation using Frequency Domain(Applied on Ship Steering Control)-Lag Compensation using Frequency Domain(Applied on Ship Steering Control)-modelling of linear systems-Phase variable and State Space Representation for Continuous System-State space using canonical-Presentation of projects

EE 412 – Control Systems II

Cr.3. Prerequisite: EE 411

Revision on State Space Representation for Continuous Systems-Applied on DC motor position control-State Space Solution and Properties of Transition Matrix-System Controllability & Observability-Eigen values, stability and state feedback -Pole placement in state feedback and System Observers-Difference equation and modelling of discrete system- Z-transform and its properties-Z-transform and its properties-Error Analysis of Discrete Control Systems-Root locus of Discrete Control Systems-State Space representation in Discrete systems(Applied on DC motor position control). Presentation of projects.

EE 413* – Microprocessor Based Control

Cr.3. Prerequisite: None

Types of Process Control Strategy - Timer modules with applications - Type of Signal and Digital Signal Conditioning. - A/D and D/A Conversion. - Data Acquisition Systems. - Analogue signal conditioning - Microprocessor and microcontroller as digital control - Microcontroller Programming- Digital Input/Output ports with applications - Microcontroller Principles and Configurations - Interrupts: Software and hardware with applications - Counters with applications - Special Instructions of Microcontrollers - Embedded system Applications.

EE 422 – Electrical Machines III

Cr.3. Prerequisite: EE 322

Synchronous generator construction - EMF & Equivalent circuit Power equation and efficiency calculation for the synchronous generators - Load angle definition and operation stability limits -Voltage regulation in synchronous generators - Synchronization, parallel operation and load sharing of synchronous generators - Automatic voltage regulation and excitation techniques - Synchronous Motor V-curves - Starting methods of the synchronous motors - Saliency effect in synchronous machines -Synchronous reluctance motor - Permanent magnet synchronous generator construction, theory of operation, equivalent circuit and governing equations Permanent magnet synchronous generators applications - Field testing of electrical machines

EE 423 – Power Electronics II

Cr.3. Prerequisite: EE 323

Single phase AC Voltage controllers principles - Single phase full wave AC voltage controllers - Three phase half wave AC voltage controllers - Three phase full wave AC voltage controllers - Cyclo-converters - The MOSFET Power Transistor - Chopper principles and classification - The buck and boost regulators - The Buck-Boost and the Cuk regulators - Principles and performance of PWM inverters - Three phase inverters - Voltage control techniques - Other kinds of inverters such as CSI - Applications Case study (Recommended UPS _V/F drive _Soft Starter _PV converter) - Applications(continued)

EE 424 – Electrical Drives I

Cr.3. Prerequisite: EE 422 & EE 423

Elements of Electric Drives - Dynamics of Electric Drive System - Single phase converter DC motor drives - Semi- converter DC drives - Full- converter DC drives - Dual and Reversible DC drive7Th week exam + Closed loop control of DC drives - Typical Applications Case Study: CNC Motor Drive - DC chopper drives for DC motors- Quadrant operating DC chopper drives - Induction motor drives, operation and performance - Voltage and frequency control of 3 phase induction motor drives - Current control of 3 phase induction motor drives - Closed loop control of induction motor drives and application case study: Pumping Stations - Synchronous Motor Drive

EE 441– Power Systems II

Cr.3. Prerequisite: EE 342

Transients in R-L Series Circuits– Internal voltage of loaded machines under faults conditions– Fault calculation using Z bus– The selection of circuit breakers– The symmetrical components of unbalanced phasors – Power in terms of symmetrical components– Sequence circuits of U & D impedance– Unsymmetrical faults on power systems and single line to ground faults– Line to line faults and double line to ground faults– power system stability - Further consideration of the swing equation - The power angle equation and synchronizing power correction - Equal-area criterion of stability - Further applications of equal-area criterion - Step-by-step solution of the swing curve

EE 442 – Power Systems Protection I

Cr.3. Prerequisite: EE 441

General principles of protection - Types of Relays and construction of over current relays - Instrument Transformers – Fuses - Circuit Breakers - Over current relays' settings - Transmission Line Protection Differential Protection - Protection of transformers - Protection of Motors - Generator Protection

EE 511 – Discrete Control Systems

Cr.3. Prerequisite: EE 412

Revision on discrete data systems and z transform - Revision on Root locus technique for discrete data - Applying MATLAB applications on Root Locus - Examples for discrete data - Design of digital control loops using root locus technique - Frequency response analysis of discrete data control systems - Design of discrete control loops using frequency response approach - Using MATLAB examples applied on Designing discrete control systems - Design of discrete data control system using PID controller in the time domain - PID tuning in the frequency domain for discrete data control system - MATLAB Applied examples on PID control – Controllability and Observability – State feedback for Discrete control systems - MATLAB Applied examples on State feedback for Discrete control systems - Case Studies and Applications(Two level tank system, motor speed control)

EE 512 – Automated Industrial Systems I

Cr.3. Prerequisite: EE 411

Introduction to Automation - Building Blocks and Components of Automated systems - Motor Control Center (MCC) Relay Logic - Programmable Logic Controller (PLC) Hardware - PLC Programming language - Programming with Logic Functions - Timers operation - Counters operation - Advanced Programming Techniques - Control Application Examples - Industrial Applications Examples - Practical Case Studies - Application Project - Advanced PLC and Automated Systems

EE 513 – Control Applications in Power Engineering

Cr.3. Prerequisite: EE 412

Control problems in electrical power system – An introduction - Modeling System Components in power system Dynamics - Excitation control Systems- QV control - Generation control systems - PF control Channel

EE 514 – Robotics

Cr.3. Prerequisite: EE 412 & CC 441*

Introduction to Robotic systems - Actuator and Sensors - Rigid motion and Homogenous Transformation Matrix - Euler Angles and Arbitrary axes Denavit–Hartenberg Convention - Inverse kinematics - 7thweek+ Closed Chain kinematic Wheeled Mobil Robot - WMR Velocity kinematics Modelling - WMR Velocity kinematics Modelling - WMR Mobility, Actuation and Sensing Characteristics - WMR Mobility, Actuation and Sensing Characteristics - WMR Levels of Control, Actuators, Robot Velocity, Position Control - WMR Levels of Control, Actuators, Robot Velocity, Position Control - Collision Avoidance of a WMR - WMR Navigational Systems

EE 515 – Computer Control of Dynamics Systems

Cr.3. Prerequisite: EE411

Introduction to computer control, Relation between S-domain and-Z domain, Digital redesign of continuous control, Realization of discrete system, Implementation of digitized analog controller, state feedback in discrete form, Realization of state feedback in discrete form, PC based data acquisition systems, Algorithms for digital PID Controllers, Algorithms for digital tuned PID Controllers, Introduction to Digital Filters – FIR and IIR, Design and Implementation of some FIR and IIR filters, Case study applications.

EE 516 – Modern Control Systems

Cr.3. Prerequisite: EE 412

State space analysis for L.S - Nonlinear state space equation - Decomposition of linear systems (1) - Dead beat response - Pole assignment by using state FB - Observer and state estimation - Introduction to linear optimization - Introduction to self-tuning systems - System estimation

EE 517 – Optimal and Adaptive Control

Cr.3. Prerequisite: EE 412

Review of modern control approach - Calculus of Extrema - Mathematical modelling - Optimization techniques - Adaptive systems - General Revision.

EE 518 – Automated Industrial Systems II

Cr.3. Prerequisite: EE 412 & EE 512

Review automation system components - Advanced Programming Of PLC - Structure Programming and programming Blocks - Analog Signal Processing - Data Block and Data Storage - Trouble Shooting using PLC - Case study - Data Interchange and serial communications - Communication networks protocol and topology - Industrial protocol - Human Machine interface (HMI) and SCADA - Case study and application

EE 519 – Industrial Communication Networks

Cr.3. Prerequisite: EE 512

Basic process control system hierarchy - Process and control loop Characteristics and industrial control terminology - Piping and Instrumentation Diagram (P&ID) - Standard and advanced regulatory controller - Electrical power plant as an example of process control system Case Study - Steam power plant control loops: Fuel control loop - Steam Power plant Control loops: Three element control (Feed water, Drum water level, steam pressure and Steam flow rate) - Advanced Regulatory control system: Cascaded Control loop - Advanced Regulatory control system: Feed Forward Control - Advanced Regulatory control system: Ratio Control - Principle of auto-tuning system - Process Optimization Principle - Recent technologies of Process control system - Advanced technologies of Process control system - Project Evaluation & Discussion.

EE 521 – Special Electrical Machines

Cr.3. Prerequisite: EE 422

Two Phase AC Motors - Single Phase AC Motors - Starting of Single Phase AC Motor - Single phase commutator series motor (Universal Motor) Energy conversion in doubly salient machines - Three phase conventional reluctance machines - Salient pole synchronous reluctance motor – Operation principles of stepper motor - Permanent magnet stepper motors - Variable reluctance stepper motors - Switched reluctance motors - Linear induction motor - Induction Generator - Operation and performance of permanent magnet DC motors - Uni and bi-directional brushless DC motors

EE 522 – Electrical Drives II

Cr.3. Prerequisite: EE 424

Choice of electrical motors suitable for Industrial applications - D-Q model of DC machines - Voltage control of DC machines based on D-Q - Speed control of DC motors based on D-Q model - D-Q model of Induction motor - Direct torque control of Induction motor (DTC)Generalized Torque equations of switched reluctance motor (SRM)Variable speed control of reluctance motor - A comparison between voltage fed and current fed VSD Commercial examples of VSD - Introduction to machine design - Material selection suitable for electrical machines - Basics of transformer design3 phase transformer design - DC machine design

EE 523 – Fundamentals of Renewable Energy

Cr.3. Prerequisite: EE 424

Power for sustainable future - Geothermal energy - Geothermal energy - Biomass energy - Wave energy - Solar energy - Wind energy - Grid code - Reactive Power and renewable energy

EE 541 – Power System Protection II

Cr.3. Prerequisite: EE 442

Static/ digital versus electromechanical relays– Relaying practices– Components, detectors and applications– Hardware of digital relay– Mathematical background for digital protection– Digital O.C. relay– Digital distance relay– Digital protection of rotating machines– Digital protection of transformers– Digital bus bar protection– Integration of protection and control in substations– Traveling wave based protection– Recent topics in digital protection.

EE 542 – Electrical Power Stations

Cr.3. Prerequisite: EE 442

Introduction to Power Station - Classical Energy sources New Energy source - Types of generating stations (1) - Comparison between different types of power stations - Load and Load curves - Active and reactive power control - Parallel operation and coordination - Power plant economics - Types and description of substations - Design of Substations - Earthing of Substation - Automation

EE 543 – Electrical Power Distribution

Cr.3. Prerequisite: EE 441

Introduction to electrical distribution systems - Distribution systems layouts and configurations - Electrical Load Characteristics - Electrical Load Estimation - Voltage Regulation and Profile - Voltage Drop Calculations - Branching Circuit Design - Short Circuit Calculations and Protection of LV and MV Systems - Power Factor Correction Methods and Benefits - Sizing Power Factor Banks for Distribution Transformers, OHLs and Industrial Motors - Distribution Transformers Types, Connections and Vector Groups - Cooling Classes and Sizing of Distribution Transformers – Distributors - Operation and Control of Distribution System - Power Quality in Distribution System

EE 544 – Power Systems III

Cr.3. Prerequisite: EE 441

Introduction - Reliability concepts - Network reduction methods and economic dispatch for combined cycle Hydro and thermal units. - Reliability of distribution system –Capacity output reliability table - Reliability Indices - Load forecast basics - Methods of load forecasting - Power quality basics - Standards for power quality - Harmonics sources and effects - Harmonic filtering - SCADA basics - SCADA in electrical power system

EE 545 – High Voltage Engineering

Cr.3. Prerequisite: EE 441

Generation of High Voltage dc - Generation of AC High Voltage - Generation of Impulse Voltages and Currents - Measurements of High Voltages - Sources of Transients in Power Systems -Traveling Waves - Lattice Diagram - Insulations - Surge Arresters - High Voltage Circuit Breakers - Gas Insulated Switchgear - Insulation Coordination –Testing HVDC studies.

EE 546 – Electrical Engineering Materials

Cr.3. Prerequisite: EE 442

Electric materials classification– Dielectrics Macroscopic & Microscopic approaches– Types of polarization – frequency response – complex permittivity– Dielectric losses and their measurements– Dielectric Breakdown (1)– Applications of Dielectrics– Magnetic materials: Macroscopic & Microscopic approaches– Hysteresis – Applications– Superconductivity and superconductors– Polymers and their characteristics– Ceramics and their characteristics– Optical fibers and their properties– Corrosion and cathodic protection of metals.

EE 547 – Utilization of Electrical Engineering

Cr.3. Prerequisite: EE 442

Terms used in illumination and laws of illumination - Polar curves and photometry - Design of illumination schemes - Electric heating - The arc furnaces and electric welding - Comparison between AC and DC welding - Ideal traction system - Train movement and energy consumption - Electric traction motors - Control of traction motors - Electrolytic processes - Calculation of current required for depositing a metal – Refrigeration - Air conditioning - Tariffs

EE 548 –Electromechanical Systems for Commercial Installations

Cr.3. Prerequisite: EE 442

Characteristics of Industrial & Commercial Loads - Selection of distribution system - Wiring systems - System protection & coordination - Controllers & MCC - Power factor and p.f. correction – Lighting - Heating and Air Conditioning - Special Loads - Lifts and escalators – Grounding - Safety and Fire Alarm Codes and Standards

EE 549 – Computer Applications in Power Systems

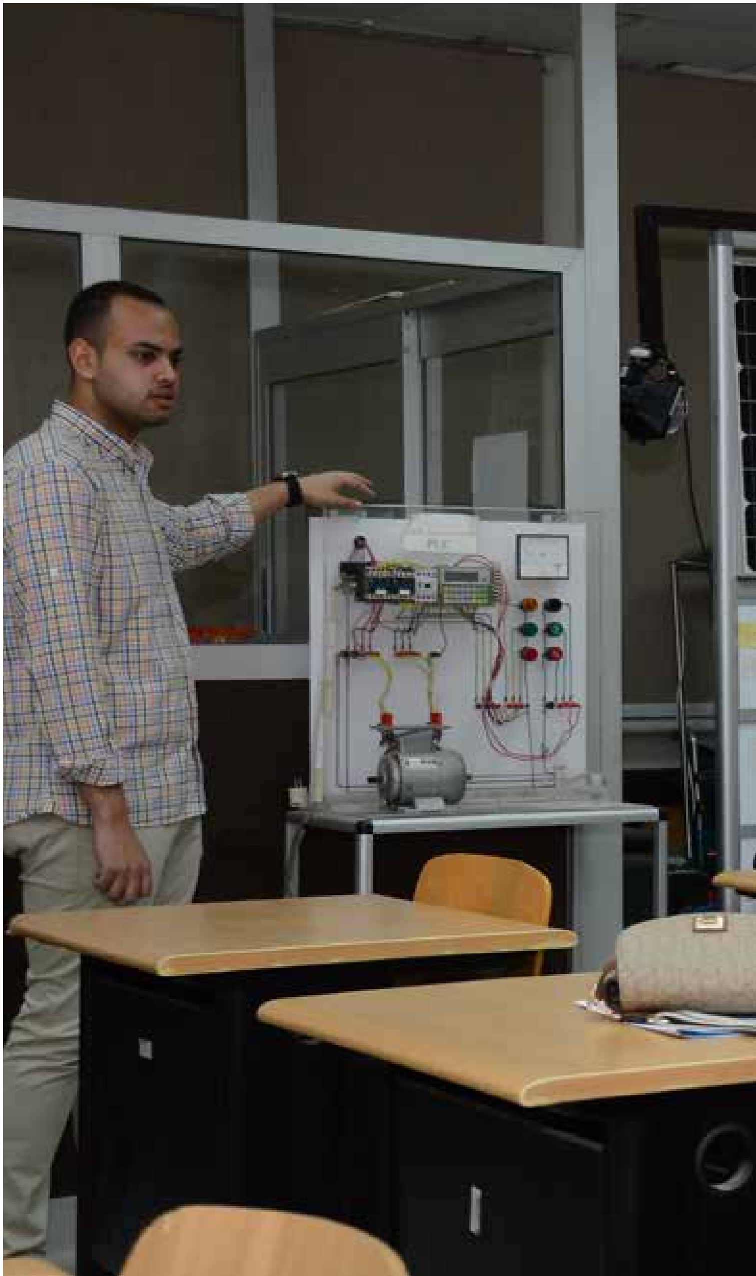
Cr.3. Prerequisite: EE 441

Introduction - Matlab loops and function - Matlab - Symbolic Processing - Applications of Matlab in control - Simulink – Introduction - How to create a model – Power System Matrices – Programming Considerations - Fault Studies - Computer programs for fault calculations - Power system stability calculations using Matlab - Artificial Intelligence (AI) techniques – Introduction - ANN – types & models - Applications of AI and ANN in power systems.

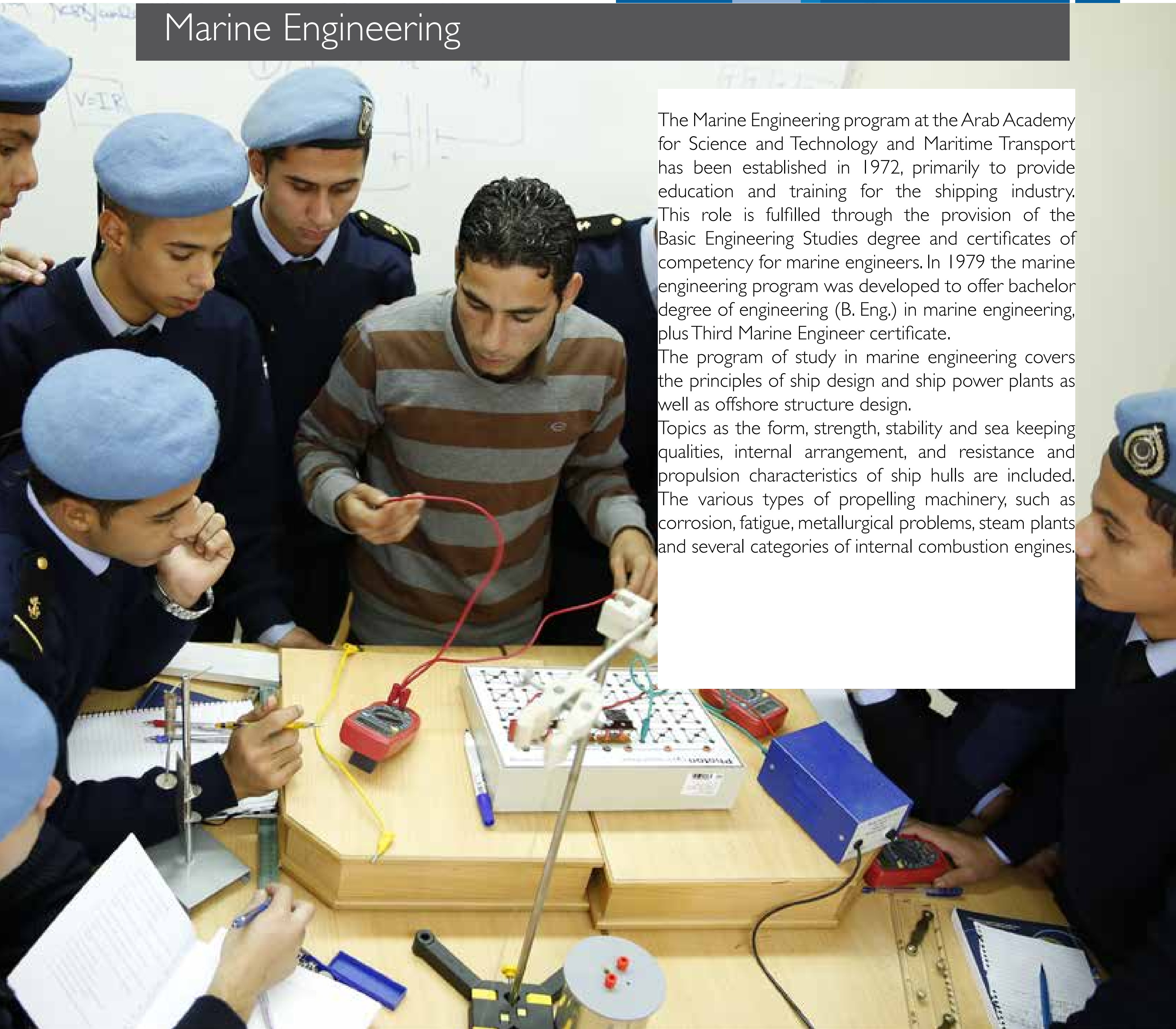
EE 501 + EE 503 – Project I + Project II

Cr.3+Cr.6. Prerequisite: Completion of 138 Credit Hours and a GPA of at least 2.00.

The final year project extends over two semesters– Topics will depend on student's and supervisor's interest– They flay include data acquisition and interpretation– Computer models and simulation or design and experimentation– Students are required to give a seminar to discuss the project results and submit a final report.



Marine Engineering



The Marine Engineering program at the Arab Academy for Science and Technology and Maritime Transport has been established in 1972, primarily to provide education and training for the shipping industry. This role is fulfilled through the provision of the Basic Engineering Studies degree and certificates of competency for marine engineers. In 1979 the marine engineering program was developed to offer bachelor degree of engineering (B. Eng.) in marine engineering, plus Third Marine Engineer certificate.

The program of study in marine engineering covers the principles of ship design and ship power plants as well as offshore structure design.

Topics as the form, strength, stability and sea keeping qualities, internal arrangement, and resistance and propulsion characteristics of ship hulls are included. The various types of propelling machinery, such as corrosion, fatigue, metallurgical problems, steam plants and several categories of internal combustion engines.

In addition to the marine engineering, the department offers specialization in offshore engineering.

The Marine Engineering program at the Arab Academy for Science and Technology and Maritime Transport prepares well qualified marine engineers who play a significant role in shipping industry and marine business. Their responsibility will be the provision, management, design, selection to do installation, operation and maintenance of the engineering systems and associate equipment encountered in the shipping sector as well as marine industry.

Since the design of Marine systems encompasses many Engineering fields, graduates of this department are called to handle diverse professional responsibilities. Therefore, the program includes the fundamentals of physical science and mathematics as well as a broad range of engineering aspects that are environmentally friendly. To provide the appropriate educational breadth, it is also desirable that as many courses in the humanities and social sciences be elected and accommodated. It is recognized that the undergraduate program cannot treat all of the important aspects of engineering for the marine environment that may be desired by the student graduate work is therefore encouraged.

The undergraduate program is arranged to give the students broad knowledge in engineering mechanics by requiring basic courses in the areas of structural mechanics, hydrodynamics, marine power systems, and marine dynamics.

The program has been planned to satisfy the requirements of the Supreme Council of Universities in Egypt (SCU) and Accreditation Board for Engineering & Technology (ABET).

Academic Program Sheet

Year 1			
Semester 1		**Semester 2**	
LH131	ESP (1)	LH132	ESP (2)
BA123	Mathematics (1)	BA124	Mathematics (2)
BA113	Physics (1)	BA114	Physics (2)
CC111	Introduction to Computer	CC114	Introduction to Programming
ME151	Eng. Drawing & Projection	IM112	Manufacturing Technology
BA141	Eng. Mechanics (1)	BA142	Engineering Mechanics (2)
MT112T	Marine safety	BA118	Chemistry
P 101	Physical Education (1)	P 102	Physical Education (2)
D 101	Leadership (1)	D 102	Leadership (2)
Year 2			
Semester 3		**Semester 4**	
LH 231	Technical Report Writing	BA 224	Mathematics (4)
BA 223	Mathematics (3)	EE 218	Instrumentation & Measurements
ME 252	Mechanical Engineering Drawing	IM 212	Manufacturing Process (1)
ME 231	Thermodynamics	MM 221	Marine Diesel Engine (1)
EE 238	Electrical Eng. Fundamentals	MM 241	Naval Arch. & Ship Construction
ME 274	Material Science	MM 211	Marine Engineering (1)
P 203	Physical Education (3)	P 204	Physical Education (4)
D 203	Leadership (3)	D 204	Leadership (4)

Year 3			
Semester 5		**Semester 6**	
MM 322	Marine Diesel Engines (2)	ME 355	Theory of Machines
MM 312	Marine Engineering (2)	MM 317	Marine & Offshore Simulation
MM 342	Naval Arch. & Ship Construction (2)	MM 346	Marine Hydrodynamics 1
EE 320	Marine Electrical Engineering	ME 276	Stress Analysis
EE 310	Marine Control Systems	EE 329	Electrical Machines
MM 313	Watch Keeping Duties	NM 291 or MM 382	Maritime Law or Maritime Economics
D 305	Leadership (5)		
P 305	Physical Education (5)		
N 310	Nautical Technology		
N 370	Marine Safety		
Year 4			
Semester 7			
MM 415	Marine Engineering 3	IM 400	Practical Training
ME 454	Machine Design	ME 434	Refrigeration & Air Conditioning
ME 431	Heat Transfer	ME 423	Steam Plant Engineering
MM 447	Marine Hydrodynamics 2	ME 455	Computer Aided Design
EE 418	Automatic Control Systems	MM 429	Electric Ship Design
CC 442	Digital Electronics & Microprocessors	MM 471	Intro. to Offshore Engineering
		MM 423	Marine Diesel Engines 3
Year 5			
Semester 9		**Semester 10**	
MM 543	Ship Design	MM 526	Maintenance Planning for Marine Units
IM 423	Operations Research	MM 544	Shipyard Technology
MM 501	Project (1)	MM 503	Project (2)
MMXXX	Department Restricted Elective	MMXXX	Department Restricted Elective
MMXXX	Department Restricted Elective	MMXXX	Department Restricted Elective
MMXXX	Department Restricted Elective		

Department Restricted Electives			
Group A		**Group B**	
MM 548	Design of Special Types of Ships	MM 573	Oil & Gas Production Technology
MM 525	Marine Power Plant Design & Operation	MM 571	Design & Const. of Offshore Structures
ME 458	Mechanical Vibrations	MM 572	Drilling Technology
MM 545	Ship Resistance and Powering	MM 570	Underwater Technology
MM 528	Ship Propulsion Systems	MM 575	Offshore Engineering
ME 565	Turbo-machinery	MM 576	Hydromechanics of Offshore Structures

Graduation Requirements

Candidates for bachelor degree of engineering (B. Eng.) in Maine Engineering plus Third Marine Engineer Certificate, must complete the professional degree program which consists of five years study (10 semesters, 180 Cr Hrs). The program of study comprises the following instructional and training phases:

PHASE - I

A phase of study at the Academy on internal residence. Consists of four semesters with a minimum duration of two years.

PHASE - II

A guided sea-training period on board the training ship of the Academy (AIDA IV), for duration of four months; equivalent to a six months period of practical sea training. The guided sea training is carried out under the supervision, guidance and evaluation of the Marine Engineering Department in coordination with the Sea Training Department.

PHASE - III

A phase of study at the department on external residence basis for five semesters. Minimum duration of two and half years.

Completion of the study of phase - I, together with a guided sea-training period onboard the training ship of the Academy, qualifies the student to appear before a Board of Examiners of Engineers for written and oral examinations for the award of a certificate of competency as Engineer Watch keeper (Third Marine Engineer).

At the beginning of the 9th term, students decide on one of the two offered areas:

- Marine Engineering
- Offshore Engineering

In the final year, students form design teams and work on engineering application projects. Professors from universities and professional engineers from the marine industry are invited to evaluate and assess the final students' project report.

College Requirements					
A total of 52 credit hours are required by the college as per the following table:					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
Compulsory Courses					
BA	1	BA 113	Physics (1)	3	None
	1	BA 118	Chemistry	2	None
	1	BA 123	Mathematics (1)	3	None
	1	BA 141	Engineering Mechanics (1)	3	None
	2	BA 114	Physics (2)	3	BA 113
	2	BA 124	Mathematics (2)	3	BA 123
	2	BA 142	Engineering Mechanics (2)	3	BA 141
	3	BA 223	Mathematics (3)	3	BA 124
	4	BA 224	Mathematics (4)	3	BA 223
CC	1	CC 111	Introduction to Computer	3	None
	2	CC 114	Introduction to Programming	3	CC 111
IM	2	IM 112	Manufacturing Technology	2	None
LH	1	LH 131	ESP I	2	None
	2	LH 132	ESP II	2	LH 131
	3	LH 231	ESP III	3	LH 132
ME	2	ME 151	Eng. Drawing & Projection	2	None

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 52 Cr. Hr. of the following compulsory courses					
	1	MT112T	Marine safety	2	None
	1	P 101	Physical Education 1	0.5	None
	2	P 102	Physical Education 2	0.5	P 101
	3	P 203	Physical Education 3	0.5	P 102
	4	P 204	Physical Education 4	0.5	P 203
	5	P 305	Physical Education 5	0.5	P 204
	1	D 101	Leadership 1	0.5	None
	2	D 102	Leadership 2	0.5	P 101
	3	D 203	Leadership 3	0.5	P 102
	4	D 204	Leadership 4	0.5	P 203
	5	D 305	Leadership (5)	0.5	P 204
	5	N 310	Nautical Technology	1	None
	5	N 370	Marine Safety	1	None

Department Requirements

A total of 128 credit hours are required by the department, which are distributed as follows:

- 113 credit hours of compulsory courses.
- A minimum of 15 credit hours of department restricted electives that are selected from the two main course groups as follows:
    - Four courses equivalent to 12 credit hours from the main area of interest.
    - One course, from the other group, equivalent to 3 credits.

The required compulsory and restricted elective courses are listed in the following table.

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 113 Cr. Hr. of the following compulsory courses					
CC	7	CC 442	Digital Design and Intro. to Microprocessor	3	CC 114
EE	3	EE 238	Electrical Eng. Fundamentals	3	BA 124
	4	EE 218	Instrumentation & Measurements	3	EE 238
	5	EE 310	Marine Control Systems	2	EE 218
	5	EE 320	Marine Electrical Engineering	1	EE 238
	6	EE 329	Electrical Machines	3	EE 238
	7	EE 418	Automatic Control Systems	3	EE 329
IM	4	IM 212	Manufacturing Processes	3	IM 112
	9	IM 423	Operation Research	3	90 Cr.Hr.
ME	3	ME 231	Thermodynamics	3	BA 114
	3	ME 252	Mechanical Engineering Drawing	3	ME151
	3	ME 274	Materials Science	3	BA 114 & BA 142
	6	ME 276	Stress Analysis	3	ME 274
	6	ME 355	Theory of Machines	3	BA 142
	7	ME 431	Heat Transfer	3	ME 231
	7	ME 454	Machine Design	3	ME 276 & ME 252
	8	ME 423	Steam Plant Engineering	3	ME 431

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses					
A total of 113 Cr. Hr. of the following compulsory courses					
ME	8	ME 434	Refrigeration & Air Conditioning	3	ME 431
	8	ME 455	Computer Aided Design	3	ME 454
MM	4	MM 211	Marine Engineering (1)	3	None
	4	MM 221	Marine Diesel Engine (1)	3	ME 231
	4	MM 241	Naval Arch. & Ship Construction (1)	3	None
	5	MM 312	Marine Engineering (2)	2	MM 211
	5	MM 313	Watch Keeping Duties	2	None
	5	MM 322	Marine Diesel Engines (2)	2	MM 221
	5	MM 342	Naval Arch. & Ship Construction (2)	2	MM 241
	6	MM 317	Marine & offshore simulation	3	None
	6	MM346	Marine Hydrodynamic 1	3	MM 241
	6	MM381	Maritime Law OR	3	None
		MM 382	Maritime Economics	3	None
	7	MM 415	Marine Engineering (3)	3	MM 312 or MM221
	7	MM 447	Marine Hydrodynamic 2	3	MM 346
	8	MM 423	Marine Diesel Engines (3)	3	MM 322 or MM221
	8	MM 429	Electrical Ship design	3	EE329
	8	MM 471	Intro. to Offshore Engineering	3	None
	9	MM 501	Senior Project 1	3	135 Cr. Hr.
	9	MM 543	Ship Design	3	MM 241& ME 276
	10	MM 503	Senior Project 2	6	MM 501
	10	MM526	Maintenance Planning for Marine Units	3	126 Cr.Hr.
	10	MM 544	Shipyard Technology	3	MM 543

Department Restricted Electives

At least five courses (15 Cr. Hr.) from the following list of the college electives from the following main course groups:

- Group A: Marine Engineering
- Group B: Offshore Engineering

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Group A	9 – 10	ME 458	Mechanical Vibrations	3	ME 355
	9 – 10	ME 565	Turbomachinery	3	MM 447
	9 – 10	MM 548	Design of special types of ships	3	MM 543
	9 – 10	MM 525	Marine Power Plants design and operation	3	MM 423
	9 – 10	MM 528	Ship Propulsion Systems	3	MM 447& MM 241
	9 – 10	MM 545	Ship Resistance and Powering	3	MM 447& MM 241
Group B	9 – 10	MM 570	Underwater Technology	3	MM 471
	9 – 10	MM 571	Design & Construction of Offshore Structures	3	MM 471
	9 – 10	MM 572	Drilling Technology	3	MM 471
	9 – 10	MM 573	Oil & Gas Production Technology	3	MM 471
	9 – 10	MM 576	Hydromechanics of offshore structures	3	MM 471
	9 – 10	MM 575	Offshore Engineering	3	MM 471

Course Summary Description

MM 211 - Marine Engineering 1

Cr.3. Prerequisite: None

Introduction to marine engineering, types of marine power plants, introduction to marine auxiliary engines transmission of power through propulsion systems - thrust bearing- shafting - shaft bearing- stern tube- propeller - different types of pumps - displacement and retodynamic - construction - performance - characteristics - heat exchangers - central cooling systems.

MM 221 - Marine Diesel Engines 1

Cr.3. Prerequisite: ME 231

Classification of internal combustion engines - construction details - systems of marine diesel engines - super-charging - marine fuels and fuel injection systems - combustion and diesel knocking - engine preparation and starting - engine performance and heat balance analysis and calculation. Operation and trouble shooting. Hands-on laboratory work is an integral part of this course.

MM 241 - Naval Architecture and Ship Construction 1

Cr.3. Prerequisite: None

The course deals with the main topics of naval architecture (e.g. - ship's term - principal dimensions - form coefficients - calculations of areas and volumes - center of gravity and buoyancy - initial stability - trim - resistance and powering) and ship construction (e.g. - ship's types - systems of framing - welding - material – classification societies - etc…).

MM 312 - Marine Engineering 2

Cr.3. Prerequisite: MM 211

Pumping systems - cooling systems - ballast system - bilge system - piping fitting - types of valves – deck machinery - watch keeping duties. Introduction to steering gear.

MM 313 - Watch Keeping Duties

Cr.3. Prerequisite: None

Watch keeping arrangements and procedures - keeping a safe engine watch - keeping a watch in port - keeping an effective engine watch in port under normal circumstances - keeping a safe engine watch at sea going - watch keeping routine duties - engine room log book data steps to prepare for maneuvering - procedures taken in an emergency case in the engine room.

MM 317 - Marine and offshore simulation

Cr.3. Prerequisite:none

Introduction to geometric main dimensions of ship hull form and platform rigs, drawing and fairing of ship lines, lines plans for different ship types, different types of bows and stern, ship form, space allocations and general arrangements GA, Midship section, shell expansion drawing, aerofoils and their marine applications, airfoil drawing, applications to rudders and ducts, propeller geometry, propeller drawings, introduction to engine room simulator, simulation of main engines, ship auxiliary system, simulation of electric power plants.

MM 322 - Marine Diesel Engines 2

Cr.3. Prerequisite: MM 221

The training machinery installations - main and auxiliary engines preparations -starting - condition monitoring and stopping procedures - actual systems of training ship - cooling - lubrication - fuel and starting systems of main propulsion plant - main diesel engine propulsion system evaluation using the diesel engine combustion performance analyzer - engine trouble shooting study and analysis - marine machinery maintenance.

MM 342 - Naval Architecture and ship construction 2

Cr.2. Prerequisite: MM241

Merchant ship types principle dimensions - ship stresses - framing system - ship structural items - typical mid ship sections longitudinal and transverse members - types of rudders - docking of ship - inspection and maintenance work of all under water fittings - different surveys required by the rules of classification societies.

MM 346 – Marine Hydrodynamic 1

Cr.3. Prerequisite: MM 241

Introduction - Physical properties of fluids – Fluid Statics- Forces on submerged plane and curved surfaces- Buoyancy – Stability of immersed and floating bodies– Flowing fluids and pressure variation- Fluids kinematics – Vorticity- Stream Function and Velocity Potential – Irrotational flow – Euler and Bernoulli's equations-Reynolds Transport and Control Volume Approach – Continuity Equation – Differential form of continuity equation-Basic Flows (Uniform , source, sink, doublet, vortex)- Principle of superposition – Laplace Equations – Circular Cylinder with and without Circulation- Conformal mapping – Kukowski Transformation - Airfoils –Lift equation.

MM381 – Maritime Law

Cr.3. Prerequisite: None

Introduction in Maritime law – Main International maritime organizations – Flag State – Coastal State – Port State – Ship Marks – Classification Sociteites – International Conventions (SOLAS 1974) – International Conventions (LL 1966) – International Conventions (STCW 95) – International Marine Accidents – International Conventions (MARPOL 7378/) – Ship's Certifcates and documents.

MM 382 – Maritime Economics

Cr.3. Prerequisite: None

An overview of the Shipping market - The Economic and Political Framework - The Economics of Seaborne Trade and Cargo - Shipping Market Organization - The Charter Market - The Economic Principles - Supply , Demand and Shipping market Cycles - The Business Environment - The shipping market Supply / Demand Model - The Demand Function - The Supply Function - Shipping Cost, Revenue and Financial Performance - Cash flow - The Running Cost Calculation - The Capital Cost Calculation - The Revenue Calculation - Computing the Cash flow - The Intel national Framework of Maritime Economics - General Cargo and The Economics of Liner Shipping - What is the Liner Cargo? - Principles of The Liner Conference system - What is the General Cargo - Traditional Liner operator - Unitization of General Cargo - The Major Liner Routes - The Organization of Liner Industry - Liner Tariffs and the Price Mechanism - Bulk Cargo and the Economics of Liner - The Commercial organs of Bulk Shipping - What is the Bulk Cargo? - The liquid Bulk Cargoes - The five major dry bulk. - The minor bulk trade -Refrigorated Cargo -The Economics of Ships and Ship Designs

MM 415 - Marine Engineering 3

Cr.3. Prerequisite: MM 312 – MM221

Shafting Arrangement - Pumps design consideration - Shipboard Piping Systems design - Heat Exchanger Design - Marine Pollution - Deck Machinery - Procedures taken in an emergency case in the engine room

MM 423 - Marine Diesel Engines 3

Cr.3. Prerequisite: MM 221 - MM322

Review of marine diesel engines constructional features - kinematics and dynamics of crankshaft mechanisms - combustion chamber analysis and design - fixed and moving parts analysis and design. Design of diesel engine cooling and fuel injection systems. Moreover the exhaust system analysis and design will be introduced.

MM 447 – Marine Hydrodynamic 2

Cr.3. Prerequisite: MM346

Review of Control volume approach,- Momentum equation (derivation and interpretation), Moment of momentum equation, Navier Stokes equation, Energy equation, Hydraulic and Energy grade lines, application to pipe flows, Dimensional analysis and Similitude, Surface resistance, Laminar and turbulent boundary layer, drag and lift.

MM 471 - Introduction to Offshore Engineering

Cr.3. Prerequisite: None

Principles of oceanography - geological properties of the ocean floor. Offshore prospecting. Winds - waves - tides and currents – history and development of offshore industry – types of offshore structures and vehicles - their performance - capabilities and limitations – fixed structures - compliant structures -

mobile structures - semi-submersibles - support and supply vessels - sub-sea systems – oil and gas drilling & production technologies – safety aspects of offshore installations.

MM 548–Design of Special types of Ships

Cr.3. Prerequisite: MM 543

General arrangement of some special ship types, General design theories and approaches, introduction to conceptual design of special types of ships, methods of ship design, Preliminary design methods for sizing and form, estimation of a ship's dimensions, weights, and capacity, Selection of principal dimensions, form coefficients, materials, and scantlings of hull structure, mast and rigging, Hydrostatics, stability, subdivision analysis, load lines and freeboard, tonnage, Computer aided representation of hull shape and drawings. Preliminary lines plan, Powering, maneuvering, and sea-keeping estimation, Propeller, main machinery, and auxiliary machinery, , Development of structural arrangement and supporting calculations for main structural members according to classification society requirements using steel, and different codes aluminum or composite material, Practical design and layout of modern high-speed vessels, Hydrodynamics, resistance, propulsion and motions of specific type of high speed ships: Catamarans, hydrofoils and hovercrafts, Safety considerations.

MM 525 – Marine Power Plant Design and Operation

Cr.3. Prerequisite: MM 423

Design features and requirements of marine power plants, Steam power plant, gas turbine power plant, diesel engines power plant, combined power plants, design of components and supporting systems, machinery arrangement and design of engine room layout, waste heat recovery and energy conservation systems, emission calculations and environmental impacts, operation of marine power plants , trouble shooting and maintenance programs

MM 526–Maintenance Planning For Marine Units

Cr.3. Prerequisite: 126 Cr.Hr.

Maintenance definition, objectives, aspects, management functions, types of maintenance, ship's data & documentation, international rules & regulations, predictive maintenance techniques, scheduled maintenance for machinery & equipment, spare parts & inventories, automated maintenance systems, reliability & redundancy.

MM 528 - Ship Propulsion Systems

Cr.3. Prerequisite: MM 447 – MM 241

The principals of steam turbine - gas turbine - diesel - diesel electric and combined marine power systems including power cycles - operating characteristics - and limitations. Engine-Hull-propeller matching and propulsion power transmission. Principals of electric power generation - electric load analysis - costing in marine power plant. Decision making for selection of propulsion systems and their components.

MM 543 - Ship Design

Cr.3. Prerequisite: MM 241 – ME376

The course deals with topic related to the design process of a ship (e. g. Hydrostatic data, Stability and determination of main dimensions - ship strength)

MM 544 - Shipyard Technology

Cr.3. Prerequisite: MM 543

Shipyards classification, parameters affecting shipyard's site selection.Tools and equipment used in Shipyards. Shipbuilding stages and processes: Stocking stage, material preparation, marking and cutting. Shipbuilding stages and processes: forming methods. Shipbuilding stages and processes: subassembly, assembly, welding methods. Shipbuilding stages and processes: erection, welding inspection methods. Shipyard layout. Shipbuilding methods (hull works and outfitting works). Shipbuilding planning and factors affecting block predefinition. Ship launching methods.Ship launching calculations.Tests during construction, quay tests, sea trials and ship delivery. Shipyard's productivity and Shipyard's competitiveness. Main features of world class shipyards.

MM 545 - Ship Resistance and Powe1ring

Cr.3. Prerequisite: MM 447and MM 241

The course deals with the main topics of ship resistance and powering. How to calculate the resistance for a particular ship and the selection of power and propeller.

MM 570 - Underwater Technology

Cr.3. Prerequisite: MM 471

Survey of undersea activities in oceanography and offshore engineering – the tools of underwater operations - decompression chambers - diving apparatus - submarines - robotics and remotely operated vehicles – design criteria and applications – corrosion and cathodic protection – underwater inspection – maintenance and repair operations.

MM 571 - Design and Construction of Offshore Structures

Cr.3. Prerequisite: MM 471

Wave theories - wave loading and offshore structures - Morison equation - wave slamming - current forces – wind forces on offshore structures – wave spectra and random loading – structural design of the jacket structure - stresses in cylindrical members and joints – design of topside structures – construction materials - steel structures - concrete structures – fabrication of the jacket and topside structures – transportation - launching - lifting and upending operations – pilling and installation operations – certifications and regulations.

MM 572 - Drilling Technology

Cr.3. Prerequisite: MM 471

Drilling objectives – physical and mechanical properties of rocks – drilling methods - drilling equipment - main and auxiliary drilling tools - drilling bits - drilling string - bit-rotation mechanisms – Mud engineering - drilling fluids - directional drilling - drilling practices – casing and cementing operations – drilling complications – drilling economics.

MM 573 - Oil and Gas Production Technology

Cr.3. Prerequisite: MM 471

Physical properties of oil and gas – well completions - bottom hole completion techniques - well productivity – types of production systems - fixed plate forms - floating production - sub-sea systems – offshore pipelines – process plant - general layout and design - produced fluid systems - gas injection systems - separation facilities - oil and gas transfer - oil and gas flow metering - oily water processing – maintenance and safety aspects.

MM 575 - Offshore Engineering

Cr.3. Prerequisite: MM 471

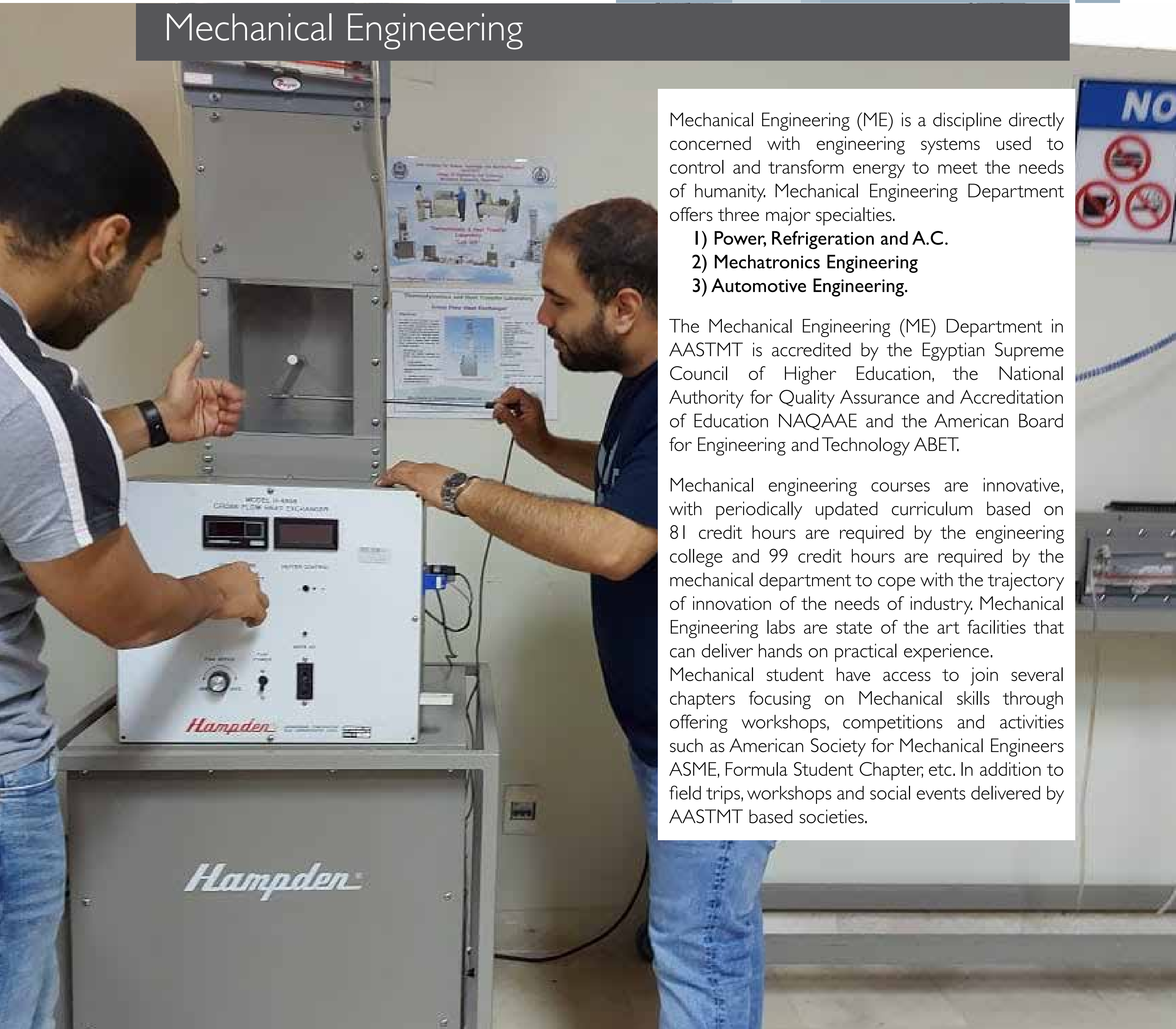
Fundamental properties of reservoir rocks - porosities - permeability - fluid distribution in reservoirs - mechanical properties of rocks - Fundamental properties of reservoir fluids - composition of petroleum fluids - properties of the liquid and gaseous states – reservoir performance – performance prediction – Gas and water injection – Enhanced recovery methods – Basic concepts of well testing – Reservoir simulation.

MM 576 – Hydromechanics of Offshore Structures

Cr.3. Prerequisite: MM 471

Introduction, hydrostatics, constant potential flow phenomena, constant real flow phenomena, ocean surface waves, rigid body dynamics, potential coefficients, floating structures in waves, non-linear behavior, station keeping, operability, wave forces on slender cylinders, survival loads on tower structures, sea bed

Mechanical Engineering



Mechanical Engineering (ME) is a discipline directly concerned with engineering systems used to control and transform energy to meet the needs of humanity. Mechanical Engineering Department offers three major specialties.

1) **Power, Refrigeration and A.C.**
2) **Mechatronics Engineering**
3) **Automotive Engineering.**

The Mechanical Engineering (ME) Department in AASTMT is accredited by the Egyptian Supreme Council of Higher Education, the National Authority for Quality Assurance and Accreditation of Education NAQAAE and the American Board for Engineering and Technology ABET.

Mechanical engineering courses are innovative, with periodically updated curriculum based on 81 credit hours are required by the engineering college and 99 credit hours are required by the mechanical department to cope with the trajectory of innovation of the needs of industry. Mechanical Engineering labs are state of the art facilities that can deliver hands on practical experience.
Mechanical student have access to join several chapters focusing on Mechanical skills through offering workshops, competitions and activities such as American Society for Mechanical Engineers ASME, Formula Student Chapter, etc. In addition to field trips, workshops and social events delivered by AASTMT based societies.

What you will learn

In your first and second year your study will be focused on mathematics, sciences and mechanical engineering foundation to understand the basis of new technologies and concepts.

The third and fourth year dive deeper in the fundamental of mechanical engineering and acquire technical knowledge to put you on the path of becoming a professional engineer.

In the last year you will undertake a graduation project involving analytical design, simulation and experimental work for tackling a significant engineering challenge. Also, you will get an opportunity of becoming more specialized in your interest by selecting elective courses that will empower you to pursue your career goal.
You will develop technical industrial experience through internship and training opportunities offered by AASTMT industry and academic partners regionally and internationally.

Career prospects for Mechanical Graduates
At the end of your journey in the Mechanical Engineering Department you will be able to pursue careers in any of the following multidisciplinary fields:

- Renewable energy and Water treatment applications
- Design, selection &, operation of Power plants.
- Heating, air conditioning and refrigeration
- Manufacturing, automation and robotics
- Embedded systems, artificial intelligence & IOT.
- Automotive and transportation industry.
- Project management and Quality assurance.
- Safety and firefighting.
- Maintenance and Reliability engineers.
- Turbomachinery and drilling Technology,

AASTMT Mechanical graduates are not limited to the above mentioned fields due to their transferable skills that can be applicable in other disciplines.

Academic Program Sheet
Energy and Power + Refrigeration/Air Conditioning Engineering

Year 1			
Semester 1		**Semester 2**	
BA 113	Physics (I)	BA 114	Physics (Ii)
BA 118	Chemistry	BA 124	Mathematics (Ii)
BA 123	Mathematics (I)	BA 142	Engineering Mechanics (Ii)
BA 141	Engineering Mechanics (I)	CC 112	Structured Programming
CC 111	Introduction To Computers	IM 112	Manufacturing Technology
IM 111	Industrial Relations	LH 132	English For Special Purpose (Ii)
LH 131	English For Special Purpose (I)	ME 151	Engineering Drawing & Projection
Year 2			
Semester 3		**Semester 4**	
BA 223	Mathematics (Iii)	BA 224	Mathematics (Iv)
EE 238	Electrical Engineering Fundamentals	EE 218	Instrumentation & Measurements
LH 231	Technical Report Writing	IM 212	Manufacturing Processes (I)
ME 232	Thermodynamics (I)	ME 333	Thermodynamics (Ii)
ME 252	Mechanical Engineering Drawing	ME 276	Stress Analysis
ME 274	Materials Science	ME 241	Experimental Methods
Year 3			
Semester 5		**Semester 6**	
BA 323	Mathematics (V)	CC442	Digital Design & Introduction To Microprocessor
CC 413	Numerical Analysis	ME 458	Mechanical Vibration
ME 355	Theory Of Machines	ME 357	Machine Design (Ii)
ME 356	Machine Design (I)	ME 362	Fluid Mechanics (I)
ME 381	Internal Combustion Engines (I)	ME 382	Internal Combustion Engines (Ii)
EE 329	Electrical Machines	NE 466	Environmental Science And Technology

Year 4			
Semester 7		**Semester 8**	
IM 423	Operations Research	EE 448	Electrical Power
ME 431	Heat Transfer	ME 423	Steam Plant Engineering
EE 417	Automatic Control Engineering	ME 434	Refrigeration & Air Conditioning
ME 461	Fluid Mechanics Ii	ME 464	Hydrualic And Pneumatic Systems
NE 264	Scientific Thinking	ME 455	Computer Aided Design
NE 364	Engineering Economy	ME XXX E	Department Restricted Electives
		ME 424	Applied Heat & Mass Transfer
		ME 534	Energy Management

Year 4			
Semester 9		**Semester 10**	
ME 501	Senior Project (I)	IM 535	International Operations Management
ME 520	Thermal Plant Engineering	ME 503	Senior Project (Ii)
ME 524	Renewable Energy Resources	ME 542	Maintenance Planning
ME 565	Turbomachinery	ME 5XX	Elective Group A
ME 5XX	Elective Group A	ME5XX or IM5XX	Elective Group B
ME 5XX	Elective Group A		

Department Restricted Electives			
Group A		**Group B**	
ME 522	Power Plant Analysis And Design	ME 481	Automotive Technology
ME 523	Power Plant Operation & Management	ME 554	Optimum Design
ME 526	Power Plant Measurements & Control	IM 542	Reverse Engineering
ME 535	Refrigeration Equipment & Control	ME 591	Mechatronics
ME 536	Air Conditioning Units And Control		
ME 537	Refrigeration Plant Design & Selection		
ME 538	A/C System Design & Selection		
ME 566	Gas Dynamaics		

Graduation Requirements

College Requirements					
A total of 81 credit hours are required by the college as per the following table:					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
Compulsory Courses A total of 81 Cr. Hr. of the following compulsory courses					
BA	1	BA 113	Physics (I)	3	None
	2	BA 114	Physics (II)	3	BA 113
	1	BA 118	Chemistry	2	None
	1	BA 123	Mathematics (I)	3	None
	2	BA 124	Mathematics (II)	3	BA 123
	1	BA 141	Engineering mechanics (I)	3	None
	2	BA 142	Engineering mechanics (II)	3	BA 141
	3	BA 223	Mathematics (III)	3	BA 124
	4	BA 224	Mathematics (IV)	3	BA 223
	5	BA 323	Mathematics (V)	3	BA 224
CC	1	CC111	Introduction to Computer	3	None
	2	CC112	Structured Programming	3	CC 111
	5	CC 413	Numerical Analysis	3	CC 112 & BA 224
	6	CC 442	Digital Design and Introduction to Microprocessors	3	EE 218 & CC 112
IM	1	IM 111	Industrial Relations	2	None
	2	IM 112	Manufacturing Technology	2	None
	7	IM 423	Operations Research	3	90 Credit Hours
	10	IM 535	International Operation Management	3	126 Credit Hours

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses					
A total of 81 Cr. Hr. of the following compulsory courses					
ME	2	ME 151	Engineering Drawing and Projection	2	None
LH	1	LH 131	English for Special Purposes(I)	2	None
	2	LH 132	English for Special Purposes(II)	2	LH 131
	3	LH 231	Technical Report Writing	3	LH 132
EE	4	EE 218	Instrumentation and Measurements	3	EE 238
	3	EE 238	Electrical Engineering Fundamentals	3	BA 124
	5	EE 329	Electrical Machines	3	EE 238
	7	EE417	Automatic Control Engineering	3	EE 329
NE	7	NE 264	Scientific Thinking	3	None
	7	NE 364	Engineering Economy	3	54 Credit Hours
	6	NE 466	Environmental science and technology	3	None

Department Requirements

A total of 99 credit hours are required by the department, which are distributed as follows:

- 84 credit hours of compulsory courses
- A minimum of 15 Cr. Hrs. of department electives selected from these two main groups.
- Students of Energy and Power Engineering Major & Refrigeration and Air Conditioning Engineering should select only one course of the available courses (ME 424 & ME 534)
- Students of Energy and Power Engineering Major should register 3 power subjects from group A + 1 subject from group B.
- Students of Refrigeration and Air Conditioning Engineering Major should register 3 refrigeration subjects from group A + 1 subject from group B.
- A senior project divided on two parts constituting 9 credit hours.

The required compulsory and restricted elective courses are listed in the following table.

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses					
A total of 87 Cr. Hr. of the following compulsory courses					
ME	3	ME 232	Thermodynamics (I)	3	BA 114
	4	ME 241	Experimental Methods	3	54 Credit Hours
	3	ME 252	Mechanical Engineering Drawing	3	ME 151
	3	ME 274	Materials Science	3	BA 114 & BA 142
	4	ME 276	Stress Analysis	3	ME 274
	4	ME 333	Thermodynamics (II)	3	ME232
	5	ME 355	Theory of Machines	3	BA 142
	5	ME 356	Machine Design (I)	3	ME 276 & ME 252
	6	ME 357	Machine Design (II)	3	ME 356
	6	ME 362	Fluid Mechanics (I)	3	BA 114
	5	ME 381	Internal Combustion Engines(I)	3	ME 232
	6	ME 382	Internal Combustion Engines(II)	3	ME 381

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses					
A total of 87 Cr. Hr. of the following compulsory courses					
ME	8	ME 423	Steam Plant Engineering	3	ME 431
	6	ME 431	Heat Transfer	3	333 or 231
	8	ME 434	Refrigeration & Air Conditioning	3	ME 431
	8	ME 455	Computer Aided Design	3	ME 356 or ME 454
	6	ME 458	Mechanical Vibrations	3	ME 355
	8	ME 464	Hydraulic and Pneumatic Systems	3	ME 362
	9	ME 501	Senior Project (I)	3	S.S.*
	10	ME 503	Senior Project (II)	6	ME 501
	9	ME 520	Thermal Plant Engineering	3	ME 423
	9	ME 524	Renewable Energy	3	126 Credit Hours
	9	ME 565	Turbo machinery	3	ME 461
	10	ME 542	Maintenance Planning	3	126 Credit Hours
	7	ME 461	Fluid Mechanics (II)	3	ME 362
IM	4	IM 212	Manufacturing Process (I)	3	IM 112
EE	8	EE 448	Electrical Power	3	EE 329
Department Restricted Electives					
One elective course of the following two					
ME	8	ME 424	Applied Heat and Mass Transfer	3	ME 431
	8	ME 534	Energy Management	3	126 Credit Hours

Department Restricted Electives

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Five elective courses from Group A and Group B					
Group A	9, 10	ME 522	Power plant analysis and design	3	ME 520
	9, 10	ME 523	Power plant operation & Management	3	126 Credit Hours
	9, 10	ME 526	Power plant measurements & control	3	EE417
	9, 10	ME 535	Refrigeration equipment & control	3	ME 434
	9, 10	ME 536	Air Conditioning Units and Control	3	ME 434
	9, 10	ME 537	Refrigerating plant design and selection	3	ME 434
	9, 10	ME 538	Air conditioning systems design & selection	3	ME 434
	9, 10	ME 566	Gas Dynamics	3	ME 461
Group B	9, 10	IM 542E	Reverse Engineering	3	126 Credit Hours
	9, 10	ME 481	Automotive Technology	3	ME 381
	9, 10	ME 554	Optimum Design	3	138 Credit Hours
	9, 10	ME 591	Mechatronics	3	CC 442

Major: Mechatronics Engineering

Year 1			
Semester 1		**Semester 2**	
BA 113	Physics (I)	BA 114	Physics (Ii)
BA 118	Chemistry	BA 124	Mathematics (Ii)
BA 123	Mathematics (I)	BA 142	Engineering Mechanics (Ii)
BA 141	Engineering Mechanics (I)	CC 112	Structured Programming
CC 111	Introduction To Computers	IM 112	Manufacturing Technology
IM 111	Industrial Relations	LH 132	English For Special Purpose (Ii)
LH 131	English For Special Purpose (I)	ME 151	Engineering Drawing & Projection
Year 2			
Semester 3		**Semester 4**	
BA 223	Mathematics (Iii)	BA 224	Mathematics (Iv)
EE 238	Electrical Engineering Fundamentals	EE 218	Instrumentation & Measurements
LH 231	Technical Report Writing	IM 212	Manufacturing Process (I)
ME 232	Thermodynamics (I)	EE 329	Electrical Machines
ME 252	Mechanical Engineering Drawing	ME 276	Stress Analysis
ME 274	Materials Science	ME 333	Thermodynamics (Ii)

Year 3			
Semester 5		**Semester 6**	
BA 323	Mathematics (V)	CC 213	Programming Applications
CC 413	Numerical Analysis	EC 238	Electronics (I)
ME 241	Experimental Methods	CC 442	Digital Design & Introduction To Microprocessors
ME 355	Theory Of Machines	ME 357	Machine Design (Ii)
ME 356	Machine Design (I)	ME 362	Fluid Mechanics I
ME 385	Internal Combustion Engines	ME 458	Mechanical Vibrations
Year 4			
Semester 7		**Semester 8**	
ME 431	Heat Transfer	ME 455	Computer Aided Design
EC 339	Electronics (Ii)	ME 593	Electromechanical Systems
IM 423	Operations Research	EE 416	Microcontroller Applications
EE 417	Automatic Control Engineering	EC 534	Analogue & Digital Signal Processing
ME 464	Hydraulic And Pneumatic Systems	EE 419	Modern Control Engineering
ME 591	Mechatronics	ME XXXE	Elective A

Year 5			
Semester 9		**Semester 10**	
NE 364	Engineering Economy	IM 535	International Operations Management
ME 595	Automation Of Mechanical Systems	ME 503	Senior Project (Ii)
NE 264	Scientific Thinking	ME 542	Maintenance Planning
ME 501	Senior Project (I)	ME 594	Robotics And Applications
ME 592	Mechatronics Systems	NE 466	Environmental Science And Tech.
ME XXXE	Elective B	ME XXXE	Elective C

Department Restricted Electives			
Electives A,B,C			
ME 524	Renewable Energy Resources	ME 425	Power Plant Technology
ME 461	Fluid Mechanics Ii	ME 583	Vehicle Control And Safety Systems
ME 434	Refrigeration & Air Conditioning	ME 554	Optimum Design
ME 542	Maintenance Planning	ME 481	Automotive Technology
ME 520	Thermal Power Plant	ME 465	Computational Fluid Dynamics
ME 423	Steam Plant Engineering	ME 565	Turbo Machinery

Graduation Requirements

College Requirements					
A total of 90 credit hours are required by the college as per the following table:					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
Compulsory Courses A total of 90 Cr. Hr. of the following compulsory courses					
BA	1	BA 113	Physics (I)	3	None
	2	BA 114	Physics (II)	3	BA 113
	1	BA 118	Chemistry	2	None
	1	BA 123	Mathematics (I)	3	None
	2	BA 124	Mathematics (II)	3	BA 123
	1	BA 141	Engineering mechanics (I)	3	None
	2	BA 142	Engineering mechanics (II)	3	BA 141
	3	BA 223	Mathematics (III)	3	BA 124
	4	BA 224	Mathematics (IV)	3	BA 223
	5	BA 323	Mathematics (V)	3	BA 224
CC	1	CC111	Introduction to Computer	3	None
	2	CC112	Structured Programming	3	CC 111
	6	CC 213	Programming Applications	3	CC 112
	5	CC 413	Numerical Analysis	3	CC 112 & BA 224
	6	CC 442	Digital Design and Introduction to Microprocessors	3	EE 218 & CC 112
IM	1	IM 111	Industrial Relations	2	None
	2	IM 112	Manufacturing Technology	2	None
	7	IM 423	Operations Research	3	90 Cr. Hours
	10	IM 535	International Operation Management	3	126 Cr. Hours
EC	8	EC534	Analog and Digital Signal Processing	3	EC 239

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses					
A total of 90 Cr. Hr. of the following compulsory courses					
ME	2	ME 151	Engineering Drawing and Projection	2	None
LH	1	LH 131	English for Special Purposes (I)	2	None
	2	LH 132	English for Special Purposes (II)	2	LH 131
	3	LH 231	Technical Report Writing	3	LH 132
EE	4	EE 218	Instrumentation and Measurements	3	EE 238
	3	EE 238	Electrical Engineering Fundamentals	3	BA 124
	5	EE 329	Electrical Machines	3	EE 238
	7	EE 417	Automatic Control Engineering	3	EE 329
	8	EE 419	Modern Control Engineering	3	EE 417
NE	9	NE 264	Scientific thinking	3	None
	9	NE 364	Engineering Economy	3	54 Credit Hours
	10	NE 466	Environmental science and technology	3	None

Department Restricted Electives			
ME 524	Renewable Energy Resources	ME 425	Power Plant Technology
ME 461	Fluid Mechanics Ii	ME 583	Vehicle Control And Safety Systems
ME 434	Refrigeration & Air Conditioning	ME 554	Optimum Design
ME 542	Maintenance Planning	ME 481	Automotive Technology
ME 520	Thermal Power Plant	ME 465	Computational Fluid Dynamics
ME 423	Steam Plant Engineering	ME 565	Turbo Machinery

Department Requirements

A total of 90 credit hours are required by the department, which are distributed as follows:

- 81 credit hours of compulsory courses.
- 9 credit hours of department restricted electives that are selected from groups A, B & C.

The required compulsory and restricted elective courses are listed in the following table.

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 81 Cr. Hr. Of the following compulsory courses					
ME	3	ME 232	Thermodynamics (I)	3	BA 114
	5	ME 241	Experimental Methods	3	54 Credit Hours
	3	ME 252	Mechanical Engineering Drawing	3	ME 151
	3	ME 274	Materials Science	3	BA 114 & BA 142
	4	ME 276	Stress Analysis	3	ME 274
	4	ME 333	Thermodynamics (II)	3	ME232
	5	ME 355	Theory of Machines	3	BA 142
	5	ME 356	Machine Design (I)	3	ME 276 & ME 252
	6	ME 357	Machine Design (II)	3	ME 356
	6	ME 362	Fluid Mechanics (I)	3	BA 114
	5	ME 385	Internal Combustion Engines	3	ME 232
	7	ME 431	Heat Transfer	3	ME333 or ME231
	8	ME 455	Computer Aided Design	3	ME 356 or ME 454
	6	ME 458	Mechanical Vibrations	3	ME 355
	7	ME 464	Hydraulic and Pneumatic Systems	3	ME 362
	9	ME 501	Senior Project (I)	3	S.S.*
	10	ME 503	Senior Project (II)	6	ME 501
	7	ME 591	Mechatronics	3	CC442
	8	ME 593	Electromechanical Systems	3	ME 591

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 81 Cr. Hr. of the following compulsory courses					
	9	ME 592	Mechatronic Systems	3	ME 591
	10	ME 594	Robotics Applications	3	ME355
	9	ME 595	Automation of Mechanical Systems	3	ME 593
EC	6	EC238	Electronics (I)	3	EE238
	7	EC339	Electronics(II)	3	EC238
IM	4	IM 212	Manufacturing Process (I)	3	IM 112
EE	8	EE416	Microcontroller Applications	3	CC442

Department Restricted Electives

Select 1 course from group A,B,C (total of 9 Cr. Hrs.) from the following list

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
	Select 1 course from each group A & B (total of 6 Cr. Hrs.) from the following list				
Elective A,B,C	8,	ME 524	Renewable Energy Resources	3	126 Credit Hours
	8,	ME 434	Refrigeration and Air Conditioning	3	ME 431
	8,	ME 461	Fluid Mechanics (II)	3	ME 362
	8,	ME 425	Power Plant Technology	3	ME 333
	9,	ME 583	Vehicle Control and Safety Systems	3	ME 385
	9,	ME 554	Optimum Design	3	138 Credit Hours
	9,	ME 542	Maintenance Planning	3	126 Credit Hours
	9,	ME 465	Computational Fluid Dynamics	3	ME 461 & ME 431
	10,	ME 481	Automotive Technology	3	ME 385
	10,	ME 423	Steam Plant Engineering	3	ME 431
	10,	ME 520	Thermal Power Plant	3	ME 423
	10,	ME 565	Turbo machinery	3	ME 461

Major: Automotive Engineering

Year 1			
Semester 1		**Semester 2**	
BA 113	Physics (I)	BA 114	Physics (Ii)
BA 118	Chemistry	BA 124	Mathematics (Ii)
BA 123	Mathematics (I)	BA 142	Engineering Mechanics (Ii)
BA 141	Engineering Mechanics (I)	CC 112	Structured Programming
CC 111	Introduction To Computers	IM 112	Manufacturing Technology
IM 111	Industrial Relations	LH 132	English For Special Purpose (Ii)
LH 131	English For Special Purpose (I)	ME 151	Engineering Drawing & Projection
Year 2			
Semester 3		**Semester 4**	
BA 223	Mathematics (Iii)	BA 224	Mathematics (Iv)
EE 238	Electrical Engineering Fundamentals	EE 218	Instrumentation & Measurements
LH 231	Technical Report Writing	IM 212	Manufacturing Process (I)
ME 232	Thermodynamics (I)	ME 233	Thermodynamics (Ii)
ME 252	Mechanical Engineering Drawing	ME 241	Experimental Methods
ME 274	Materials Science	ME 276	Stress Analysis
Year 3			
Semester 5		**Semester 6**	
BA323	Mathematics (V)	ME 458	Mechanical Vibrations
CC 413	Numerical Analysis	ME 357	Machine Design (Ii)
EE 329	Electrical Machines	ME 362	Fluid Mechanics (I)
ME 355	Theory Of Machines	ME 382	Internal Combustion Engines (Ii)
ME 356	Machine Design (I)	ME 383	Automotive Engines
ME 381	Internal Combustion Engines (I)	NE 466	Environmental Science And Technology

Year 4			
Semester 7		**Semester 8**	
CC 442	Digital Design & Introduction To Microprocessors	ME 455	Computer Aided Design
EE 417	Automatic Control Engineering	ME 461	Fluid Mechanics (Ii)
IM 423	Operations Research	ME 483	Alternative Fuels & Power Systems
ME 431	Heat Transfer	ME 485	Automotive Power Trains
ME 581	Automotive Fuel & Ignition Systems	ME 591	Mechatronics
NE 364	Engineering Economy	NE 264	Scientific Thinking
Year 5			
Semester 9		**Semester 10**	
ME 501	Senior Project (I)	IM 535	International Operations Management
ME 434	Refrigeration & Air Conditioning	ME 464	Hydraulic And Pneumatic Systems
ME 582	Automotive Chassis Systems	ME 503	Senior Project (Ii)
ME 583	Vehicle Control & Safety Systems	ME 586	Vehicle Design & Engineering
ME 584	Automotive Electric & Electronic Systems.	ME 588	Vehicle Maintenance & Repair
ME XXX E	Electivea		

Department Restricted Electives

ME 524	Renewable Energy Resources		
ME 566	Gas Dynamics		

Graduation Requirements

College Requirements					
A total of 81 credit hours are required by the college as per the following table:					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
Compulsory Courses A total of 81 Cr. Hr. of the following compulsory courses					
BA	1	BA 113	Physics (I)	3	None
	2	BA 114	Physics (II)	3	BA 113
	1	BA 118	Chemistry	2	None
	1	BA 123	Mathematics (I)	3	None
	2	BA 124	Mathematics (II)	3	BA 123
	1	BA 141	Engineering mechanics (I)	3	None
	2	BA 142	Engineering mechanics (II)	3	BA 141
	3	BA 223	Mathematics (III)	3	BA 124
	4	BA 224	Mathematics (IV)	3	BA 223
	5	BA 323	Mathematics (V)	3	BA 224
CC	1	CC111	Introduction to Computer	3	None
	2	CC112	Structured Programming	3	CC 111
	5	CC 413	Numerical Analysis	3	CC 112 & BA 224
	7	CC 442	Digital Design and Introduction to Microprocessors	3	EE 218 & CC 112
IM	1	IM 111	Industrial Relations	2	None
	2	IM 112	Manufacturing Technology	2	None
	7	IM 423	Operations Research	3	90 Credit Hours
	10	IM 535	International Operation Management	3	126 Credit Hours

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 81 Cr. Hr. of the following compulsory courses					
ME	2	ME 151	Engineering Drawing and Projection	2	None
LH	1	LH 131	English for Special Purposes (I)	2	None
	2	LH 132	English for Special Purposes (II)	2	LH 131
	3	LH 231	Technical Report Writing	3	LH 132
EE	4	EE 218	Instrumentation and Measurements	3	EE 238
	3	EE 238	Electrical Engineering Fundamentals	3	BA 124
	5	EE 329	Electrical Machines	3	EE 238
	7	EE 417	Automatic Control Engineering	3	EE 329
NE	8	NE 264	Scientific Thinking	3	None
	7	NE 364	Engineering Economy	3	54 Credit Hours
	6	NE 466	Environmental science and technology	3	None

Department Requirements

A total of 99 credit hours are required by the department, which are distributed as follows:

- 96 credit hours of compulsory courses.
- 3 credit hours of department restricted electives.

The required compulsory and restricted elective courses are listed in the following table.

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 99 Cr. Hr. Of the following compulsory courses					
IM	4	IM212	Manufacturing Process (I)	3	IM112
ME	3	ME 232	Thermodynamics (I)	3	BA 114
	4	ME 241	Experimental Methods	3	54 Credit Hours
	3	ME 252	Mechanical Engineering Drawing	3	ME 151
	3	ME 274	Materials Science	3	BA 114 & BA 142
	4	ME 276	Stress Analysis	3	ME 274
	4	ME 333	Thermodynamics (II)	3	ME232
	5	ME 355	Theory of Machines	3	BA 142
	5	ME 356	Machine Design (I)	3	ME 276 & ME 252
	6	ME 357	Machine Design (II)	3	ME 356
	6	ME 362	Fluid Mechanics (I)	3	BA 114
	5	ME 381	Internal Combustion Engine (I)	3	ME 232
	6	ME 382	Internal Combustion Engine (II)	3	ME 381
	7	ME 431	Heat Transfer	3	333 or 231
	9	ME 434	Refrigeration & Air Conditioning	3	ME 431
	8	ME 455	Computer Aided Design	3	ME 356 or ME 454
	6	ME 458	Mechanical Vibrations	3	ME 355
	8	ME 461	Fluid Mechanics (II)	3	ME 362
	10	ME 464	Hydraulic and Pneumatic Systems	3	ME 362
	8	ME 483	Alternative Fuel & Power Systems	3	ME 381

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 99 Cr. Hr. of the following compulsory courses					
ME	6	ME 383	Automotive Engines	3	ME 381
	9	ME 501	Senior Project (I)	3	S.S.*
	10	ME 503	Senior Project (II)	6	ME 501
	7	ME 581	Automotive Fuel & Ignition System	3	ME 381
	9	ME 582	Automotive Chassis Systems	3	ME 381
	9	ME 583	Vehicle Control & Safety Systems	3	ME 381
	9	ME 584	Automotive Electric & Electronic Systems	3	ME 381
	9	ME 485	Automotive Power Trains	3	ME 381
	10	ME 586	Vehicle Design and Engineering	3	ME 356
	10	ME 588	Vehicle Maintenance & Repair	3	ME 383& ME 483
	8	ME 591	Mechatronics	3	CC 442
Department Restricted Electives Select 1 course (total of 3 Cr. Hrs.) from the following list					
ME	9	ME 524	Renewable Energy Resources	3	126 Credit Hours
	9	ME 566	Gas Dynamics	3	ME 461

Course Summary Description

Project Courses - (ME X0X)

ME 501 - Senior Project I

Cr.3. Prerequisite: Senior Standing - Completion of 138 Credit Hours and a GPA of at least 2.00.

Application-oriented project to show competence in major academic area. Where, an independent research project is conducted under the guidance of a faculty member in the Department of Mechanical Engineering. The research should contribute to the advancement of knowledge in the field. Written report and formal presentation are required.

ME 503 - Senior Project II

Cr.6. Prerequisite: ME 501

Application-oriented project to show competence in major academic area. Where, an independent research project is conducted under the guidance of a faculty member in the Department of Mechanical Engineering. The research should contribute to the advancement of knowledge in the field. Written report and formal presentation are required.

Power Plant Engineering Courses - (ME X2X)

ME 423 - Steam Plant Engineering

CR: 3. Prerequisite: ME 431

Steam processes, steam charts - Steam software - Steam flow through nozzles, Continuity equation, energy equation, subsonic and supersonic nozzles. - Steam jet deflections - Super saturation and thermal equilibrium flow - Types of steam turbines, single stage, multistage velocity compounded, multistage pressure compounded and reaction turbines - Steam flow through single stage impulse turbine. - Steam flow through multistage velocity compounded and pressure compounded - Steam flow through reaction turbine, steam turbine governor. - Types of steam boilers, fire tube and water tube constructions. - Fuel combustion, and boiler components - Boiler efficiency calculation, gas loop temperature calculations - Steam condensers types and constructions - Steam condenser calculations.

ME 424- Applied Heat and Mass Transfer

CR: 3. Prerequisite: ME 431

General Equation for heat transfer - Two Dimensional Heat transfer by conduction - Unsteady state heat transfer by conduction - Multidimensional unsteady state heat conduction (chart solutions), quenching processes, heat transfer in chilling processes, defrost applications - Convective heat transfer applications - Radiation Heat transfer applications - Mass transfer principles - Cooling coil and evaporative cooler design - Water desalination single effect, multi effect and MSF system design.

ME 425- Power Plant Technology

CR: 3. Prerequisite: ME 333

Thermodynamics Review (1st, 2nd laws of thermodynamics) - Steam Formation - Steam Properties
and Process - Simple Rankine Cycle - Modified Rankine Cycle - Reheat and Regeneration Cycles - Steam Turbine, Steam Generator and Steam Condenser - Power Plant Control - Simple Gas Turbine Cycle - Gas Turbine Cycle with Reheat, Intercooling and Regeneration - Combined Cycle Power Plant Nuclear Power Plant - Renewable Power Generation, Solar Energy - Wind Energy - Geothermal Energy.

ME 520- Thermal Plant Engineering

CR: 3. Prerequisite: ME 423

Thermodynamic Review - Steam Plant Components - Steam Plant Cycles - Modifications of Steam. Plant Cycle - Design of Feed water Heater - Gas Turbine Power Plant - Gas Turbine Cycles - Modifications of Gas Turbine Cycle - Application of Gas Power Plant - Combined Cycle - Nuclear Power Plant - Pressurized Water Reactors - Boiling Water Reactors.

ME 522- Power Plant analysis and design

CR: 3. Prerequisite: ME 424

Design of Steam Generator - Design of Condenser - Design of an Evaporative Cooling Towers - Design of Gas Turbine, Combined Cycle and Cogeneration - Simulation of Components and Systems - Simulation of Components and Systems - Optimization - Air Feed Water and Drain system - Generalized Heat Balance Computer Program - General Comments on Power Plant Design.

ME 523- Power Plant Operation and Management

CR: 3. Prerequisite: ME 423

Load Curves - Power Plant Economics - Investment in Power Plants - Selection of Plant - Station Performance, Revision and Evaluation - Operation of Gas Turbines - Typical Problems in Gas Turbines Operation - Operation of Steam Turbines - Operation of Boiler s - Water Treatment - Operation of Cooling Towers and Condensers.

ME 524- Renewable Energy Resources

CR: 3. Prerequisite: 126 Credit Hours

The current energy resources - Environmental Impact of Energy production - Need for renewable resources - Solar Energy: photovoltaic cells - Solar Energy: thermal energy production - Wind Energy - Hydropower - Wave and Tidal Energy - Ocean Thermal Energy Conversion - Geothermal Energy - Nuclear Energy - Biomass as source of energy - Environmental Impact of Renewable Energy.

ME 526- Power Plant Measurements and Control

CR: 3. Prerequisite: EE 417

Introduction to system concepts, instrumentation and process control - Process Variables, Process-open and Closed Loop Cycles - System model representation (modeling of mechanical, electrical, and electromechanical systems) - System model representation (modeling of fluid and thermal systems) -System response and design of dynamic systems - Static Error Effects on Error System Stability -Basic control action - Design of controller, Ziegier-Noicls method - Measurement Means, Measurements Dynamics, Identification of Measurement Devices - Sensors & its Requirement - Analog signal conditioning - signal conditioning circuits - Resistance - type strain gauges, force, torque and pressure load cells.

Heat, Thermodynamics, Refrigeration & Air conditioning Courses (ME X3X)

ME 231- Thermodynamics (Industrial and Marine)

CR: 3. Prerequisite: BA 114

Thermodynamic Processes -Heat Engine Cycles (Carnot, Joule, Otto, Diesel, Dual) - Heat Transfer (Conduction and Convection through Walls, Cylinders and Spheres)- Steam Power Plants (RankineCycle for wet steam, Superheated Steam and Reheat)- Psychrometry (Dry and Wet bulb Temp, Specific and relative Humidity, Psychrometric Chart)

ME 232- Thermodynamics (I)

CR: 3. Prerequisite: BA 114

Basic of energy conversion systems- first law of thermodynamics for closed system application- first law of thermodynamics for open system application- Second law of thermodynamics of heat engine, heat pump- Reversible and irreversible processes- Perfect gas properties and processes- Working fluids, liquid, vapour, and gas (use of vapour tables).

ME 333- Thermodynamics (II)

CR: 3. Prerequisite: ME 232

Entropy and exergy- Heat engine cycles- Gas mixture properties- Psychometric properties and processors- Compressors- Thermodynamic analysis.

ME 439 Thermo-fluids (Electrical)

CR: 3. Prerequisite: BA 114/ CR: 3

Basic thermodynamics concepts- Energy transfer- First law of thermodynamics- Second law of thermodynamics- Engine cycles- Properties of a pure substance- Steam Cycles-Introduction to fluid mechanics, and fluid properties- Measurements of pressure and Pascal law- Bernoulli, Energy, Momentum equations - Pipe flow.

ME 431- Heat Transfer

CR: 3. Prerequisite: ME 231or ME 333

Steady State Conduction in One Dimension - General Conduction Equations - External Surfaces -
Steady State Conduction in Two Dimensions - Principles of convection - Empirical Relations for Forced Convection - Natural Convection Systems - Radiation Heat Transfer - Design of surface heat exchangers - Design of compact heat exchangers.

ME 434- Refrigeration & Air conditioning

CR: 3. Prerequisite: ME 431/ CR: 3

Vapor compression cycles - Refrigeration systems -Air conditioning systems - Insulation and marine insulation requirements - Cooling and heating load calculation - Refrigerant choice - Choice of refrigeration cycle - Design of cycle elements- Refrigeration control - maintenance and trouble shooting.

ME 534- Energy Management

CR: 3. Prerequisite: 126 Credit Hours

Energy classification - Sources and utilization - Principal fuels for energy conversion - Petroleum fuels characteristics - World natural gas production and reserves - Gas pipe lines and underground storage. - Liquefied natural gas and absorption of acidic gases from natural gas. - Energy storage -Environmental impact of combustion of fuels - Source monitoring of NOx and SOx. Low density heat transfer - Monitoring of carbon monoxide emissions - Control by furnace and burner design - Energy management systems - Total energy schemes. Pinch technology. Computer simulation using (MESSAGE) - Energy recovery. Process integration.

ME 535- Refrigeration Equipment and control

CR: 3. Prerequisite: ME 434

Compressors- Heat exchangers -Condensers-Evaporators- Liquid chillers- Measuring Components Accessories- Cycle selection- Control system.

ME 536- Air conditioning units and control

CR: 3. Prerequisite: ME 434

Domestic units- small power- Medium power units-High power units- Air cycle units- Thermoelectric units - AHU and FCU Modules- Absorption units- Safety-Fire fitting.

ME 537- Refrigeration plant design & selection

CR: 3. Prerequisite: ME 434

Cold stores, freezers, dual- Constructional requirements and materials- Loading and unloading-Direct and Brine systems- Design systems- M/C room-work shop requirements- Capacity control system Freezing tunnels- Trouble shooting.

ME 538- Air Conditioning Systems, design & selection

CR: 3. Prerequisite: ME 434

Air Conditioning Load Estimation- Air Conditioning Load Estimation- HAVAC- Units Capacity Requirements- All Air , All Water , Air/Water Control Systems- Air Distribution and Flow Control-
Air Duct Design- Air Duct fabrication- Air Duct material &accessories- Air Duct - Technical Repair and Commissioning.

General Mechanical Courses - (ME X4X)

ME 241- Experimental Methods

CR: 3. Prerequisite: 54 Credit Hours

Introduction - Generalized Measuring System, Significant Digits, Rounding, Truncation - Data Acquisition, Signals, Signal Conditioning, Sampling - Lab View - Lab View Tutorial - Back ground and Introduction to thermal experiments - Background and Introduction Fluid mechanics experiments - Background and introduction to Material experiments - Background and Introduction to solid mechanics experiments - Presentation & communication skills - Accuracy, Precision, Error in Measurement, Calibration - Lab Work - Uncertainty Analysis - Displacement and Dimensional Measurement - Library Exercise - Oral Presentation for Selected Topics.

ME 542- Maintenance Planning

CR: 3. Prerequisite: 126 Credit Hours

Introduction - Maintenance situation - Maintenance cycle - Working examples on cycle schedule - Computer aided maintenance - Economic aspects of maintenance engineering - Diagnostic capabilities of Predictive maintenance - Vibration Analysis (introduction, Types of Equipment, system Applications - Case study - Motor Analysis ((introduction, Types of Equipment, system Applications,case study) - Organization of different maintenance type maintenance -Investigation of failure – Reliability inmaintenance - Case study.

Applied Mechanics Courses - (ME X5X)

ME 151- Engineering Drawing & Projection

CR: 2. Prerequisite: None

Drawing practices and techniques (Exercises on geometrical construction) – Methods of object projection (Exercises on geometrical construction - Exercises on object projection) - Orthogonal projection (Exercises on orthogonal projection) - Missing views, dimensioning and free hand sketching (Exercises on projection and free hand sketching) - Sectioning and conventions (Exercises on sectional views) - Intersection of geometrical surfaces and development (Exercises in intersection of geometrical surfaces and development) - Standard metal sections and metal structures (Exercises on metal structures) - Compound metal sections and welds (Exercises on metal structures) - Isometric projection & Surface intersections (Exercises on Isometry and surface intersections) - Perspective projection (Exercises on Perspective projection) - Computer Aided drafting using AutoCAD (General Introduction) - Drawing and editing commands in AutoCAD - Writing texts, Dimensioning and viewing commands

ME 252- Mechanical Engineering Drawing

CR: 3. Prerequisite: ME 151

AutoCAD basics - Object construction and manipulation - Geometric construction - Layers, text generation and dimensioning - Section views, hatching and construction of blocks - Solid modeling - Assembly drawing with applications in Mechanical, Industrial and Marine Engineering - Free hand sketching - Conventional representation of Mechanical elements - Surface finish and machining symbols - Fits and tolerances - Welding and hydraulic symbols.

ME 355- Theory of Machines

CR: 3. Prerequisite: BA 142

Types of motion - Velocity analysis - Acceleration analysis - Dynamic force analysis - Balancing of rotating masses - Balancing of reciprocating masses - Kinetic energy storage and flywheel - Gear geometry - Gear trains - Gyroscopic couples

ME 356- Machine Design (I)

CR: 3. Prerequisite: ME 276 and ME 252

Stresses in machine parts - Material selection and factor of safety - Application to design of machine elements - Fatigue in metals - Stress concentration and design of members subjected to fatigue loading - Power screws types and applications - Bolted joints and pressure vessels - Welded and adhesive joints - Springs - Miscellaneous design problems

ME 357- Machine Design (II)

CR: 3. Prerequisite: ME 356

Power transmission systems, Specifications of different types of belts (Belt selection) - Belt selection (Cont.), Chains. Types and selection - Wire Rope selection - Gear types and spur gear force analysis -
Design of spur gears - Helical gear force analysis - Bevel and Worm Gears - Introduction to AntiFriction Bearings - Selection of Ball and Roller Bearings - Introduction to sliding bearings - Design and Selection of Sliding Bearings - Design of shafts based on strength and rigidity - Design of shafts based on strength and rigidity - Clutches and Brakes

ME 454- Machine Design (Marine)

CR: 3. Prerequisite: ME 252 & ME 276

Introduction & Stresses in Machine Parts - Stresses in Machine Parts - Screws - Fasteners and Connections - Welded Joints - Flexible Mechanical Elements - Sliding Bearings - Roller Bearings - Gears - Shafts.

ME 455 - Computer Aided Design

CR: 3. Prerequisite: ME 356 or 454 or 456

Introduction to computer aided drafting and analysis - 2D and 3D Drafting (parametric solid
modeling) - Introduction to the software «Solid Edge» - 2D and 3D parametric modeling -
Introduction to finite element analysis - The finite element software «FEMAP» - Application to
different machine element problems - Simulation of dynamic systems - MATLAB analysis and
graphics - Application to different Mechanical, Hydraulic and Thermal systems (MATLAB ‹Simulink›) - Introduction to optimization - System and element optimum design problems.

ME 456- Machine Design (Industrial)

CR: 3. Prerequisite: ME 252 & ME 277

Introduction & Stresses in Machine Parts - Stresses in Machine Parts - Screws - Fasteners and Connections - Welded Joints - Flexible Mechanical Elements - Sliding Bearings - Roller Bearings -
Gears - Shafts.

ME 458 - Mechanical Vibrations

CR: 3. Prerequisite: ME 355

Harmonic and periodic motions - Free vibrations - Forced vibrations - Transmissibility and isolation- Vibration measurements - Vibration under general forcing conditions - Two degree of freedom systems - Multi-degree of freedom systems - Eigen value and eigen vector problems.

ME 554 - Optimum Design

CR: 3. Prerequisite: 138 Credit Hours

Conventional versus optimum design process - Optimum design problem formulation - Graphical optimization - Optimum design concepts - Gradient vector and Hessian matrix - Concept of necessary and sufficient conditions - Unconstrained optimum design problems - Optimality conditions for functions of single variable - Optimality conditions for functions of several variables - Constrained optimum design problems - Necessary conditions with equality constraints - Necessary conditions with inequality constraints - Numerical methods for unconstrained optimum design - Linear programming methods for optimum design - Optimum design selected projects.

Hydraulics & Fluid Mechanics Courses - (ME X6X)

ME 361- Fluid Mechanics (Industrial)

CR: 3. Prerequisite: 54 Credit Hour

Introduction to fluid mechanics - Physical properties of fluids - Pressure and head - Concepts of fluid flow - Continuity equation - Energy equation and its applications - Steady flow in pipes -
Components of hydraulic circuit - Pumps - Valves in simple circuits - Hydraulic cylinder - Hydraulic motors - Hydraulic cranes and hydraulic presses.

ME 362 –Fluid Mechanics I

CR: 3.Prerequisite: BA 114

Introduction - Physical properties of fluids - Fluid statics - Forces on submerged surfaces and buoyancy - Introduction to fluids kinematics - Dynamics of incompressible flow - Flow and velocity measurement - Similitude and dimensional analysis - Flow through pipes - Pumps (Types and performance)

ME 461 - Fluid Mechanics II

CR: 3.Prerequisite: ME 362

Differential analysis of fluid flow - Kinematics of fluid flow - Liner motion, angular motion and deformation - Conservation of mass and stream function - Velocity potential and irrotational flows - General equations of motion (Navier-Stokes equations) - Euler's equations of motion - Basic two-dimensional potential flows - Superposition of plane potential flows - Introduction to compressible fluid flow - Mach Number and speed of sound - Isentropic and Non-isentropic flow of an ideal gas - Normal shock waves.

ME 464- Hydraulic and Pneumatic Systems

CR: 3.Prerequisite: ME 362

Introduction to Fluid Power System - Hydraulic Fluids and Transmission Lines -Hydraulic Pumps - Fluid Power Actuators (Cylinders, Rotary Actuators, Motors) - Control Components of Hydraulic Systems - Accumulators and Pressure Intensifiers - Hydraulic Circuit Design and Analysis –Pneumatic circuits- Compressors-Air Control valves- Pneumatic actuators-

ME 465- Computational fluid dynamics (CFD)

CR: 3.Prerequisite: ME 461 and ME 431

Introduction – The finite difference method (FDM) – Solution of fluid flow problems using FDM with MATLAB – The finite element method (FEM) - Solution of fluid flow problems using FEM with MATLAB (PDE Tool) – The finite volume method (FVM) - Solution of fluid flow problems using FVM with MATLAB – Thermofluid problems using the FVM with FLUENT software.

ME 565 - Turbo machinery

CR: 3.Prerequisite: ME 461

Main Types of Turbo machines and Performance Basic Laws - Main Types of Turbomachines and Performance Basic Laws - Dimensional Analysis and Model Testing - Hydraulic Pumps (Centrifugal and Axial Pumps) - Hydraulic Turbines - Centrifugal Compressors and Fans - Axial Compressors and Fans

ME 566 - Gas Dynamics

CR: 3.Prerequisite: ME 461

Expression for the velocity of sound, Mach Number, Isentropic flow and its governing relations, Flow with normal shocks and oblique shocks, Governing equations, Fanno and Rayleigh lines. Use of isentropic and normal shock tables to solution of problems, Application to flow in Nozzles, Simple pipe flow with friction.

Materials Science Courses - (ME X7X)

ME 274 - Materials Science

CR: 3.Prerequisite: BA 114 and BA 142

Classification of Engineering Materials - Atomic Bonding in Solids - The Crystalline Structure of Materials - Properties, Testing, and Inspection of Engineering Materials - Introduction to Thermal Equilibrium Diagrams -Non-Destructive Testing - Heat Treatment of Metals -Corrosion

ME 276 - Stress Analysis

CR: 3.Prerequisite: ME 274

Concept of stress and strain, Normal stresses and strains, shearing stresses and bearing stresses, Stresses due to torsion, Normal forces, and shearing forces and bending moments in beams, Stresses due to bending, Stress and strain transformations, Thin and thick walled cylinders, Stress concentration, Experimental stress analysis, Deflection and buckling of beams and columns.

ME 277- Strength of Materials (Industrial)

CR: 3. Prerequisite: ME 274

Review of Units, Static - Supports Reactions and Internal Forces - Types of Beams, Normal Force and Shear Force Diagrams - Shear Force Diagrams - Bending Moment Diagrams - SFD and BMD for Linearly Varying Distributed Loads- Introduction to Stresses and Strains, Simple Normal and Simple Shear - Direct Normal and Shear stresses - Bending Theory and Bending Stresses - Stresses Due to Unsymmetrical Bending - Transverse Shear Stress - Introduction to Torsion in Shafts -Stresses and Deformation Due to Torsion - Strain and Deformation Due to Axial Loads- Statically Indeterminate Axial Members.

Automotive & Internal Combustion Engines Courses - (ME X8X)

ME 381 - Internal Combustion Engines (1)

CR: 3.Prerequisite: ME 232

Engine types - Engine parts -Valve timing; effects on P-V diagram-Spark ignition vs compression ignition - Engine charging and volumetric efficiency - Fuel properties - Carburetors - Carburetor calculations - Thermodynamics of combustion - Engine heat transfer - Energy balance of engines - Engine performance and testing - Octane and cetane ratings-Revision

ME 382 - Internal Combustion Engines (2)

CR: 3.Prerequisite: ME 381 and ME333

Introduction to D.E. -Analysis of Actual Cycle of Diesel Engine Using "El Chelberg Chart"- Analysis of Actual Cycle of D.E. Using " El Chellberg Chart" - Charging and Scavenging Process - Combustion Processes in D.E - Fuel Injection Systems - Exhaust Emissions (Formation - Effects - Measurements - Control - Standards) - Super Charging -Turbocharging - Engine Operating Characteristics

ME 383 - Automotive Engines

CR: 3.Prerequisite: ME 381

Engine types and classifications principles of operation–valve timing; volumetric efficiency-mixture requirements in ICE-Jetronic injection systems (principles-equipment)-Motronic injection system - Motronic injection systemwith closed loop emission control- Diesel Engine theory of Operation - Engine Instruments- Flame Theory - Chemical Kinetics - Engine Cooling Systems -Engine Lubrication Systems - Engine Emissions formation.

ME 385 - Internal Combustion engines (for mechatronics students)

CR: 3.Prerequisite:ME333

Engine types and classifications principles of operation – valve timing; volumetric efficiency-mixture requirements in ICE-Jetronic injection systems (principles-equipment)- Motronic injection system - Motronic injection system with closed loop emission control- electronic ignition systems – Diesel injection (principles-equipment)-Engine Cooling Systems -Engine Lubrication Systems – performance parameters

ME 481 - Automotive Technology

CR: 3.Prerequisite: ME 381

Automotive tools & measuring instruments- Motronic System-engine sensors and actuators automotive clutch-manual transmissions - automatic transmission -Steering system-Wheel angles -suspension system - Brake system (disc brake)-Brake system (drum brake)- Tires- vehicle heating and air conditioning systems - electrical vehicles

ME 483 - Alternative Fuels and Power Systems

CR: 3.Prerequisite: ME 381

Natural gas engine theory of operation - Natural gas engine construction and maintenance - Hydrogen engine theory of operation - Hydrogen engine construction and maintenance - Methanol & ethanol theory of operation - Gas Turbine theory of operation - Gas turbine construction - Gas turbine fuel systems - Striling engines - Steam engines - Rotary engine - Electrical vehicles - Hybrid vehicles-Bio-Diesel & vegetables oil engines - Bio-Gas engines.

ME 484 - Automotive fuel and Ignition Systems

CR: 3.Prerequisite: ME 381

K-Jetronic system - L- Jetronic system - Battery ignition systems -Electronic ignition systems - M-Motronic system -ME-Motronic system - MED-Motronic system - Diesel injection systems - Electronic diesel injection systems - Emission reduction in ICE-Emission legislations and laws.

ME 485 - Automotive Power Trains

CR: 3.Prerequisite: ME 381

Automotive Clutches - Manual transmission - Transmission construction and operation -Synchronizing mechanism - Automatic transmissions, principles of automatic transmission and torque converter, planetary gears operation and construction, hydraulic systems - Drive systems , FWD, RWD, four wheel drive, all-wheel drive - Drive lines, Propeller shaft, Universal joints, Automotive differentials -Brake system (disc brake) - Brake system drum brake, ABS, EBS - Tires.

ME 582 - Automotive Chassis Systems

CR: 3.Prerequisite: ME 381

Introduction to Chassis-analysis of dynamic system - tire dynamics - Ride dynamics - Handling dynamics - Acceleration - Suspensions (Conventional System and Electronic Systems) -Steering conventional and electronic Systems - Chassis Frames

ME 583 - Vehicle Control and Safety Systems

CR: 3.Prerequisite: ME 381

Modern Vehicle control - Main Vehicle Control - Modeling of Vehicles - Cruise Control - Adaptive Cruise Control - Intelligent vehicle High Way System (IVHS) - Active Control - Passive Control - Safety requirements - Active and semi active Suspension - Emission Control - Restraint System Electronics

ME 584 - Automotive Electric & Electronic Systems

CR: 3.Prerequisite: ME 381

The alternator, Alternator regulators - Alternator Testing Services - Starting motor, starter service - Storage batteries -Body Electrical Wiring systems -Lighting system - Meters and gauges -Ignition switch and steering lock, wind shield wipers and washers, fuses and relays - Electronic stability programmed ,Anti lock (ABS), Electronic Traction Support (ETS), Brake System, Acceleration Ship Regulation (ASR) - Parking aids, Vision enhancement systems- Intelligent vehicle diagnostics - Heating and Automotive air conditioning.

ME 586 - Vehicle Design and Engineering

CR: 3.Prerequisite: ME 381

Modern materials and vehicle design - Body design: The styling process - Body design: Aerodynamics -Chassis design and analysis- Crash worthiness- Noise, vibration and harshness-Occupant- accommodation - Suspension systems and components - Control systems in vehicles -The design of engine characteristics for vehicle use -Transmissions and driveline-Braking systems.

ME 588 - Vehicle Maintenance & Repair

CR: 3.Prerequisite: ME 381

Maintenance techniques - Workshop layout and planning -Workshop management systems -Automotive tools, measuring instruments, testers and analyzers - Spare parts management systems - Service manual technical information systems - Diagnosis theory and fundamentals - Maintenance schedules - Engine overhaul and performance - engine performance -Powertrain maintenance - Chassis maintenance - Quality Assurance and Quality Control.

Mechatronics Engineering Courses - (ME X9X)

ME 591 - Mechatronics

CR: 3.Prerequisite: CC 442

Introduction to Mechatronics and Measurement Systems- Mechatronics Key Elements- Introduction to Sensors and Transducers- Position and Motion Sensors - Temperature Sensing Devices - Pressure, Flow, Stress, and Strain Sensors-Actuating Devices- Analog Signal Processing - Digital Circuits and Systems - Analog to Digital and Digital to Analog Conversion - Data Acquisition Systems- Case Studies.

ME 592 - Mechatronic Systems

CR: 3.Prerequisite: ME 591

Introduction to Mechatronics Systems- Mechatronics System Performance- Computer Control- Z-transform - Discrete Controllers I - Discrete Controllers II - Interfacing Sensors and Actuators to Computer - Real-Time Interfacing - Computer I/O Cards and Software I- Computer I/O Cards and Software II - Data Acquisition and Control Case Studies - Liquid Level Control - Robotics Applications .

ME 593 - Electromechanical Systems and Microprocessor Applications

CR: 3.Prerequisite: ME 591

Introduction to electro-mechanical systems - Review of power electronic devices - DC motors: types and characteristics - DC motors speed control: analog, PWM - DC motor braking control, H-bridge , control of speed direction - Stepper motors:Types and operation - Stepper motors - Stepper motor speed and direction control, micro-stepping - AC types and theory of operation - PWM, AC motors control, UPS-, Inverters, vector drive control, Introduction to PLC - PLC input-output modules - PLC Ladder diagram I, case study - PLC Ladder diagram II, Timers and counters, Case studies.

ME 594 - Robotics Applications

CR: 3.Prerequisite: ME 355

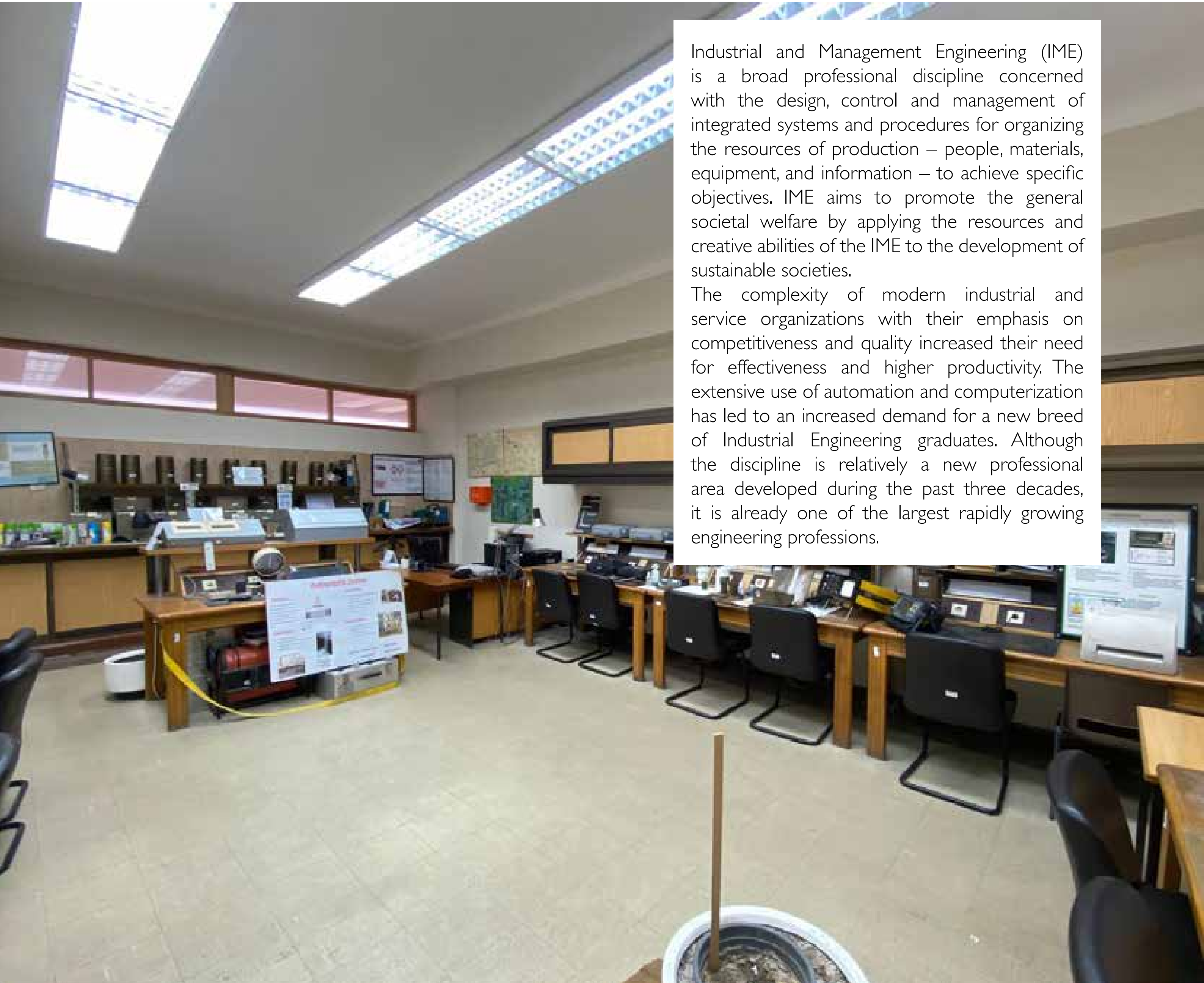
Introduction - Basic concepts in robotics - Homogeneous transformation - Coordinate frames, transform graphs - Assignment of coordinate frames - Direct kinematics - Forward Kinematics algorithms - Inverse kinematics - Problems with programming kinematic models - Control circuits - Path control - External sensors and perception - Internal sensors - Fluid actuators - Electrical actuators.

ME 595 - Automation of Mechanical Systems

CR: 3.Prerequisite: ME 593

Review of Ladder diagram programming - Mathematical operations - Mathematical operations - Structured programming - Data blocks programming - Data blocks programming - Wiring diagram - Wiring diagram - Communications - Communications - Application - SCADA and HMI interfaces - SCADA and HMI interfaces - DCS Systems - Applications.

Industrial and Management Engineering



Industrial and Management Engineering (IME) is a broad professional discipline concerned with the design, control and management of integrated systems and procedures for organizing the resources of production – people, materials, equipment, and information – to achieve specific objectives. IME aims to promote the general societal welfare by applying the resources and creative abilities of the IME to the development of sustainable societies.

The complexity of modern industrial and service organizations with their emphasis on competitiveness and quality increased their need for effectiveness and higher productivity. The extensive use of automation and computerization has led to an increased demand for a new breed of Industrial Engineering graduates. Although the discipline is relatively a new professional area developed during the past three decades, it is already one of the largest rapidly growing engineering professions.

Industrial Engineers (IE's) are those who understand the design, operation, inspection, management and use of systems and the integration of those functions. According to the Institute of Industrial and Systems Engineers (IISE), IE's combine the abilities of engineers and managers. They draw upon the knowledge of mathematics, physical and technical engineering sciences combined with management behavioral sciences to function as problem solvers, innovators, designers, coordinators, and system integrators. Industrial Engineers practice in all phases of manufacturing industries, service industries and government agencies. They design and coordinate components of plant facilities, man-machine systems, material handling systems, information systems, computer-controlled systems, and inventory systems. In addition, they analyze costs and economic feasibility, sustainability, human abilities and needs, jobs and work measurement, and mathematical models of systems. The background, experience and training of Industrial Engineers give them wide acquaintance with industrial problems.

Industrial Engineering programs of study prepare graduates for careers in all phases of industrial, manufacturing and service firms. It qualifies them to perform different managerial and technical functions that require scientific and engineering background. By combining the study of science, mathematics, engineering fundamentals, design, management and quality principles, the programs provide a unique background and a sound basis for life-long career development in engineering practice, research, or management.

Recent developments such as widespread industrial interest in systems approach, information systems, advanced materials, manufacturing processes, global firms, sustainability, supply chain, and quality systems have made the Industrial Engineer's entrance into management even more likely. They are trained to have familiarity with qualitative and quantitative methods interaction and control. At present, the demand for Industrial Engineers exceeds supply assuring job opportunities expected to expand rapidly in the future.

Career opportunities for Industrial Engineers cover a whole spectrum of industrial systems and service systems. Industrial systems include, but are not limited to: Automotive, Aerospace, Apparel, Basic Metals, Beverages, Building Materials, Chemicals, Computers, Appliances, Electronics, Equipment, Fabricated Metals, Food Processing, Glass, Ceramics, Heavy Machinery, Paper, Petroleum Refining, Pharmaceuticals, Plastics, Power utilities, Publishing, Textiles, Tire and rubber, Wood, and furniture. Service Systems include, but are not limited to : Banking, Education, Communications, Financial services, Government, Health and medical, Hotel, Information, Insurance, Repair and Maintenance, Restaurant, Retail trade, Transportation, Wholesale trade, Transportation, and Warehousing.

The Industrial and Management Engineering program at the Arab Academy for Science and Technology and Maritime Transport AASTMT was established in 1994 to prepare graduates for careers in various areas. The program enables them to perform technical and managerial functions that require sound basis for life-long career development in engineering practice, research, and management.

The program has been carefully designed and continuously updated according to the national and international academic reference standards of industrial and management engineering and is fully recognized by the Egyptian Supreme Council of Universities (SCU) and accredited by both the National Authority for Quality Assurance and Accreditation of Education (NAQAAE) and by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET).

The program educational objectives of the IME B.Sc. program are to produce and qualify graduates to:

- Become successful industrial engineers.
- Assume leadership roles within industrial organizations and/or pursue graduate level education.
- Be self-learners and starters with creativity, quality, and following the engineering code of ethics.
- Ensure sustainable development in their organization.

Academic Program Sheet

Year 1			
Semester 1		**Semester 2**	
BA 113	Physics I	BA 114	Physics II
BA 123	Mathematics I	ME151	Eng. Drawing & Projection
BA 141	Engineering Mechanics I	BA 124	Mathematics II
CC 111	Introduction to computer	BA 142	Engineering Mechanics II
IM 111	Industrial Relations	CC 114	Introduction to Programming
LH 131	ESP I	IM 112	Manufacturing Technology
BA 118	Chemistry	LH 132	ESP II
Year 2			
Semester 3		**Semester 4**	
BA 223	Mathematics III	BA 224	Mathematics IV
IM 221	Introduction to Industrial Engineering	EE 236	Electrical Engineering I
LH 231	Technical Report Writing	IM 213	Material Removal Processes
ME 252	Mechanical Eng. Drawing	ME 231	Thermodynamics
ME 274	Materials Science	ME 241	Experimental Methods
NE 264	Scientific Thinking	ME 277	Strength of materials
Year 3			
Semester 5		**Semester 6**	
EE 326	Electrical Engineering II	IM 315	Materials Technology
IM 314	Material Forming Processes	IM 316	Advanced Manufacturing Systems
IM 341	Engineering Statistics	IM 342	Statistical Analysis
ME 355	Theory of Machines	IM331	Industrial Data Systems Management
ME 361	Fluid Mechanics	ME 454	Machine Design
NE 364	Engineering Economy	NE 465	Aesthetic Edu. & Art Appreciation

Year 4			
Semester 7		**Semester 8**	
ME 455	Computer Aided Design	IM 400IM	Practical Training
IM 422	Work Design and Measurements	IM 417	Failure Analysis
IM 423	Operations Research	IM 424	Production Planning and Control
IM 432	Operations Management	IM 425	Management Science
IM 433	Leadership in Industrial Organizations	IM 426	Industrial Facilities Planning
IM 443	Quality Engineering	IM 434	Engineering Project Management
		IM 444	Reliability Engineering
Year 5			
Semester 9		**Semester 10**	
IM 501	Senior Project I	IM 502	Senior Project II
IM 527	Human Factors Engineering and Design	IM 535	International Operations Management
IM 528	Discrete Event System Simulation	IM XXXE	Department Restricted Elective
IM XXXE	Department Restricted Elective	IM XXXE	Department Restricted Elective
IM XXXE	Department Restricted Elective	IM XXXE	Department Restricted Elective
IM XXXE	Department Restricted Elective		

Department Restricted Electives			
Group 1: Materials and Manufacturing Engineering		**Group 2: Industrial Engineering**	
IM 511E	Engineering Metrology	IM 521E	Discrete Event System Simulation
IM 512E	Integrated Manufacturing Systems	IM 522E	Industrial Systems Simulation
IM 513E	Advanced Joining Processes	IM 523E	Human Factors Engineering and Design
IM 514E	Polymers, Ceramics and Composite Materials	IM 524E	Industrial Safety
IM 515E	Selection of Engineering Materials	IM 525E	Industrial Material Handling Systems
IM 516E	Engineering Solid Mechanics	IM 526E	Factory Physics
IM 517E	Smart Materials and Applications in Industrial Systems	IM 527E	Social Network Analysis
Group 3: Management Engineering		**Group 4: Quality and Design Engineering**	
IM 531E	Human Resource Management	IM 541E	Product Design and Development
IM 532E	Industrial Distribution Systems	IM 542E	Reverse Engineering
IM 533E	Supply Chain Management	IM 543E	Design of Experiments
IM 534E	Maintenance Management	IM 544E	Quality Assurance Systems
IM 535E	Marketing Management	IM 545E	Total Quality in Industrial Management
IM 536E	Engineering Cost Analysis	IM 546E	Machinery Condition Monitoring
IM 537E	Introduction to Entrepreneurship	IM 547E	Introduction to Six Sigma

Graduation Requirements

College Requirements					
A total of 57 credit hours are required by the college as per the following table:					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
Compulsory Courses A total of 60 Cr. Hr. of the following compulsory courses					
BA	1	BA 113	Physics I	3	None
	2	BA 114	Physics II	3	BA 113
	1	BA 118	Chemistry	2	None
	1	BA 123	Mathematics I	3	None
	2	BA 124	Mathematics II	3	BA 123
	3	BA 223	Mathematics III	3	BA 124
	4	BA 224	Mathematics IV	3	BA 223
	1	BA 141	Engineering Mechanics I	3	None
	2	BA 142	Engineering Mechanics II	3	BA 141
CC	1	CC111	Introduction to Computer	3	None
	2	CC114	Introduction to Programming	3	CC 111
IM	1	IM 111	Industrial Relations	2	None
	2	IM 112	Manufacturing Technology	2	None
	8	IM 400IM	Practical Training	0	None
	10	IM 535	International Operations Management	3	126 Credit Hours
ME	1	ME151	Eng. Drawing & Projection	2	None

College Requirements					
A total of 57 credit hours are required by the college as per the following table:					
Subject Field	**Semester**	**Course Code**	**Course Title**	**Cr. Hr.**	**Prerequisite**
Compulsory Courses A total of 60 Cr. Hr. of the following compulsory courses					
LH	1	LH 131	ESP I	2	None
	2	LH 132	ESP II	2	LH 131
	3	LH 231	Technical Report Writing	3	LH 132
NE	3	NE 264	Scientific Thinking	3	None
	5	NE 364	Engineering Economy	3	54 Credit Hours
	6	NE 465	Aesthetic Edu. & Art Appreciation	3	None
	6	NE 465	Aesthetic Edu. & Art Appreciation	3	None

Department Requirements

A total of 120 credit hours are required by the department, which are distributed as follows:
A total of 123 credit hours are required by the department, which are distributed as follows:

- 105 credit hours of compulsory courses.
- A minimum of 18 credit hours of department restricted electives that are selected from the four main course groups as follows:
  - One course from the "Industrial Engineering" group, equivalent to 3 credits
  - One course from the "Management Engineering group, equivalent to 3 credits
  - Four courses, one from each of the groups, equivalent to 12 credits.

The required compulsory and restricted elective courses are listed in the following table.

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 96 Cr. Hr. of the following compulsory courses					
IM	4	IM 213	Material Removal Processes	3	IM 112
	5	IM 314	Material Forming Processes	3	IM 213, ME 277
	6	IM 315	Materials Technology	3	ME 277
	6	IM 316	Advanced Manufacturing Systems	3	IM 314
	8	IM 417	Failure Analysis	3	IM 315
	3	IM 221	Introduction to Industrial Engineering	3	None
	7	IM 422	Work Design and Measurements	3	90 Credit Hours
	7	IM 423	Operations Research	3	90 Credit Hours
	8	IM 424	Production Planning and Control	3	IM 432
	8	IM 425	Management Science	3	IM 423
	8	IM 426	Industrial Facilities Planning	3	IM 423
	9	IM 527	Human Factors Engineering and Design	3	IM 422
	9	IM 528	Discrete Event System Simulation	3	IM 423

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 96 Cr. Hr. of the following compulsory courses					
IM	6	IM 331	Industrial Data Systems Management	3	54 Credit Hours
	7	IM 432	Operations Management	3	90 Credit Hours
	7	IM 433	Leadership in Industrial Organizations	3	90 Credit Hours
	8	IM 434	Engineering Project Management	3	IM 423
	5	IM 341	Engineering Statistics	3	BA 224
	6	IM 342	Statistical Analysis	3	IM 341
	7	IM 443	Quality Engineering	3	IM 342
	8	IM 444	Reliability Engineering	3	IM 443
	9	IM 501	Senior Project I	3	S.S.*
	10	IM 502	Senior Project II	6	IM 501
ME	3	ME 274	Materials Science	3	BA 114, BA 142
	3	ME 252	Mechanical engineering Drawing	3	ME 151
	4	ME 277	Strength of Materials	3	ME 274
	4	ME 231	Thermodynamics	3	BA 114
	4	ME 241	Experimental Methods	3	54 Credit Hours
	5	ME 355	Theory of Machines	3	BA 142
	5	ME 361	Fluid Mechanics	3	BA 124
	6	ME 454	Machine Design	3	ME 252
	7	ME 455	Computer Aided design	3	ME 454
EE	4	EE 236	Electrical Engineering I	3	BA 124
	5	EE 326	Electrical Engineering II	3	EE 236

Department Restricted Electives

At least nine courses (24 Cr. Hr.) from the following list of the college electives

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Group 1	9 – 10	IM 511E	Engineering Meteorology	3	126 Credit Hours
	9 – 10	IM 512E	Integrated Manufacturing Systems	3	126 Credit Hours
	9 – 10	IM 513E	Advanced Joining Processes	3	IM 417
	9 – 10	IM 514E	Polymers, Ceramics & Composite Materials	3	IM 417
	9 – 10	IM 515E	Selection of Engineering Materials	3	126 Credit Hours
	9 – 10	IM 516E	Engineering Solid Mechanics	3	IM 417
	9 – 10	IM 517E	Smart Materials and Applications in Industrial Systems	3	126 Credit Hours
Group 2	9 – 10	IM 521E	Discrete Event System Simulation	3	IM 423
	9 – 10	IM 522E	Industrial Systems Simulation	3	IM 521E
	9 – 10	IM 523E	Human Factors Engineering and Design	3	IM 422
	9 – 10	IM 524E	Industrial Safety	3	126 Credit Hours
	9 – 10	IM 525E	Industrial Material Handling Systems	3	IM 426
	9 – 10	IM 526E	Factory Physics	3	IM 424
	9 – 10	IM 527E	Social Network Analysis	3	126 Credit Hours

Department Restricted Electives

At least nine courses (24 Cr. Hr.) from the following list of the college electives

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Group 3	9 – 10	IM 531E	Human Resource Management	3	126 Credit Hours
	9 – 10	IM 532E	Industrial Distribution Systems	3	IM 432
	9 – 10	IM 533E	Supply Chain Management	3	IM 432
	9 – 10	IM 534E	Maintenance Management	3	IM 432
	9 – 10	IM 535E	Marketing Management	3	IM 432
	9 – 10	IM 536E	Engineering Cost Analysis	3	126 Credit Hours
	9 – 10	IM 537E	Introduction to Entrepreneurship	3	126 Credit Hours
Group 4	9 – 10	IM 541E	Product Design and Development	3	126 Credit Hours
	9 – 10	IM 542E	Reverse Engineering	3	126 Credit Hours
	9 – 10	IM 543E	Design of Experiments	3	126 Credit Hours
	9 – 10	IM 544E	Quality Assurance Systems	3	IM 443
	9 – 10	IM 545E	Total Quality in Industrial Management	3	IM 443
	9 – 10	IM 546E	Machinery Condition Monitoring	3	126 Credit Hours
	9 – 10	IM 547E	Introduction to Six Sigma	3	126 Credit Hours

* Senior Standing (Completion of 138 Credit Hours and a GPA of at least 2.00).

*IM517E, IM527E, IM537E, and IM547E are planned for offering during the academic year 2016/2017.

Where the four main course groups are:

- Group 1: Materials and Manufacturing Engineering.
- Group 2: Industrial Engineering.
- Group 3: Management Engineering.
- Group 4: Quality and Design Engineering.

Course Description

IM 400IM – Practical Training

Cr.0. Prerequisite: None.

This course is a non-credit course and is a college graduation requirement. Students are asked to undertake a minimum of four weeks of practical training in off-campus sites recommended by the college and the department in order to pass this course. Students are required to submit a recognition letter from the site where they received their training, besides a report and a presentation. Course is a Pass/Fail one.

IM 501 – Senior Project I

Cr.3. Prerequisite: Senior Standing – Completion of 138 Credit Hours and a GPA of at least 2.00.

Application-oriented project shows competence in major academic area, where an independent research project is conducted under the guidance of a faculty member in the Department of Industrial and Management Engineering. The research should contribute to the advancement of knowledge in the field. Written report and formal presentation are required.

IM 502 – Senior Project II

Cr.6. Prerequisite: IM 501

Application-oriented project to show competence in major academic area. Where, an independent research project is conducted under the guidance of a faculty member in the Department of Industrial and Management Engineering. The research should contribute to the advancement of knowledge in the field. Written report and formal presentation are required.

IM 111 – Industrial Relations

Cr.2. Prerequisite: **None**

This course identifies the different types of industries, production techniques, management and organization structures and human resource management. It gives a brief description of the engineering education and engineering profession for different disciplines. It introduces the concepts of entrepreneurship for engineers and technology management and innovation. It also clarifies the meaning of production planning, facility layout, quality management and cost calculations.

IM 112 – Manufacturing Technology

Cr.2. Prerequisite: **None**

The course provides an introduction to engineering materials and their properties, production of common metals. It covers types of manufacturing, basic manufacturing processes such as casting, metal forming, welding and machining. An overview of some advanced manufacturing processes is also included. In addition, it introduces measurement standards, instruments, deviations and methods.

IM 212 – Manufacturing Processes

Cr.3. Prerequisite: **IM 112**

This course is tailored for departments other than the department of industrial and management engineering and it covers the following topics: Chip type machining processes, cutting tools, work holding devices, mechanics of chip formation, and analytical study of machining processes. It also includes tool wear, process accuracy and product surface finish, precision measurements and metrology, and an overview of non-conventional machining processes.

IM 213 – Material Removal Processes

Cr.3. Prerequisite: IM 112

The course covers a variety of topics including: Chip type machining processes, cutting tools, tool wear, turning processes, drilling, broaching, and abrasive machining. It also includes the mechanics of chip formation, analytical study of machining processes, work piece holding devices, and thread and gear manufacturing. Furthermore, it gives an overview of non-traditional machining processes, process accuracy and product surface finish, precision measurements and metrology.

IM 314 – Material Forming Processes

Cr.3. Prerequisite: IM 213, ME 277

The course introduces the concept of plastic deformation and Mechanical behaviour of materials.This includes stress, strain and different bulk deformation processes; including forging and forgeability, rolling, extrusion, rod & wire drawing. It also covers sheet metal forming and formability, deep drawing, shearing processes; blanking & piercing, and welding processes.

IM 315 – Materials Technology

Cr.3. Prerequisite: ME 277

The course covers the classification of engineering materials, material selection for manufacturing, casting processes and solidification, fluid flow, melting practice and casting alloys, continuous casting of steel and die casting, die design. It also includes polymers, processing of polymers, processing of reinforced plastics, metal powders production and compaction, ceramics properties and forming processes.

IM 316 – Advanced Manufacturing Systems

Cr.3. Prerequisite: IM 314

Reflecting manufacturers' growing need to integrate computers into their production processes, this course covers the machining fundamentals, as well as Computer Numerical Control (CNC) programming and operation. It covers the operation of Computer Numerical Control machine tools with a focus on word address (G and M code) programming for the industry standard Fanuc controllers.

IM 417 – Failure Analysis

Cr.3. Prerequisite: IM 315

The course covers different techniques for failure analysis including modes for mechanical failure, residual stresses, brittle and ductile fractures, fatigue fracture, wear, corrosion, elevated-temperature failures. It also introduces the different techniques of non-destructive testing.

IM 511E – Engineering Meteorology

Cr.3. Prerequisite: 126 Credit Hours

The course covers the following topics: dimensional engineering meteorology, dimensional tolerance, error propagation and tolerance accumulation, screw thread measurements and inspection, geometrical tolerance, and verification of geometrical features.

IM 512E – Integrated Manufacturing Systems

Cr.3. Prerequisite: 126 Credit Hours

This course covers the technology associated with computer integrated manufacturing (CIM). Conventional manufacturing technologies are introduced, followed by computer automation and CIM. The course includes computer-aided design (CAD), product data management (PDM), computer-aided engineering (CAE), and integrated manufacturing systems.

IM 513E – Advanced Joining Processes

Cr.3. Prerequisite: IM 417

This is an advanced course that covers the different joining processes; reaction of various materials to welding, brazing and soldering; distortion; process and material selection and structural engineering considerations.

IM 514E – Polymers, Ceramics and Composite Materials

Cr.3. Prerequisite: IM 417

This course covers the structure-property relationships as well as the mechanical and thermo-mechanical characteristics of the different types of polymeric, ceramic and composite materials. In addition, it introduces the students to the different properties and industrial applications of these classes of materials.

IM 515E – Selection of Engineering Materials

Cr.3. Prerequisite: 126 Credit Hours

The course helps students develop problem-solving abilities for materials evaluation and selection, materials processes selection, failure analysis, and materials testing. The course includes the study of the basics for material selection in the design of engineering systems; materials design parameters, and classes of materials. A set of case studies in material's selections are given throughout the course to develop the materials selection knowledge and skills of the students.

IM 516E – Engineering Solid Mechanics

Cr.3. Prerequisite: IM 417

This course presents solid modelling not just as a communication tool, but as an integral part of the design process. To this end the course explores design intent, the use of solid models in engineering analysis, and introduces techniques from manufacturing such as mould design and sheet metal patterning. The course includes the study of the basis for solid mechanics in the design of machine and product elements. A set of case studies are given throughout the course to develop the part design modelling knowledge and skills of the students.

IM 517E – Smart Materials and Applications in Industrial Systems

Cr.3. Prerequisite: 126 hours

The course covers the different types of smart materials, their properties, and fields of applications in industrial systems. Different types of smart materials are studied such as shape memory alloys, piezoelectric materials, magnetorheological fluids, and semiconductor smart systems. In addition, it introduces the students to the processing techniques and degradation mechanisms of different types of smart materials.

IM 221 – Introduction to Industrial Engineering

Cr.3. Prerequisite: None

The course provides an introduction to the fundamentals of Industrial Engineering; concepts, analysis, and design. It covers applications of the principles and problems in operations research, systems analysis, manufacturing processes, human factors, facility design, process selection, production processes, quality and operation management.

IM 422 – Work Design and Measurements

Cr.3. Prerequisite: 90 Credit Hours

The course introduces the students to the concept of improvement of productivity through designing and developing various work centres. It covers the detailed restudying of work centres to find better ways to produce the products and/or improve their quality, study of basic techniques required to establish an allowed time standard to perform a given task. It also includes performance rating and measurement of work content of prescribed methods with considerations for allowance for fatigue and personal unavoidable delays.

IM 423 – Operations Research

Cr.3. Prerequisite: 90 Credit Hours.

The course provides the basic concepts and fundamentals of management science, problems addressed by operations research, and problem formulations in linear programs. It includes the graphical solution of linear programs, simplex method, transportation model, assignment model, network planning, and critical path and PERT methods.

IM 424 – Production Planning and Control

Cr.3. Prerequisite: IM 432

The course covers topics related to materials management; purchasing and inventory acquisition, inventory control; including safety stocks and service levels. It also includes material and capacity requirements planning, scheduling and controlling production activities, analysis of manufacturing, service and project operations. Furthermore, it covers quality assurance, maintenance and cost control, and strategy for future production operations.

IM 425 – Management Science

Cr.3. Prerequisite: IM 423

The course provides students with many approaches to solving both single and multi-objective optimization problems, analyzing the sensitivity of the results, exploring design alternatives using computed queuing parameters, and making decisions according to Monte-Carlo simulation results or Markovian analysis or Analytic Hierarchy Process. Spreadsheets are used extensively to accomplish the mathematical manipulations.

IM 426 – Industrial Facilities Planning

Cr.3. Prerequisite: IM 423

The course provides the students with an introduction to types of facilities, steps in facilities design, layout planning tools and techniques, applications in manufacturing and non-manufacturing areas.

IM 521E – Discrete Event System Simulation

Cr.3. Prerequisite: IM 423

This course provides a basic treatment of discrete-event simulation, including the proper collection and analysis of data, the use of analytic techniques, verification and validation of models, and designing simulation experiments. Furthermore, it presents the application of simulation in manufacturing and material handling systems, and service industries.

IM 522E – Industrial Systems Simulation

Cr.3. Prerequisite: IM 521E

As a continuation to the IM 521E course, this course starts with an introduction to simulation concepts, and progresses through an overview of the Arena software, basic model development, input analysis, additional modelling constructs, output analysis, and advanced modelling. Furthermore, the course includes chapters on integrating Arena simulation models with other applications, specialized statistical issues, continuous simulation, and conducting a successful simulation study.

IM 523E – Human Factors Engineering and Design (Ergonomics)

Cr.3. Prerequisite: IM 422

The course covers topics related to the human characteristics (capabilities, limitations, motivations and desires) in order to adapt a human made environment to the people involved. It highlights that this knowledge may affect complex technical systems workstations, or the tools used at work.

IM 524E – Industrial Safety

Cr.3. Prerequisite: 126 Credit Hours

The course covers accident causes, losses, and investigative techniques. It includes the role of human, task/machine, and environment in accident prevention. It introduces safety standards, codes, and laws. It also covers product liability, design, evaluation, and management of safety organizations and programs. The topics of hazard recognition, analysis, control and risk assessment, systems safety and related techniques are also included.

IM 525E – Industrial Material Handling Systems

Cr.3. Prerequisite: IM 426

The course provides a broad understanding of materials handling engineering from a system design and application engineering point of view. It covers the topics of instruction in the engineering principles, design criteria, operating parameters, performance requirements, equipment resources, and applications of engineering practices involved in the planning, design, and operation of materials handling systems for manufacturing, physical distribution, and government operations. A materials handling system design project is a required part of the course.

IM 526E – Factory Physics

Cr.3. Prerequisite: IM 424

This course provides students' with deep and generic insights for understanding, evaluating, and improving the performance of production lines. The course covers different topics including: advanced inventory management and control techniques, advanced materials requirements planning, basic dynamics of production lines, the different variability sources in a production line, the corrupting influence of variability, evaluating the performance of production lines, and the effect of batching on production lines' performance.

IM 527E – Social Network Analysis

Cr.3. Prerequisite: 126 Credit Hours

The course introduces students to the basic concepts and analysis techniques in Social Network Analysis. Students learn how to identify key individuals and groups in social systems, to detect and generate fundamental network structures, and to model growth and diffusion processes in networks. Students will be able to design and execute network analysis projects including collecting data and considering ethical and legal implications, to perform systematic and informed analyses of the network data.

IM 331 – Industrial Data Systems Management

Cr.3. Prerequisite: 54 Credit Hours

The course provides an introduction to Data Management Systems. It explains the importance of information systems to management and how Database Management Systems can be used as decision support systems. Techniques of designing a database management system valuable for decision makers are thoroughly explained. Structured query language is included to generate useful reports for decision makers. The course provides also hands-on the most up-to-date database management software tool.

IM 432 – Operations Management

Cr.3. Prerequisite: 90 Credit Hours

The course introduces the production, operations and productivity concepts. It covers production, operation decision making, systems design, capacity and investment, facility location and layout, and planning for goods and services. It also includes the concept of process planning and selection, forecasting demand, aggregate demand, aggregate planning and master scheduling.

IM 433 – Leadership in Industrial Organizations

Cr.3. Prerequisite: 90 Credit Hours

This course provides the students with an introduction to leadership as a key function of scientific management in industrial organizations. It addresses the different theories of leadership, styles, cultural impact, and the key leadership issues facing engineers with responsibility for executing their organizations strategies.

IM 434 – Engineering Project Management

Cr.3. Prerequisite: IM423

An introduction to project management including project selection within a general strategic orientation, organizing the project and the project management team, scope management, project planning and scheduling, probabilistic scheduling, budgeting and cost estimating, resource allocation and levelling, project time acceleration, project monitoring and control, and project integration management.

IM 535 – International Operations Management

Cr.3. Prerequisite: 126 Credit Hours.

The course introduces the students to the concepts of international business environment, international trade and direct foreign investments, foreign exchange, and economic cooperation.

IM 531E – Human Resource Management

Cr.3. Prerequisite: 126 Credit Hours.

The course covers topics related to: Managers and their personnel concepts, personnel administration and resource policies, organizational planning and management development, managing and working in a changing world. It also includes the concepts of motivation and team work, recruitment and selection, training and appraisal, worker participation in production problems, wages, incentives and services.

IM 532E – Industrial Distribution Systems

Cr.3. Prerequisite: IM 432

The course covers the concepts of design and analysis of distribution systems of people, processes and technology. The focus is on distribution, warehousing, and material handling. Other topics include the role of the warehouse in the extended enterprise, warehouse planning, process design, layout, equipment selection, workforce and workplace issues, and financial performance measures.

IM 533E – Supply Chain Management

Cr.3. Prerequisite: IM 432

This course covers the major issues in supply chain management, including: definition of a supply chain; role of inventory; advanced production-inventory models; supply contracts; bullwhip effect and information sharing; vendor-managed inventories and other distribution strategies; third-party logistics providers; managing product variety; information technology and supply chain management; international issues.

IM 534E – Maintenance Management

Cr.3. Prerequisite: IM 432

The course introduces the concepts of maintenance and the industrial organization, acquisition policy and maintenance life, cycle costs, maintenance strategy as a business centred approach. It also covers topics of reliability of plant components and systems, determining the life plan and schedule, controlling plant reliability, reliability centred maintenance, and enterprise asset management.

IM 535E – Marketing Management

Cr.3. Prerequisite: IM 432

The course introduces the students to the concepts of evaluation of markets and marketing, the marketing environment, demand and market study, the buyer behaviour; consumer and organizational markets. It also covers the topics of the marketing mix, marketing information system, the development of new products and services, the product life cycle, pricing and promotional distribution systems, and development and marketing plan.

IM 536E – Engineering Cost Analysis

Cr.3. Prerequisite: 126 Credit Hours

This course provides the latest principles and techniques for the evaluation of engineering design, with an emphasis on analysis and estimation of costs. It analyzes labour, material, accounting, and forecasting; then the theme of estimating is developed, with a study of methods, operations, and products.

IM 537E – Introduction to Entrepreneurship

Cr.3. Prerequisite: 126 Credit Hours

The course provides an introduction to the principles of Entrepreneurship. It introduces the essential elements of building one's own business, from brainstorming ideas and assessing opportunities to pitching a business idea. It explains entrepreneurial thinking with attention to entrepreneurial mind-set, entrepreneurial motivations, and entrepreneurial behaviours.

IM 341 – Engineering Statistics

Cr.3. Prerequisite: BA 224

The course introduces the students to statistical sciences, descriptive statistics and inferential statistics, methods of graphical presentation of data, histogram, box plot, position parameters, mean, median, and quartiles, dispersion parameters, and variance. It covers also the fundamentals of probability, probability distributions for discrete and continuous variables, and sampling distributions.

IM 342 – Statistical Analysis

Cr.3. Prerequisite: IM 341

The course starts with a revision of engineering statistics. Then it provides the sampling distributions, point estimators, and confidence interval estimations for single and two samples. It covers the testing of hypothesis, linear regression, multiple regression, and analysis of variance.

IM 443 – Quality Engineering

Cr.3. Prerequisite: IM 342

The course introduces the principles and concepts of statistical quality control, quality improvement tools, control charts for variables, control charts for attributes, choice between attribute and variable control charts, process capability measures. It also covers the types of attribute acceptance sampling plans, characteristics of acceptance sampling plans, producer consumers' relationships, performance of acceptance sampling plans, economics of acceptance sampling plans. The standard attribute acceptance sampling plans applications and limitation, the quality in design, reliability, product life and process design are included.

IM 444 – Reliability Engineering

Cr.3. Prerequisite: IM 443

The course covers principles of reliability, failure rate and its relation to reliability, probability distribution of the time to failure, exponential and Weibull distributions, reliability of systems, series and parallel systems, stand by redundancy, systems mean time to failure, mean residual life, reliability in design. It also includes failure mode effect analysis, failure tree analysis, reliability testing and analysis, and warranty problems.

IM 541E – Product Design and Development

Cr.3. Prerequisite: 126 Credit Hours

This course examines the product design and development process. Topics include: organization and management issues associated with the product development process; the identification of customer needs and the translation of these needs into product performance specifications; methodologies for the generation and selection of concepts; developing the product architecture with emphasis on creating interfaces, prototyping and design for manufacturing.

IM 542E – Reverse Engineering

Cr.3. Prerequisite: 126 Credit Hours.

The course provides an introduction to product development with reverse engineering concept, product development tools, definition of customer needs, product architectures. It also covers product metrics, design for manufactures and assembly, design for environment, and several case studies.

IM 543E – Design of Experiments

Cr.3. Prerequisite: 126 Credit Hours

The course includes a revision of models for statistical analysis, the objectives of design of experiments, single factor designs, several factors designs, 2k factorial design, fractional factorial design, orthogonal array and Taguchi methods, and robust design.

IM 544E – Quality Assurance Systems

Cr.3. Prerequisite: IM 443

The course covers the quality management and quality assurance vocabulary, the development of quality assurance standards; complaint, myths and advantages of quality assurance certification. It includes the structure of quality assurance standards, the procedure of implementation of quality assurance standards, certification and accreditation bodies, and clauses of quality assurance standards, selection of appropriate quality management standards, quality management, and quality systems guidelines. It also covers the structure of quality manual, internal and external auditing, auditor qualification, reporting the audit, and the standards strongly related to quality assurance standard.

IM 545E– Total Quality in Industrial Management

Cr.3. Prerequisite: IM 443

This course introduces the history and evolution of quality, definition of quality, basic concept of total quality management, philosophies of leading sags of quality Deming, Juran, Ichikawa, Crosby, Taguchi, ChigoChingo. It also covers the characteristics of quality distribution parameters, the relationships between quality parameters, some statistical process control tools, and quality cost.

IM 546E – Machinery Condition Monitoring

Cr.3. Prerequisite: 126 Credit Hours

The course covers maintenance types, maintenance philosophy, the role of vibration in Machinery Condition Monitoring (MCM), damage in machines, vibrational techniques, and vibration analysis. It also covers unbalance detection, bent shaft, misalignment, mechanical looseness, bearing faults, gear faults, pump cavitations, and electrical motor faults.

IM 547E– Introduction to Six Sigma

Cr.3. Prerequisite: 126 Credit Hours

This course introduces and examines Six Sigma concepts and theory of quality control in manufacturing and service operations, analysis of product design and process capability, and statistical process control. Students will develop a broad understanding of Six Sigma principles and practice, and acquire knowledge about such initiatives in manufacturing and service operations.

NE 364 – Engineering Economy

Cr.3. Prerequisite: 54 Credit Hours

A study of basic concepts emphasizing analysis of aggregate economy. Examination of the processes of price determination and calculation of optimum demand for maximum profit. Basic principles of money-time relationship. Methods of investment assessment and fundamental techniques of comparison of investment opportunities. Theories of depreciation of physical facilities and study of cost recovery systems.

Oil and Gas Engineering

The Oil and Gas engineering has a long history of innovation. Finding new and better ways to get at oil and gas resources hidden from view far in the subsurface has been a necessity to meet growing demand for energy.

Oil and Gas engineering, the branch of engineering that focuses on processes that allow the development and exploitation of crude oil and natural gas fields as well as the technical analysis, computer modeling, and forecasting of their future production performance. Oil and Gas engineering evolved from mining engineering and geology, and it remains closely linked to geoscience, which helps engineers understand the geological structures and conditions favorable for Oil and Gas deposits. The Oil and Gas engineer, whose aim is to extract gaseous and liquid hydrocarbon products from the earth, is concerned with drilling, producing, processing, and transporting these products and handling all the related economic and regulatory considerations.

Mission

The Program's Mission is to provide our students quality education through our elite faculty and educational resources to transfer the up-to-date knowledge, skills, tools, and methods via the following,

- Create, preserve, integrate, transfer and apply oil and gas engineering knowledge.
- Produce capable future engineers and to enhance the capabilities of current practitioners.

Oil & Gas Engineering Objectives

The Program's objectives can be summed up as follows:

- Prepare students to become successful professional engineers in the demanding field of oil and gas engineering.
- Provide students with the fundamental principles of science and engineering in order to cope successfully with the technological challenges of the oil and gas industry.
- Cultivate analytical skills, problem solving tactics, and critical thinking.
- Promote engineering ethics, job responsibility, and moral practices.
- Develop skills for effective communication with co-workers, managers, and the public on topics related to technical concepts, risks, and recommendations.
- Continue life-long learning process in the area of oil and gas engineering that are directly linked to industry and current state-of-the-art technology and participate in graduate education to remain as effective professionals in the workplace of the future.
- Provide the theoretical and computational skills necessary for the solution of both theoretical and practical engineering problems in the field of oil and gas energy.

The program offers the degree of Bachelor of Science (B. Sc.) in Oil & Gas Engineering. The candidate for the (B. Sc.) degree is required to pursue scholastic quality and complete a plan of study prepared with his academic advisor and approved by the Oil & Gas Engineering Department Council.The number of credit hours required for graduation is 180 (Cr. Hr.) spreading over 10 academic semesters. The program contains a sequence of courses that are designed according to the National Academic Reference Standards (NARS) and Accreditation Board for Engineering and Technology (ABET) for Oil and Gas engineering.

Academic Program Sheet

Year 1			
Semester 1		**Semester 2**	
BA 113	Physics (1)	BA 114	Physics (2)
BA 123	Mathematics (1)	BA119	Organic Chemistry (1)
BA 141	Eng. Mechanics (1)	BA 124	Mathematics (2)
CC 111	Introduction to Computer	BA 142	Engineering Mechanics (2)
BA 118	Chemistry	CC 112	Structured Programming
LH 131	ESP (1)	IM 112	Manufacturing Technology
ME 151	Eng. Drawing and Projection	LH 132	ESP (2)
Year 2			
Semester 3		**Semester 4**	
BA 223	Mathematics (3)	BA 224	Mathematics (4)
EE 238	Electrical Eng. Fundamentals	EE 218	Instrumentation & Measurements
LH 231	Technical Report Writing	CH204	Mass Balance
OG 211	General Geology	OG 212	Petroleum Geology
CH201	Chemical Engineering Calculations	ME 276	Stress Analysis
ME 274	Material Science	NE466	Environmental Science & Technology
Year 3			
Semester 5		**Semester 6**	
OG 321	Introduction to Petroleum Engineering	CH302	Mechanical Unit Operation
OG 322	Reservoir Engineering (I)	OG 324	Multi Phase Flow
ME362	Fluid Mechanics (1)	CB 240	Theory of Structures
MM 471	Introduction. to Offshore Engineering	EE 329	Electrical Machines
BA 327	Statistics & Numerical Methods	NE 264	Scientific Thinking
ME 231	Thermodynamics	OG 323	Reservoir Engineering (II)
		OG 301	Practical Training (I)

Semester 7		Semester 8	
ME 464	Hydraulic & Pneumatic Systems	CH401	Separation Processes I
ME 431	Heat Transfer	MM 570	Underwater Technology
OG 413	Natural Gas Engineering	OG 414	Health, Safety & Risk Assessment
OG 424	Drilling Engineering (I)	OG 415	Pipelines Engineering
EE 417	Automatic Control Engineering	OG 425	Drilling Engineering (II)
MM 571	Design & Construction of Offshore Structures	OG 426	Oil & Gas Recovery
		OG 402	Practical Training (II)
Year 5			
Semester 9		**Semester 10**	
OG 516	Computer Applications for O&G Indus.	OG 528	Oil &Gas Production
OG 527	Well Testing	OG 523	Natural Gas Liquefaction
OG 503	Project (I)	OG 504	Project (II)
OG XXX	Department Restricted Elective	OG XXX	Department Restricted Elective
OG XXX	Department Restricted Elective	OG XXX	Department Restricted Elective
OG XXX	Department Restricted Elective		

Department Restricted Electives

Group A - Elective courses from OG		Group B - Elective courses from other Engineering Disciplines.	
OG 531	Handling, Storage & Trans. of Petro. Prod	ME 565	Turbomachinery
OG 519	OIL & Gas Legalization	ME 542	Maintenance Planning
OG 517	Reservoir Simulation	IM 434	Engineering Project Management
OG 518	Petroleum Economics	IM 443	Quality Engineering
CH408	Gas processing	CH403	Petrochemical Industries

Graduation Requirements

College Requirements					
A total of 51credit hours are required by the college as per the following table:					
Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses Compulsory Courses A total of 51 Cr. Hr. of the following compulsory courses					
BA	1	BA 113	Physics (1)	3	None
	1	BA 118	Chemistry	2	None
	1	BA 123	Mathematics (1)	3	None
	1	BA 141	Engineering Mechanics (1)	3	None
	2	BA 114	Physics (2)	3	BA 113
	2	BA 124	Mathematics (2)	3	BA 123
	2	BA 119	Organic Chemistry	2	BA 118
	2	BA 142	Engineering Mechanics (2)	3	BA 141
	3	BA 223	Mathematics (3)	3	BA 124
	4	BA 224	Mathematics (4)	3	BA 223
	5	BA 327	Statistics & Numerical Methods	3	BA 224
CC	1	CC 111	Introduction to Computer	3	None
	2	CC 112	Structured Programming	3	CC 111
EE	3	EE 238	Electrical Eng. Fundamentals	3	BA 124
IM	2	IM 112	Manufacturing Technology	2	None
LH	1	LH 131	ESP I	2	None
	2	LH 132	ESP II	2	LH 131
	3	LH 231	Technical Report Writing	3	LH 132
ME	2	ME 151	Eng. Drawing & Projection	2	None

Department Requirements

A total of 129 credit hours are required by the department, which are distributed as follows:

- 114 credit hours of compulsory courses.
- A minimum of 15 credit hours of department restricted electives that are selected from the Three main senior standing courses groups as follows:
  - Three courses equivalent to 9 credit hours from Group (A): Elective courses from OG
  - Two course, from the Group (B): Elective courses from other Engineering Disciplines, equivalent to 6 credits hours, one course from each discipline.

Minimum of two courses from group C, equivalent to 6 credit hours (of department free elective courses).

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 114 Cr. Hr. of the following compulsory courses					
NE	5	NE 466	Environmental Science & Technology	3	None
	6	NE 264	Scientific Thinking	3	None
EE	4	EE 218	Instrumentation & Measurements	3	EE 238
	6	EE 329	Electrical Machines	3	EE 238
	7	EE 417	Automatic Control Engineering	3	EE 329
ME	3	ME 274	Materials Science	3	BA 114 & BA 142
	4	ME 276	Stress Analysis	3	ME 274
	5	ME 362	Fluid Mechanics (I)	3	BA 114
	6	ME 231	Thermodynamics	3	BA 114
	7	ME 464	Hydraulic & Pneumatic Systems	3	ME 362
	7	ME 431	Heat Transfer	3	ME 231
CB	6	CB 240	Theory of Structures	3	BA 124
OG	3	OG 211	General Geology	3	None
	4	OG 212	Petroleum Geology	3	OG 211

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 114 Cr. Hr. of the following compulsory courses					
EE	5	OG 321	Introduction to Petroleum Engineering	3	OG 212
	5	OG 322	Reservoir Engineering (I)	3	OG212
	6	OG 323	Reservoir Engineering (II)	3	OG 322
	6	OG 324	Multi Phase Flow	3	ME231, ME362
	6	OG 301	Practical Training (I)	0	66 Cr.Hr.
	7	OG 413	Natural Gas Engineering	3	None
	7	OG 424	Drilling Engineering (I)	3	OG323
	8	OG 414	Health, Safety & Risk Assessment	3	None
	8	OG 415	Pipelines Engineering	3	ME 464
	8	OG 425	Drilling Engineering (II)	3	OG 424
	8	OG 426	Oil & Gas Recovery	3	OG 323
	8	OG 402	Practical Training (II)	0	OG 301
	9	OG 516	Computer Applications for O&G Indus	3	126 Cr.Hr.
	9	OG 527	Well Testing	3	OG 323
	9	OG 503	Project (I)	3	135 Cr.Hr
	10	OG 528	Oil &Gas Production	3	OG 415
	10	OG 523	Natural Gas Liquefaction	3	OG 413
	10	OG 504	Project (II)	6	OG 503

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Compulsory Courses A total of 114 Cr. Hr. of the following compulsory courses					
MM	4	MM 471	Intro. to Offshore Engineering	3	None
	7	MM 571	Design & Construction of Offshore Structures	3	MM 471
	8	MM 570	Underwater Technology	3	MM 471
CH	3	CH 201	Chemical Engineering Calculations	3	None
	4	CH 204	Mass Balance	3	CH 201
	6	CH 302	Mechanical Unit Operations	3	ME 362
	8	CH 401	Separation Processes I	3	CH 204

Department Restricted Electives

At least nine courses (15 Cr. Hr.) from the following list of the college electives

Subject Field	Semester	Course Code	Course Title	Cr. Hr.	Prerequisite
Group A	9 – 10	OG 531	Handling, Storage & Trans. of Petro. Prod	3	OG 321
	9 – 10	OG 519	OIL & Gas Legalization	3	None
	9 – 10	OG 517	Reservoir Simulation	3	OG323
	9 – 10	OG 518	Petroleum Economics	3	None
	9 – 10	CH 408	Gas Processing	3	CH 401
Group B	9 – 10	ME 565	Turbomachinery	3	ME 464
	9 – 10	ME 542	Maintenance Planning	3	126 Cr.Hr.
	9 – 10	IM 434	Engineering Project Management	3	144 Cr.Hr.
	9 – 10	IM 443	Quality Engineering	3	BA 327
	9 – 10	CH403	Petrochemical Industries 1	3	BA119

Where the two main course groups are:

- Group (A): Elective courses from OG.
- Group (B): Elective courses from other Engineering Disciplines.

Oil & gas Engineering Courses (OG)

OG 211– General Geology

Prerequisite: None / CR: 3

Introduction to the Earth as a Planet- the constitution and physical conditions of the subsurface - An introduction mineral species and to the petro-genesis of three major rock groups; igneous, metamorphic and sedimentary -The application of various techniques in the identification of the common rock-forming minerals and of rocks important in the petroleum industry -The physical, chemical and mechanical properties of common sedimentary rocks. This section will focus on their reservoir and seal properties- Deformation of rocks- the formation of faults and folds and their significance in the petroleum industry.

OG 212– Petroleum Geology

Prerequisite: OG 211/ CR: 3

History of petroleum geology- Oil & Gas accumulation-The occurrence of petroleum-Source rock- Migration and accumulation- Reservoir rocks-Reservoir pore space- Reservoir fluids- Stratigraphic traps- Structural traps- Hydrodynamic Traps-Combination traps- Subsurface geology and mapping, and Reservoir appraisal- Exploration engineering-Gravity surveying-Magnetic surveying- Seismic data Acquisition- Seismic data Processing- Seismic data Interpretation- Introduction to logging and formation testing- hydrocarbon indicators- Exploration Risk and Analysis.

OG 321– Introduction to Petroleum Engineering

Prerequisite: OG 212/ CR: 3

Introduction to engineering- Petroleum exploration- Major concepts of drilling, Production and reservoir engineering- Historical background of petroleum industry- Worldwide sources of petroleum-Companies and societies in petroleum industry as well as relevant environmental, health, safety and ethical issues.

OG 322– Reservoir Engineering (I)

Prerequisite: OG 212/ CR: 3

Properties of reservoir rocks- Fluid flow through hydrocarbon reservoirs and the interaction between the fluids and the reservoir is examined- Basic concepts such as porosity and permeability and combines Darcy›s law with conservation principles to establish the diffusivity equation for porous media and the radial flow of compressible and nearly incompressible fluids, with the main focus on oil- Primary drive mechanisms are introduced and material balance equations developed and used to confirm reserve estimations and drive mechanism assumptions.

OG 323– Reservoir Engineering (II)

Prerequisite: OG 322/ CR: 3

Recovery factors, mobilization, displacement and sweep efficiencies. Fractional flow analysis and displacement efficiency. Heterogeneity and gravity segregation and their effect on recovery. Water and gas coming. Unsteady state field water influx calculations. Determination of aquifer parameters from history matching. Pseudo relative permeability and vertical equilibrium. Decline curve analysis.

OG 324 – Multi Phase Fow

Cr.3. Prerequisite: ME231, ME362

The course deals with the different types of flow: Gas/ liquid, liquid/liquid and liquid/solid particle flow systems. Types of multiphase flow through horizontal and vertical systems. General conservation laws, interfacial conditions and constitutive relations. Multiphase flows in pipes, flow regime maps, concentration distributions, pressure drop, calculation methods, and stability problems. Applications of the multiphase flow in natural gas production.

OG 301– Practical Training (I)

Prerequisite: 66 Cr.Hr./ CR: 0

A minimum of two weeks (10 working days) of Summer Practice is obligatory to fulfill the requirements for the B.Sc. degree. The first practice is preferred to be in drilling operations after the second year. The training is based on the content of the summer practice manual.

OG 413– Natural Gas Engineering

Prerequisite: None / CR: 3

Components of the petroleum production systems- Well inflow performance and deliverability analysis. Production from both saturated and under saturated oil reservoirs -Production from two phase reservoirs- Production from gas reservoirs -Pseudo critical properties of natural gases- Gas well deliverability for non-Darcy flow- The near-wellbore condition and wellbore skin characterization- Well head surface gathering systems. Artificial lift systems- Horizontal well production- Production chemistry basics (wax, scale, corrosion, emulsions).

OG 424– Drilling Engineering (I)

Prerequisite: OG 323/ CR: 3

Understand major rotary Rig system- Differentiate between the different rig types- Understand the mud engineering concept - Casing program Hydrostatic- Formation and overburden pressure- Differentiate between MWD and LWD- Hole problems; stuck pipe , lost circulation and blow out- Selection of the suitable bit types- Drilling hazards.

OG 414– Health, Safety & Risk Assessment

Prerequisite: None / CR: 3

Basic Environmental compartments- Drilling and production discharge in the onshore and offshore areas- Waste disposal and treatment- Decommissioning of oil and gas installations- Regulatory Approaches and Safety Measures- Occupational health hazards- Estimation of Total Petroleum Hydrocarbon (TPH) and suggested measures- Safety systems and Risk management at offshore- Legal framework for offshore operations. OISD guidelines- Case studies of history of accidents in petroleum industry- Risk assessment methods for hazards.

OG 415– Pipelines Engineering

Prerequisite: ME 464/ CR: 3

Mechanical Design of Pipelines and Pressure Vessels- Ancillary Equipment- Pipeline Materials selection and Construction- Inspection & Monitoring- Maintenance and Repairs- Corrosion Engineering- Environmental Impact, Risk Management and Life Extension.

OG 425– Drilling Engineering (II)

Prerequisite: OG 424/ CR: 3

Procedures of drilling a well including the casing and cementing design and drill string selection criteria and design- Directional well planning- Advanced practices of petroleum well drilling and directional drilling techniques.

OG 426– Oil & Gas Recovery

Prerequisite: OG 323/ CR: 3

Defining enhanced oil recovery (EOR), enhanced gas recovery (EGR) and enhanced coal bed methane recovery (ECBM). Reasons for EOR/EGR/ECBM- Screening of reservoirs for selection of EOR/EGR/ ECBM methods - Sweep and displacement efficiency. Estimating trapped oil saturation- Decreasing residual oil saturation by miscible/near-miscible/immiscible gas injection processes- Controlling mobility at the field scale by polymer flooding and by water-alternating-gas (WAG) injection. Increasing oil mobility by thermal methods of cyclic steam stimulation, steamdrive, and in-situ combustion. Miscible displacement of CH_4 by CO_2 in depleted gas reservoirs- Displacing CH_4 in coal seams by N_2 and CO_2.Co-optimisation of EOR/ EGR/ECBM and CO_2.

OG 402– Practical Training (II)

Prerequisite: OG 301/ CR: 0

A minimum of two weeks (10 working days) of summer practice is obligatory to fulfill the requirements for the B.Sc. degree. The second practice is for production and/or reservoir engineering after the third year of undergraduate education. The training is based on the content of the summer practice manual.

OG 516– Computer Applications for O&G Indus

Prerequisite: 126 Cr Hr / CR: 3

Computer programming- Program Design- Input and Output- Applications in Petroleum Engineering- Modeling in oil and gas practice including geophysical, well logging, drilling, reservoir and production.

OG 527 – Well Testing

Prerequisite: OG 425/ CR: 3

Fundamental principles that govern the behavior of reservoir fluids and their response to reservoir features- Sampling and testing methods are presented together with techniques of data analysis determination of relevant properties- The theory of reservoir pressure testing is introduced, testing methods examined and some of the standard analysis techniques explored, using both "hand calculations" and industry standard software.

OG 503 – Project (I)

Prerequisite: 135 Cr.Hr / CR: 3

Involves the satisfactory formulation of the literature review-Definition of the research problem- Completion of a significant part of the research - Development of a thesis outline.

OG 528– Oil &Gas Production

Prerequisite: OG 415 / CR: 3

Methods of artificial lifting- Selection of equipment and artificial lift methods-Preparation of tubing intake curves for artificial lift systems- Design of electric submersible, gas lifting, hydraulic, jet, beam and plunger lift pumps- Pumping methods for unloading of gas wells.

OG 523 – Natural Gas Liquefaction

Prerequisite: OG 413 / CR: 3

Physical properties: Liquid-vapor equilibrium, density, ratio of vapor methane/LNG, heat of vaporization, heat of combustion- Safety aspects: flash point, fire point, auto-ignition point, minimum spark energy, flammability limits, deflagration- LNG vaporization- Rapid Phase Transition (RPT)- radiation levels- stratification/roll-over, sloshing, LNG clouds ignition- Asphyxiation risks, cryogenic liquids jets, piping behavior. Feed pretreatment: sweetening, dehydration, LNG extraction, Hg and aromatics removal- Different liquefaction processes: pure component refrigerants, pure component(s) and mixed refrigerant(s), mixed refrigerants- Peak shaving simplified scheme- Regasification process- LNG tanks: single or double or full containment (self-standing, membrane). Hazards- Jetty head, jetty trestle, harbor- LNG carriers: common features, technology, cargo operations, safety systems.

OG 504 – Project (II)

Prerequisite: OG 503 / CR: 3

Review of the literature- Execution of the research project- Discussion and critique of the results- Completion and submission of the project report and a presentation of the project results to peers.

OG 531 – Handling, Storage & Trans. of Petro. Prod

Prerequisite: OG 321 / CR: 3

Offshore storage, handling and transportation of oil and gas tankers, vessels and buoys. Structural considerations functions and operations. Loading conditions, selection specification and operational aspect. Advantages and disadvantages, limitations of various systems. Subsea oil and gas lines – Design, construction, installation (laying methods), J-tube installation, and pressure drop calculations for two phase flow including riser behavior. Economics and logistic considerations in exploring, drilling, production, transport and reservoir management. Offshore support vessels, their roles, types, capabilities including fire fighting, pollution control. Different types of barges and their operations. Offshore vessel mounted cranes. Oil & gas Terminals.

OG 519 – OIL & Gas Legalization

Prerequisite: None / CR: 3

Introduction to Contract Law and Background to the Oil and Gas Industry -Contracting in the Upstream Sector: Ownership and Licensing- Contracting in the Upstream Sector: Production Sharing Agreements and Unitization - Agreements Between Co-Ventures, Suppliers and Contractors- Contracting in the Downstream Sector: Sales and Transportation of Oil and Gas- Dispute Resolution in Oil and Gas Contracts, case study (mini project).

OG 517 – Reservoir Simulation

Prerequisite: None / CR: 3

Theoretical formulation- Data sources and integration into simulator, and quantification of uncertainties necessary for transforming real reservoir engineering problems into manageable numerical simulation models, case study (mini project).

OG 518 – Petroleum Economics

Prerequisite: None / CR: 3

Cash flow analysis in the petroleum industry (definition of cash flow, deriving net cash flow under tax/royalty systems and production sharing contracts, depreciation methods, inflation, sunk costs). Economic indicators (net present value, rate of return and other indicators). Fiscal analysis (the nature of petroleum fiscal regimes, the effects of fiscal regimes on exploration and field development decision making, economic analysis of fiscal regimes in Australia and Indonesia). Risk analysis (risks in each oil industry investment phase, project risk and expected value, sensitivity analysis, probability analysis, Monte Carlo simulation, probabilistic reserves estimates, probabilistic economics, portfolio analysis, asset management, risk and discount rates). Risk management (standards, establishing the context, identifying risk, analyzing the risks, assessing and prioritizing risks, treating the risks, insurance practices in the oil and gas industry, monitoring project risks), case study (mini project).

Petrochemical Engineering (CH)

CH 201 – Chemical Engineering Calculations

Cr.3. Prerequisite: None.

The course introduces engineering calculations, the use of common process variables, and conservation and accounting of extensive properties - mass, energy, charge, linear momentum - as a common framework for engineering analysis and modeling. Applications of conservation of mass and energy in analysis of chemical engineering processes will be addressed including recycle, bypass and multi-stream processes.There will be an introduction to equipment, flowcharts, techniques and methodologies used by practicing chemical engineers. The use of computer software, especially spreadsheets, will be integrated into the course.

CH 204 – Mass Balance

Cr.3. Prerequisite: CH 201.

Familiarizing the students with the following topics: Processes system and its variables, mass, volume, flow rates, chemical composition, pressure, temperature, fundamentals of material balance (batch and continuous), single and multiple unit calculations; recycle, bypass and purge calculations; balances on reactive systems, single phase systems and multiple systems.

CH 302 – Mechanical Unit Operations

Cr.3. Prerequisite: ME 361.

The course describes the Flow of fluids past particles: flow of fluids through granular beds, filtration, and centrifugation. Operations involving relative motion between fluid and particles: Sedimentation, fluidization, conveying, gas cleaning. Size reduction of solids: power requirements, classification of solid particles. Mixing and agitation: mixing of solids and pastes. Equipment used in all the aforementioned mechanical operations.

CH 401 – Separation Processes I

Cr.3. Prerequisite: CH 204.

This course explains: Different techniques used in the separation process: Different methods of expressing the separation processes, Distillation towers: design of distillation towers, Fundamentals of Multistage Separation, Binary Distillation: Principles, Binary Distillation: Applications, Multi- Component Separation: Conventional Distillation, Liquid-Liquid Extraction, Packed Columns, case study (mini project).

CH 403 – Petrochemical Industries I

Cr.3. Prerequisite: BA 119.

This course presents: Petrochemical industries: raw materials, natural gas: sources, classification, treatment methods, petroleum composition: petroleum distillation products used in petrochemical industries, thermal cracking, catalytic cracking, petrochemical industries processes: types of reactors used in the petrochemical industries, Methane, ammonia, urea, olefins production, liquid and gaseous materials, ethylene production, Fischer Trop reaction, case study (mini project).

CH 408 – Gas Processing

Cr.3. Prerequisite: CH 401.

This course deals with the Introduction to natural gas, composition, classification, treatment processes, gas vapor equilibrium, distillation, hydrates, their effects and control, vapor and gases removal, gaseous treatment, gaseous acids injection, sulfur recovery and nitrogen removal, liquid hydrocarbon recovery, case study (mini project).

Graduate Engineering Department

Graduate studies leading to master's degrees started to be offered in September 1994.

The Master of Science (M.Sc.) Programs aim at providing students with an engineering education with breadth across the engineering disciplines, and a special focus on one program. These programs also ensure the development and innovation of courses and curricula.

The programs aim at enhancing the students' research capabilities and scientific thinking as it is the first step towards research and development in the area, branch and topic the student selects.

The College of Engineering and Technology offers Master's Degree in the following programs

- Architectural Engineering and Environmental Design
- Computer Engineering
- Construction and Buildings Engineering
- Electrical and Control Engineering.
- Electrical Smart Grid Engineering
- Electronics and Communications Engineering.
- Marine Engineering
- Mechanical Engineering.
- Industrial and Engineering Management
- Renewable Energy and Environmental Engineering
- Smart Control Systems for Engineering Management

For further information please consult the graduate catalog and the site www.aast.edu

Master of Engineering

The Master of Engineering (M.Eng.) is a highly specialized postgraduate degree earned for studies in one of the Engineering Sciences. The study duration of an M.Eng. Degree offered by an engineering school is usually between 2 years. M.Eng. degrees in College of Engineering and Technology include theoretical courses and assignments, but they mainly focus on developing the highly specialized skills and knowledge required for students to become professional engineers in their chosen field.

The College of Engineering and Technology offers M.Eng. Degree in the following programs:

- Architectural Engineering and Environmental Design
- Computer Engineering
- Construction and Project management Engineering
- Electrical and Control Engineering
- Electronics and Communications Engineering.
- Environmental Construction Engineering.
- Engineering Management.
- Marine Engineering.
- Mechanical Engineering.
- Renewable Energy and Environmental Engineering

Doctor of Philosophy

Doctorate programs in engineering usually grant graduates with a Doctor of Philosophy (PhD) degree. The program emphasizes the application of research methods and procedures to advanced areas of importance in the sciences and technology. The program builds on the premise that advancing the applied sciences and technology must be based on fundamental comprehension of various disciplines, while continually being responsive to the needs of new technologies, and the interdisciplinary nature of the modern scientific enterprise.

The College of Engineering and Technology offers Ph.D. degree in the following programs:

- Architectural Engineering and Environmental Design
- Computer Engineering.
- Construction and Buildings Engineering.
- Electrical and Control Engineering.
- Electronics and Communications Engineering.
- Industrial and Management Engineering.
- Marine Engineering.
- Mechanical Engineering.

List of all laboratory facilities within the College of Engineering and Technology, a brief description of each, and the future plans for further extensions.

Laboratory experience is an indispensable part of the educational process and a key factor in preparing students for real engineering practical life; for this reason, the College of Engineering and Technology operates more than 40 laboratories within its premises.

All the laboratories are equipped with state of the art tools and facilities that provide hands-on practice for students; furthermore, the laboratories also provide a test bed for research to the faculty.

Professional personnel are always available to give help and support to students in projects and experiments; hence, a free access policy outside the regular lab hours in a safe and secure environment for experimentation and research is one of the privileges enjoyed by our students.

Laboratory Facilities

Current Facilities

Advanced Manufacturing Laboratory

An up-to-date Laboratory with facilities that contain contemporary contains two advanced CNC machines made by DMG MORI: a turning machine (EcoTurn 310) and a vertical milling machine (Milltap 700) to support experimentation and research in industrial automation and solving problems arising in integrated and flexible manufacturing production systems. This laboratory also contains two Additive Manufacturing (AM) machines (3D printing) made by 3D Systems that produce parts layer upon layer directly from CAD design: The first one is a Fused Deposition Modelling (FDM) machine called CUBE and the second one is a Sterolithogrpahy machine called Forms1.

Antennas and Microwave

The purpose of this laboratory is teaching the students how to measure and test experimentally the different antenna specifications such as directivity, half power beam width, bandwidth, antenna pattern,…, etc. for many different antenna configurations to simulate those different antennas using computer software to measure the standards and specifications of the different transmission lines and waveguides.

Architectural Computer Laboratories

The Architectural Computer Labs at the Architectural Engineering & Environmental Design Department, AASTMT, are useful aid to architectural students where they boast the latest technologies in desktop computers.

With computer technicians constantly at hand, the computers are always updated with the latest software and drivers. To encourage architectural students' artistic side, graphic design and animation programs are at their disposal as well as top of the line architectural rendering and Computer Aided Design (CAD) programs that help the students deliver their creative ideas across to their professors.

In addition to direct access to the computer network that connects to the internet at all times, and the wireless network that can be accessed in from every class, the research process that is essential to the design process, is made a little easier, saving the architectural students time and allowing them to be more productive.

Automatic Control Laboratory

In this laboratory students are introduced into the basic principles of industrial control applications. Using instrumentation and measurement equipment's; various areas of analogue automatic control are investigated such as pressure, flow, valve calibration and temperature control. The interfacing of analogue and digital circuit and control principles are also investigated such as computer control of motor speed and transient analysis of control systems using computer interface.

Automation Laboratory

The automation laboratory offers great opportunity to understand the industrial automation systems using high tech programmable logic controller kits of Siemens available in the market. The laboratory contains most of the equipment required in industrial applications such as pressure, temperature sensors, motors and controllers.

CAD/CAM Laboratory

A laboratory that contains up to date computers for use in computer aided design and computer aided manufacturing courses. There are CAD software like AutoCAD, Solid Edge and Solid works that help students in designing and drawing parts and components. These software packages help students to understand the basic concepts of engineering drafting and design. Moreover, there is computer aided manufacturing (CAM) software NX developed by Siemens which is an integrated product design, engineering and manufacturing solution that helps students to deliver better products faster and more efficiently. In addition to the advanced solutions for conceptual design, 3D modelling and documentation, NX provide multi-discipline simulation for structural, motion, thermal, flow and multi-physics applications and also complete part manufacturing solutions for tooling, machining and quality inspection. Furthermore, this laboratory contains statistical software: Minitab to be used in courses like statistics, statistical analysis and design of experiments.

Chemistry Lab (G105)
Chemistry labs are equipped to help engineering students to carry out chemistry experiments covering several topics in analytical chemistry and organic chemistry.

Selected topics in analytical chemistry and organic chemistry where analytical chemistry is necessary for engineering students for studying different techniques for water analysis, purification and electrochemistry. also, organic chemistry for special departments study different qualitative methods for identification of organic compounds. Students can emphasize on chemistry concepts, analysing the data, results.

They Provides a wealth of interesting information from the history of the science to connections with real world phenomena in science and engineering to common sense advice and insight on the intuitive understanding of chemistry science.

Communications Engineering Labs

This laboratory provides the students with the fundamentals and concepts of Analog and Digital communication through a set of well-prepared experiments. The educational objective of the experimental work is to provide the students with the necessary skills for performing the experiment under test to determine the required measured quantity using the available tools in the laboratory.

Computer Labs
Computer labs are equipped with high technology Intel® 4th generation Core TM 7-4770, 3.40 GHz, Microsoft Operating System windows 7-64 bit and Ubuntu Linux, Java Development Kit, C#, Java and Microsoft visual studio software. Courses taught are Data Structures, Structured Programming, Database systems, Operating Systems, Data Security, Introduction to Computers, Programming Applications, Object Oriented programming, Advanced Programming, Introduction to Software Engineering, Computer Graphics, Pattern Recognition, Modelling and simulation

Computer and Network Lab
The computer and network lab services the courses of computer networks, advanced networks, data & computer communication, database systems, data security, object oriented programming, and mobile applications. Computer and Network Lab is equipped with Workstation, dual core AMD 2.6 GHz, Intel IXDP465 Development Platform, Serial to Ethernet Application Kit Rabbit Core RCM3000, Airborne 802.11 Wireless LAN Node Module Evaluation and Development Kit, 4 port USB KVM switch kit "Trendnet", 8 port10/100 desktop switch "Netgear", LINKSYS Ethernet DSL router with 4 port switch, 3 COM 8 port switch, LINKSYS by Cisco Wireless G Broadband Router, Tripp.lite Isobar, office home and student 2007, Java Development kit(JDK 6), Eclipse + ADT plugin, Android SDK Tools, Android Platform-tools, Oracle kit (JDK 6), Eclipse + ADT plugin, Android SDK Tools, Android Platform-tools, Oracle.

Construction Surveying and Geology Lab

The construction surveying and geology laboratory provides the students with the sufficient practical training to perform the essential surveying processes which include traversing, profile levelling, levelling applications and countering, and layout of construction projects using levels, theodolites, total stations and GPS. In addition, the objective of the construction surveying and geology laboratory extends also to serve both the courses of postgraduate studies and the research effort in the area of the construction surveying. Construction surveying and geology lab may also serve the construction industry through the ability for conducting different construction surveying processes and photogrammetric and remote sensing.

Construction Materials Lab

The construction materials laboratory was established with the objective to provide an appropriate environment for students to examine some basic properties of different construction material such as aggregates, cements, concrete, masonry, wood and wood products and steel reinforcement. Through various experiments, the properties of both physical and mechanical properties of different construction materials are examined thoroughly. Students will also get hand-on experience with the way concrete is mixed, transported, placed and compacted. The tests are conducted to determine the engineering properties in terms of strength, strain, elasticity, stiffness durability, and workability. This lab is also used for the designing, proportioning, mixing, casting, curing, and tooling of concrete batches. All tests are performed based on ASTM, ACI, and AASHTO testing specifications. The objective of the construction materials laboratory extends also to serve both the courses of postgraduate studies and the research effort in the area of the properties and testing of advanced materials in construction. Moreover, the construction materials laboratory is capable of serving the community and the construction industry through conducting different quality control tests for various raw building materials and final products needed in the construction industry.

Diesel Engines Lab

The Lab contains diesel engines covering hands-on training purposes for marine, mechanical engineering and maritime transport students in addition to vocational tutoring; including the SULZER® diesel engine of 4 stroke type, having 6 cylinders of trunk type piston producing 1100 hp at 750 rpm.

Another engine of 2 stroke type having 3 cylinders producing 750 hp at 320 rpm is also available and can be operated either locally or remotely from the engine control room, similar to that normally found on board ships. Two FIAT® diesel engines driving two alternators are available. Beside the previously mentioned engines, another two engines are dedicated to dismantling and assembly purposes. A small workshop equipped with a lathe, a drill, and welding tools is allocated for maintenance operations.

Digital Circuits Lab

The Digital circuit Lab is completely equipped laboratory that contains precision measurement equipment and tools for use in digital logical experiments, design and simulation. The lab houses a collection of equipment used for generating signals and visualizing it. It is also equipped with Programmable Logic Digilent D2FT, Accessory Board Memory, Accessory Board Network (NET1), Accessory Board Digilent Analog I/O (ALO), logic Pulsar, Oscilloscopes, Function Generator, Digital Multimeter and Power Supplies. It serves the courses Digital Logic design and digital and microprocessor systems

Digital Control Lab

This laboratory attempts to clarify some of the concepts of digital control and digital circuit applications. Using advanced digital design computer software, students gain the knowledge of the various methods of digital circuit integration, circuit analysis and also power system analysis. Practical digital applications are investigated using microcontroller kits, circuit kits, programmable logic controllers and robotic

Electronics Laboratories

This laboratory provides the students with the fundamentals and concepts of electronic devices and circuits through a set of well-prepared experiments. The educational objective of the experimental work is to provide the students with the necessary skills for performing the experiment under test to determine the required measured quantity using the available tools in the laboratory.

Electronics and Communications Computer Laboratories

Each of Computer Labs 1 (Room 130) and 2 (Room 426) is equipped with 20 Desktop Computers. Those computers are loaded with required software for simulation in fields of a) Electronic Design, b) Communication Systems, and c) Antenna Design and Microwave Devices. Mathworks - Matlab -Cadence Silicon/Package/Board Suite -Cadence IC Tools -Synopsys Digital IC Tools -Xilinx Design Tools -Maplesoft Maple (Symbolic Mathematics Tool) -National Instruments LabVIEW NextGeneration -Anaconda (Tensorflow, Keras, Torch) -Ansys EM Suite.

Electrical Circuits Lab

It provides the essential knowledge for the student to understand and validate the AC and DC electric circuits' concepts. The laboratory also familiarize the student with measurements devices, power supplies and different circuit elements.

Electric Drives Laboratory

The electrical drives laboratory offers a great chance for undergraduate as well as postgraduate students to experience and be familiar with conventional electrical drives systems as well as modern advanced drives systems by experimenting AC and DC machine drive systems.

Electrical Motors Operation and Protection Laboratory

The workshop is equipped with different – easy to assemble- component panels that help the students to build electrical protection systems. In addition, several demo relays are available to demonstrate their internal structure. Furthermore, sets for demonstrating electric machines testing and construction are available. Besides that, a smart relay is used for motor control and to simulate a process with inputs/outputs simulator panel. Also, the necessary measurements of current and voltage are provided.

Electrical Machines Laboratory

The electric machines laboratory provides the opportunity to understand and examine the behavior of converting electrical energy to mechanical energy and vice versa and understand the classical electrical machines to drive several mechanical loads as well as synchronizing generators to be connected on a single local network. Also, it includes modules of power electronic devices and scopes suitable to build basic power electronic circuits and demonstrate device control and performance. Furthermore, basic converter and inverter drive sets are available to be applied with different machine types.

Electrical Power Systems Laboratory

The laboratory enables students to demonstrate the principle of power transmission using a model transmission line, electric loads connection such as inductive loads, capacitor banks and resistors to preview their effect on a power system. In addition, this laboratory is equipped with facilities that cover all power system protection related topics and achieve experimental verification of principles and practice of protective relaying.

Engineering Workshop

The workshop comprises a representative sample of most of the basic machine tools, welding and casting equipment. Its functions include the following:

- Teaching experimental manufacturing courses.
- Supporting students' senior project work.
- Fabricating specialized apparatus and equipment.
- Training purposes and imparting of skills.
- Extending services to other departments within the college.
- Serve maintaining the various technical units within the Academy.

The workshop has been recently upgraded with the following welding facilities:

- A TIG welding machine with inverter power supply.
- A Plasma cutting machine
- A Stud welding unit
- A Spot welding unit

Environmental Design Laboratory

The overarching goal of the Environmental Design Laboratory EDL is to advance sustainable design through research, education, and community outreach, with the aim of improving the dynamic interaction among the built, natural, and human environments. The Lab's primary purpose is to support the department's curriculum and the educational experience of our under/postgraduate students. The EDL is committed to providing hands-on measurements and experimentation as a viable component of the environmental design educational programs. In addition to providing specific environmental performance rigs and tests, EDL provides number of computational simulation facilities which support students' various design projects, assignments and students' requirements. The EDL may work jointly with the facilities of the wood shop and the metal shop, as well as the model-making cutter workshop.
The EDL is equipped with simple and advanced devices in order to monitor both indoor and outdoor onsite environments.

The Environmental Design Laboratory EDL underpins many of the activities of the Architectural Engineering & Environmental Design Dept. EDL works jointly with the EDRG Environmental Design Research Group as well as supporting postgraduate/research students. EDL and EDRG facilities offer support in:-

- Environmental Awareness Programs
- Physical scale Models,
- Lighting Laboratory Applications
- Natural Ventilation and Airflow Laboratory Applications
- Numerical and Computational Simulation Tests and Modelling,
- Laboratory-Based Rigs and Onsite-field Monitoring.

Field-Programmable Gate Array Lab

The Field-Programmable Gate Array (FPGA) Lab is devoted to the application of FPGA technology to information processing and general computing using VHDL synthesis methods for hardware development. Lab is equipped with commercial CAD software for VHDL simulation, synthesis, and implementation of systems in programmable XILINX XUP 100,000 gates FPGA devices. The courses taught in this lab are Digital System Design, Computer Architecture, and Computer Performance. This lab is equipped with computers, Intel 4th generation i7-4770, CPU 3.4 GHz with 8GB memory.

Fluid Mechanics and Hydraulics

The lab provides facilities for undergraduate teaching, final year projects and for research work leading to postgraduate degrees.

This lab consists of several experimental setups for verifying the basic laws of fluid mechanics and some flow measuring devices. It can also be used for fundamental studies into the structure of wake-flows and turbulent boundary layers. Throughout the laboratory there is access to fresh and salt water (which can be chilled and filtered), drainage trenches, and compressed air. Also available are oil hydraulic power supplies. The laboratory equipment is venturi meter, orifice meter, wind and smoke tunnel, pumping station, fluid circuit demonstrator, hydraulic flow channel, hydraulic bench, Pipe friction and Flow in closed channel.

The laboratory provides supports to both undergraduate and graduate teaching so that students have the opportunity to see by themselves the essential fluid mechanics principles, and to verify the applicability of various assumptions, models and analysis methods. It also provides facilities for researches in hydraulics, fluid mechanics and related fields to support graduate studies. Thus much of the fundamental research in the laboratory is comprised of thesis investigations.

Global Maritime Distress and Safety System

The purpose of the Global Maritime Distress and Safety System (GMDSS) laboratory is teaching the students how to acquire skills using some computer programs such as:

The NEC and computer FORTRAN codes for measuring the different antenna specifications such as directivity, half power beam width, bandwidth, antenna pattern,…,etc.; and simulating those different antenna configurations.

The computer MATLAB codes for simulating the different communication systems to teach students the principles of those systems; and teaching students how to deal with the program for quantitative measurement of the phenomena of the communication systems and signals processing without the use of expensive instruments.

Heat Transfer and Thermodynamics Lab

The Heat Transfer and Thermodynamics Lab covers a wide range of interests in the areas of Mechanical Engineering associated with energy use and efficiency. The Lab helps in developing practical solutions to problems in thermodynamics and heat transfer. The Lab houses undergraduate experiments in heat transfer and internal combustion engines as well as research equipment used by postgraduates and research staff. Equipment in the lab includes Modular Heat Exchanger, Convection heat transfer apparatus, Heat conduction Apparatus, Gas Turbine Trainer, Steam power plant, Cross Flow Heat Exchanger and Concentric tube heat exchanger. During the final year of the undergraduate degree, students can specialize in courses associated with the Thermodynamics Lab and undertake final year projects in the laboratory.

Heavy Structures Laboratory

The laboratory experiments conducted in heavy structures laboratory are a part of the construction and building engineering program. The laboratory serves both undergraduate projects and post-graduate research. For undergraduate students, the laboratory provides the necessary skills for performing appropriate experiments on R.C., steel member, and composite members to determine their behaviour such as; load capacity, failure modes, load-deflection and stress versus strain, using the sufficient equipment for measuring these variables when subjected to static loading. The objective of the heavy structures laboratory covers also the courses of post-graduate studies and the research effort concerning with the engineering properties and behaviour of R.C. and steel heavy structures. Moreover it can also serve the building and construction industry by conducting the required researches on reinforced concrete and metallic structures elements e.g. (columns, beams, slabs and joints), as well as structural types e.g. (frames, trusses, arches).

Human Factors and Ergonomics

The Human Factors and Ergonomics Laboratory is actively involved with the Industrial and Management Engineering department, offering training services, and consultation to the local and regional industrial community. In addition, it facilitates the education and research development of both undergraduate and graduate students. The lab conducts work in theoretical and applied ergonomics, work physiology, primarily relating to worksite, workstation, and equipment evaluation and design.

It specifically focusing on: biomechanics of the human body (modelling, strength, motions, and working postures); human engineering of systems, equipment, tools, workstations, and work tasks; and ergonomic design for safety, comfort, and performance.

This Laboratory is particularly well equipped to do research in a variety of areas including: Dexterity and Coordination, involving the use of hands, development over time and activities that involve precise hand-eye coordination. Strength measurement includes equipment for measuring the muscle fatigue when performing different tasks. Physiological measures, testing the human limitations and abilities of individuals to perform a specific task such as: testing the lifting abilities of humans, recommending the right posture for lifting. Anthropometrics, the lab comprises a wide range of anthropometric equipment for different human body measurements, to gather the characteristic measurements of a population.

Intelligent Embedded Systems & Multimedia Lab

It includes the design, development and application of computer-based systems and solutions to engineering problems in the field of embedded system design, embedded software development, embedded real-time OS, system testing, validation and simulation. The lab serves Artificial Intelligent, embedded system design, microcomputer based design, natural language processing, Image processing & pattern recognition, neural network and CAD courses.

Light Structures Laboratory

The objective of the experimental tests taking place in the light structures laboratory is to provide students with the necessary information to understand the theory of structures basics using modern tools that are available in the lab. The laboratory includes various devices for applying the required experimental tests such as bending of beams, torsion of circular rods, buckling of columns, and deflection of beams. Students are supplied with booklets showing the different experiments steps and the procedure for obtaining results. Students are required to submit a final report showing in engineering curves the outputs of the experiments and their comments. The light structures laboratory can serve the courses of post-graduate studies and researches in the scope of the structural behaviour of light structures. Moreover, the laboratory may help the building and construction industry through performing the needed researches concerning the light structures.

Marine Engineering Workshop (1)

This workshop is used for educational and training purposes of marine engineering and maritime transportation students and graduates. The lab incorporates some of the equipment a trainee would face in marine engine rooms, such as; Valves and main thrust bearings. This workshop covers areas related to the different types of valves, their purposes of use, how to maintain valves e.g. packing a gland, preparing gaskets, and lapping of valves to their respective seats using proper tools and materials. A main thrust bearing is available for the purpose of dismantling, inspection, measuring the clearances, re–conditioning of thrust pads, and assembly.

Marine Engineering Workshop (2)

This workshop is assigned to pumps, compressors, and steering gear training for marine engineering and maritime transport students. The lab covers areas related to the different types of pumps and compressors, their applications in use, their constructional details, probable defects and faults and their remedial actions. Trainees from different disciplines, related to those areas, practice the importance of steering gear, its vital role in a ship, and its operational procedure at sea, especially in emergency situations.

Internal Combustion Engines Workshop

The Workshop contains diesel engines covering hands-on training purposes for marine, mechanical engineering and maritime transport students in addition to vocational tutoring; including the SULZER® diesel engine of 4 stroke type, having 6 cylinders of trunk type piston producing 1100 hp. at 750 rpm. Another engine of 2 stroke type having 3 cylinders producing 750 hp at 320 rpm is also available and can be operated either locally or remotely from the engine control room, similar to that normally found on board ships. Two FIAT® diesel engines driving two alternators are available. Beside the previously mentioned engines, another two engines are dedicated to dismantling and assembly purposes. A small workshop equipped with a lathe, a drill, and welding tools is allocated for maintenance operations.

Marine Engineering Computer Lab (3)

The Computer Lab has high technology computers and printers. Courses taught are Data Structures, Structured Programming, Marine and Offshore Simulation, Introduction to Computers, Programming Applications, Object Oriented programming, Advanced Programming, Introduction to Software Engineering, Computer Graphics, Pattern Recognition, Marine and Offshore Modeling and simulation.

Wave-maker Laboratory

This lab is used for educational, training purposes and research for marine engineering undergrade and post-undergraduate students. The lab has been designed for the study of all aspects concerning free water surface and fluid mechanics. The view of the phenomena taken into account is granted by the material used for the realization of the flume, the glass, completely transparent; furthermore, the system is completely independent as it is equipped with a reservoir where the channel water is discharged and from where a pump sucks water to take it at the beginning of the channel. The channel, the slope of which can be varied by using the oil-hydraulic lifting system, can be fitted along the whole length with weirs and other devices, which allow to carry out a wide range of experiences. The Wave generation system has been studied to extend the range of performable experiments to the field of wave dynamics and of artificial structures for waterways containment. Therefore, the flume is suitable for: basic laboratory experiments and student project work in applied hydraulics research activities.

Materials Testing and Characterization Laboratory
The materials testing and characterization laboratory focuses on the mechanical behaviour of a variety of materials, from polymers to super alloys. The laboratory could be involved in a research concerning the investigation of material structure and mechanical properties such as yield strength, ultimate tensile strength, ductility resilience, toughness, hardness, elastic modulus, Poisson's ratio, and strain-hardening properties. The laboratory contains the following testing equipment and associated capabilities:

- A Universal Testing Machine (UTM) with varying load capabilities and specialized gripping for brittle and straight-side samples which is characterized with the following features:
- Test methods include tensile, compression and bending tests
- Testing is conducted under computer control
- A Post-test characterization via optical microscopy
- An Optical microscope equipped with an image analysis system. The microscope allows obtaining and interpreting microscope images of high quality, to perform quantitative optical measurements, and to produce high quality digital images for documentation and analysis.
- A Universal Hardness Testing Machine which is a high precision, easy operation, high sensitivity metal hardness instrument which combines the Rockwell, Brinell, and Vickers hardness principles widely used in factory workshops, laboratories, universities and research institutions. The machine is equipped with a large LCD and Microchip control system, makes hardness testing be automatically operated. Also, a built-in printer is attached to record the main technical data of the entire testing process.

Materials Destructive Testing Lab
The Materials Testing Lab is one of the first labs established in the College of Engineering, AASTMT. The Materials Testing Lab currently serves different educational and scientific activities. The lab plays a pioneering role in the QC/QA of construction work using its up-to-date facilities. In Materials Destructive Tests Laboratory, tests are carried out to the specimen's failure, in order to understand a specimen's structural performance or material behaviour under different loads.

The material testing laboratory includes Universal testing machines, Torsion Testing, Impact Testing, Bend and Hardness Test, Heat treatment furnace, Oscilloscope machine, Alpha Durometer and many other destructive tests on metals.

The lab services the mechanical, marine and the industrial departments. The lab service subjects like material science, experimental methods and stress analysis. It provides facilities for undergraduate teaching, final year projects, and for researchers' work leading to postgraduate degree.

Mechanical Vibration Lab
The Mechanical Vibrations Lab is a modern facility for performing advanced vibration analysis. The Vibrations Lab is used for undergraduate education, graduate education, senior design projects, and advanced research.
Equipment in the lab includes accelerometers, Velocity Sensor (Screw Mounting) ,Seismic Vibration Transmitter (Screw Mounting), Seismic Accelerometer Sensor, Seismic Indicator Transmitter, Signal Conditioner for Remote Sensor, Strain Gauges (Precision Strain), Proximity Sensor with cable Proximity Probe Driver, Proximity Signal Conditioner, Proximity Sensor Calibrator, Miniature Vibration Meter Device, Hydro Scout Toil Cartridges, Portable

Shaker System, Velocity Transducer, Vibration Switch, Digital Vibration Controller, Triaxial Accelerometer, Blower (Compressed Air), Flow meters for Liquid Low Frequency Accelerometer, Industrial Accelerometer, Noise Level Meter, Linear Strain Gauge, Differential Pressure Transducer, Absolute Pressure Transducer, Tachometer Speed Range, Signal Generator and Handy Oscilloscope Fluke. Data is analysed using oscilloscopes Basic experiments performed in the lab for undergraduate education include time and frequency domain vibration analysis of simple structures including MDOF modal analysis.

Mechatronics Lab

Mechatronics is the synergistic integration of mechanical engineering, electrical engineering, electronics, computer science, and control theory for the design of intelligent systems. Mechatronic systems are used in automotive systems, aerospace systems, consumer electronics, and robotics. The Lab Equipment include A Computer Integrated Manufacturing System with ProLight 3000 Turning Centre, versatile 2-axis CNC lathe for training, engineering and light-duty industrial turning applications, The SCORBOT-ER 9Pro, Robot with 6 degree of freedom, Intelitek, Robot with 4 degree of freedom, Automatic Storage and Retrieval System (ASRS), Conveyor. One PC per station and CAD/CAM software. The Mechatronics Laboratory was established to support embedded control systems in Mechanical Applications. Mechatronics Lab objective is to expect the student to understand the real pleasure of research through finding research themes, establishing theories, developing systems, conducting experiments, and presenting results. The lab supports courses like Mechatronics, Mechatronics systems, Robotics and Applications and Final-year Graduation projects as well as graduate studies.

Microprocessor Labs

The Microprocessor labs are equipped with all the necessary lab equipment, Micro Controller Kits, and all types of tools, accessories and a variety of Digital / Analogue components. These labs characterize the computer engineering department. Continuous upgrades are conducted on it to assure that it is compatible with the latest technological advances. The lab work aims to develop and enhance the students' capabilities in several relevant aspects. Practical skills are developed through experiencing real life scenarios. Present in the labs practical facilities for all Micro Processor Basics, Interfacing, Programming, Controlling and Monitoring and it is further being enhanced with the addition of many new Micro Controllers, Micro Controller Kits, Micro Processors/Controller Training stations and Interfacing Units. Part of these tools are Microprocessor application board, microprocessor training system, Spartan-3A DSP 1800A development board with embedded MicroBlaze software. Courses taught in these labs are Digital Electronics, Introduction to Microprocessor, Data Acquisition Systems, Intelligent Robotics and Microcomputer Based Design.

Mobile and web Engineering Lab

Mobile and Web lab have high technology computers and printers. It is equipped with technology Intel® 4th generation Core TM 73.40 ,4770- GHz, Microsoft Operating System windows 764- bit and Ubuntu Linux, Java Development Kit(JDK6), Oracle, SQL server and Microsoft visual studio software. This lab services the courses operating systems, web engineering, Object Oriented Programming and Mobile applications.

Non-Destructive Testing Laboratory

The NDT Lab provides tools for the non-destructive testing of welding, detecting flaws and discontinuities in materials as well as tools for measuring the thickness of coating layers and materials. The lab also contains equipment that is used in detecting the macroscopic structure of materials. It contains the following instrumentation:

A group of approved welding defects specimens, dye penetration test, magnetic particle test for surface defects of welds, X-ray test demo kit, Ultrasonic devices for (Paint layer thickness measurement, material thickness measurements and flaw detection of welding), Eddy current devices for flaw and crack detection of materials, grinding machine with water cooling for metal surface preparation before microscopic examination, dry polishing machine for final preparation of surfaces, endoscope for micro internal examinations, optical microscopes with different magnifications and one with image analysis system and a heat treatment oven up to 1200^0 C. The lab services the undergraduate and graduate students and has a good connection with the industry. It is used in the practical training for welding courses and diplomas and its instrumentation is used for the external inspection services and consultations activities carried out by its professional staff.

Physics Lab (1)

The lab is equipped to help engineering students to carry out Physics experiments covering several topics in current electricity, magnetism and optics.

Electricity, Magnetism, and Light is an engaging introductory treatment of electromagnetism and optics for first semester physics and engineering majors. Lab experiments focus on conceptual understanding, with an emphasis on relevance and historical development. Mathematics is specific and avoids unnecessary technical development. They emphasize on physical concepts, analysing the electromagnetic aspects of many everyday phenomena, and guiding readers carefully through mathematical derivations. They Provides a wealth of interesting information, from the history of the science of electricity and magnetism, to connections with real world phenomena in science and engineering to common sense advice and insight on the intuitive understanding of electrical and magnetic phenomena.

Physics Lab (2)

The lab is equipped to help engineering students to carry out Physics experiments covering several topics in thermodynamics, heat transfer, waves and sound.

Engineering curricula are notoriously demanding. One way to make the material easier to grasp and more fun to learn is to emphasize the experimental or "hands-on" aspects of engineering problems. This unique laboratory is about learning through active participation in experiments, and it specifically aims to dispel some of the mystery so many students associate with the study of thermodynamics and heat transfer.

A collection of experiments are performed in heat transfer and thermodynamics contributed by leading engineering educators.

Each experiment follows the same step-by-step format, which includes the objective of the experiment, apparatus needed, procedure, suggested headings, and references. The experiments use apparatus that is easily built or attainable. Among the topics covered are heat conduction, convection, boiling, mixing, diffusion, radiation, heat pipes and exchangers, and thermodynamics.

Physics Lab (3)
The lab is equipped to help nautical students to carry out various physics experiments covering several topics in mechanics, wave, sound, magnetism and optics. Laboratory sessions will usually be preceded with class discussion or demonstration explaining specific procedures to be followed. Laboratory exercises are designed to complement the theory presented in class and, as such, are often a compromise between the abstract world of point masses, frictionless tables, and mass-fewer strings usually assumed and the real world. We are trying to reinforce the abstract concepts of force, velocity, vectors, etc. with some real everyday phenomena in order to make the physics meaningful. Often the student will discover enough disagreement that you can make some intelligent observations as to the cause of the discrepancy.

Physical Chemistry and Reactor Design Lab
Physical Chemistry and Reactor Design lab is a useful lab for the chemical engineering students. The Lab facilitates the bond between reactor design and making bench-scale plant reactors and pilot plant reactors. The lab contains tools and equipment to deal with the chemical and physical properties of the chemical substance and the reaction mechanism takes place between different chemical reactants and how to control the reaction to maximize the Chemical Product in safe environment so the students design and perform computing models in order to build their designed reactors. To able to deal with Mass Production of Industrial Chemical and Petrochemical Plants.

Petroleum and Petrochemicals Lab
Petroleum and Petrochemical Lab is an essential lab for the chemical engineering students. The Lab facilitates is the bond between Petroleum and Petrochemicals industry and how the students deal with petroleum products from industry. The lab contains tools and equipment to deal with the chemical and physical properties of the Petroleum products and Oil analysis and the production of different petroleum products and blending with Biofuels, so the student practise how to analyze different industrial samples of the petroleum products and how to increase the product quality by improving its chemical and physical properties for industrial mass production such as transportation fluids: marine and automobiles lubricating oils and combustible fuel

Power Electronics Laboratory
The laboratory offers various equipment and tools for investigating power electronics related experiments. In addition, the laboratory provides voltage and current measurement probes, Digital storage oscilloscope and a three-phase harmonic analyzer. Wide range of components and instruments is available such as MOSFET/IGBT switches, Diodes, Filters, DC power supplies, Loads, Battery Stacks, UPS, Multi-meters, Oscilloscope and other related equipment.

Radar Laboratory

Several skills are added to the students through the study in this laboratory such as how to measure and test experimentally the principles of radar system using the lab-Radar trainer, also how to measure the different phenomena of the radar without the use of expensive instruments and to upkeep and repair the instruments such as TV and Radar (Trouble shooters). GMDSS and Applied Telecommunication System use the laboratory facilities.

Refrigeration and Air Conditioning Lab

Refrigeration and air conditioning industry is considerably growing all over the world. It covers a wide range of activities in industry, science and research applications for the comfort and benefit of mankind and his living environment. The focus of the refrigeration and Air conditioning lab is to aid the refrigeration and air-conditioning industry in the transition from CFC-11, CFC-12 and HCFC-22 to new, environmentally acceptable refrigerants.

Equipment in the lab includes advanced Commercial Refrigeration Trainer, building Management Trainer, Commercial Refrigeration Trainer, Recalculating Air Conditioning Demonstrator, Thermoelectric Pump, vapour Compression Cycle Demonstrator, Refrigerant Recovery Units, Container Reefer, Cooling Tower and Air conditioning cycle.

Practical training on refrigeration and air conditioning systems is conducted within this lab, where the trainees could improve their experience and technical knowledge concerning various related equipment. The lab current capabilities permit a variety of technical courses for engineers working in the field of that industry.

Renewable Energy

The lab provides facilities for undergraduate teaching, final year projects and for research work leading to postgraduate degrees. The laboratory can provide students with a comprehensive background in renewable energies (Solar, Wind and Fuel cell), energy measurement and energy storage.

Reverse Engineering Laboratory

A completely equipped laboratory that contains precision measurement equipment and gauges for use in experimental machining investigations and studies in quality control and to provide measurements and services to other disciplines.

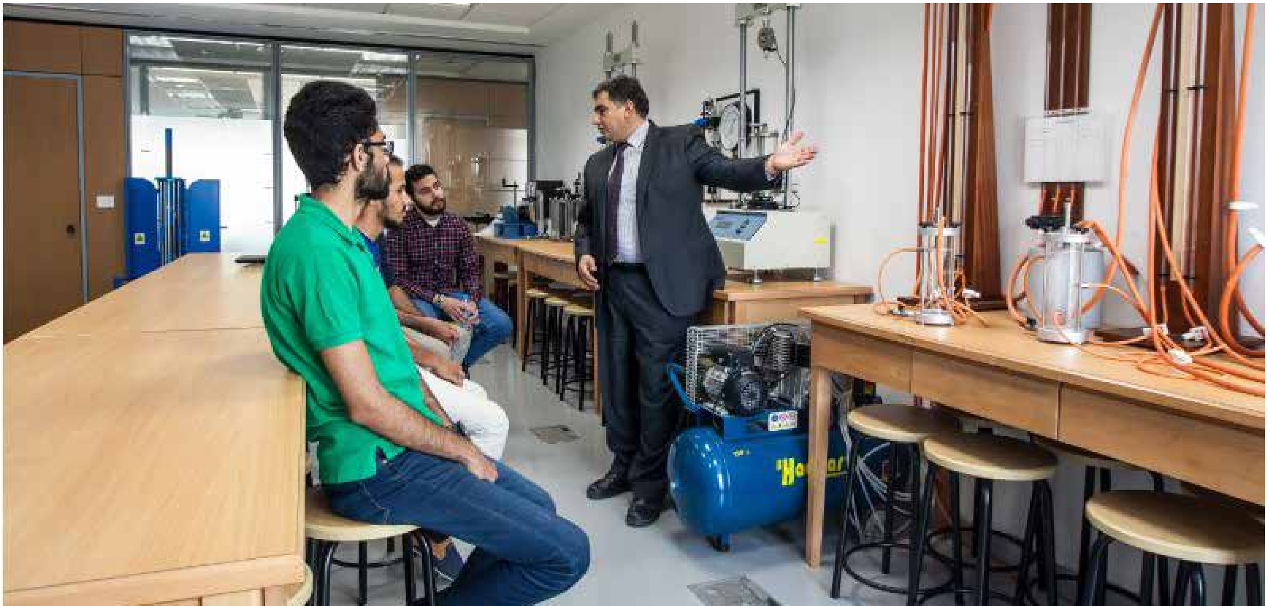
Sculpture Lab

Sculpture Lab introduce students to varieties of topics and media to enhance their artistic capabilities. The lab is set up for using different materials in making artistic models such as clay, brass and copper. The lab is equipped with metal rotational stands for holding models. Small-Scale Metal works and Casting is offered in addition to advanced finishing techniques such as soldering, forming, colouring, and various finishing processes.

Soil Mechanics and Transportation Engineering Laboratory

The experimental tests of soil mechanics is a part of the Construction and Building Engineering program. The educational objective of experimental work is to provide the undergraduate students with the necessary skills for performing appropriate laboratory experiments on the soil samples to determine the physical and engineering properties of the samples using modern tools available in the lab. Students also get hand-on experience with the way of analysing the tests results and using the results in preparing a technical soil report. All tests are performed based on ASTM testing specifications. The soil mechanics lab may also serve the practical research activities in geotechnical engineering for post-graduate students. The laboratory can also take a place in the building and construction industry by conducting the required experimental tests on soil samples used for preparing soil technical reports, analysis of pile-load tests results, proposing soil improvement techniques for external projects.

The laboratory experiments conducted in transportation engineering lab is a part of the highway design and construction course. The laboratory serves both of undergraduate and post-graduate students. For undergraduate students, the lab provides the necessary skills for conducting the different experimental tests on asphalt samples and pavement materials such as: California bearing ratio (CBR), M California bearing ratio (CBR), Marshal Test for asphalt samples, Marshal Test, and flow and stability for asphalt samples. The post-graduate students can also use the laboratory equipment in the experimental work necessary for researches. Moreover the transportation engineering lab can also serve the building and construction industry by conducting the required tests of construction asphalt materials as well as developing new materials through the use of recycled and waste materials.



Solid State Electronics and Measurements Labs
This laboratory provides the students with the fundamentals and concepts of solid-state electronics and Electronic Measurements through a set of well-prepared experiments. The educational objective of the experimental work is to provide the students with the necessary skills for performing the experiment under test to determine the required measured quantity using the available tools in the laboratory.

Steam Power Engineering Lab
This lab is used for operations related to Boiler and purifiers training of mechanical, marine, and maritime transport students.
The lab includes two models of fire tube boilers, enabling the trainees to analyse the operation of boilers and their safety devices, how to raise steam in a boiler, the operational faults and how to rectify them. Purification of oil, getting rid of sediments and impurities are very important on board ship to protect the main engine and auxiliary systems of lubrication.
A steam turbine model is available for the purpose of examining the internal parts such as nozzles, fixed blades, and bearings …etc.

Thermodynamics Lab
The Thermodynamics Lab covers a wide range of interests in the areas of Mechanical Engineering associated with energy use and efficiency. The Lab helps in developing practical solutions to problems in thermodynamics and heat transfer. The Lab houses undergraduate experiments in heat transfer and internal combustion engines as well as research equipment used by postgraduates and research staff. Equipment in the lab includes Vortex Tube Refrigerator, Modular Heat Exchanger, Forced Convection Demonstrator, Gas Turbine Trainer, Steam Turbine Trainer, Cross Flow Heat Exchanger, Air Compressor System and Concentric tube heat exchanger. During the final year of the undergraduate degree, students can specialize in courses associated with the Thermodynamics Lab and undertake final year projects in the laboratory.

Workshop & Architectural Models Lab

The Workshop and Architectural Models Lab at the Architectural Engineering & Environmental Design Department, AASTMT, is a useful aid for the exclusive use of architecture students. The Lab facilitates the bond between designing and making models. The lab contains tools and machinery for working with wood, foam, cardboard and plastics. Students build prototypes, models and mock-ups of famous buildings and take classes on how to use different materials and different models to express their ideas. The Lab also offers support in the following fields:

- Expressing architectural drawings into 3D Models.
- Using different materials for expressing models.
- Working as a team-work for making a model for a famous building

Future Expansions

The College of Engineering and Technology is continuously reviewing, updating and even developing its lab facilities. The following is a short list of the planned expansions for the College's laboratories in the near future:

- Upgrading the digital systems and computer architecture lab.
- Upgrading the microprocessor laboratory.
- Developing a new lab for Intelligent Embedded Systems & Multimedia Laboratory.
- Upgrading the materials testing and characterization laboratory.
- Developing a new lab for Optical fibres.
- Upgrading the equipment in Electronics and Communications lab.
- Developing a new lab for wave making tank.
- Planning for a new lab in the Architectural Department.
- Planning for a new lab in the Chemical and Petrochemical Department.

One of the AAST's chief attractions is its impressive and extensive range of stundent facilities. The AAST is constantly improving and updanting those facilities.

- Libraries
- College Agenda
- Student life
- General Facilities
- Service Centers

Libraries

A brief description of the services offered by the libraries

Since its inception in 1972, the Arab Academy for Science & Technology, and Maritime Transport (AASTMT) saved no effort in supporting the educational process. And because academic libraries play a major role in supporting educational activities and enriching the academic life of students and faculty members, AASTMT established a specialized library in order to make use of the information published in different media.

Due to the change in the role libraries play in the information field in general, and the academic field in particular, the Library's name changed to "Libraries & Information Services Centre" A change that was crucial due to the emergence of new information resources - in addition to books - and the growing reliance on diverse information sources that meet users" information needs.

The Centre serves the academic community in all branches of the Academy. It consists of: The Main Library (Abu-Qir), Architecture Library (Abu-Qir), Maritime Library (Abu-Qir), Management Library (Miami), Graduate School of Business Library - Alexandria (Miami), Sheraton Engineering Library, Sheraton Management & Logistics Library, Dokki Management & Logistics Library, Graduate School of Business Library (Sheraton), Port Saeed Library, Smart Village Library, Wabour Elmaya Library, and Ganoub Elwadi Library.

The libraries are all connected through online interactive terminals to ensure easy access to the centre's in-house database. In order to offer a distinguished information service, the Centre established an integrated information system that facilitates direct search through a computerized catalogue and electronic databases.

THE MAIN LIBRARY

The Main Library in Abu-Qir campus mainly serves the College of Engineering and Technology, the College of Computing & Information Technology, and the College of International Transport & Logistics, in addition to performing all technical activities of acquisition and cataloguing of all information media. The Main Library comprises a collection of books, in addition to Periodicals, Dissertations, Projects, and Electronic Journals.

The Main Library building consists of 3 floors, and can host (225) users at the same time.

The first floor comprises the references, periodicals, graduation projects, and dissertations. It also comprises a computer lab for Library users to retrieve information from the Internet, Online Public Access Catalo (OPAC), and search our set of databases and e-journals.

The second floor comprises English books in the fields of: Mechanical, Marine, Construction, Industrial Engineering, and International Transport & Logistics, in addition to a photocopy unit.

The third floor comprises English and Arabic books. English books are in the fields of: Computer, Electrical and Control, and Electronics and Communications Engineering, and Basic and Applied Sciences.

The Main Library's collection consists of (15125) books, (87) Printed Periodicals, (1243) Dissertations, and (463) Projects, in addition to Full-Text e-journals, e-books and e-dissertations.

THE ARCHITECTURE LIBRARY

The Architecture Library in Abu-Qir campus serves the department of Architectural Engineering and Environmental Design of the College of Engineering and Technology. It comprises a collection of the latest publications in architecture. Its collection consists of (2580) titles, (64) Dissertations (10) periodicals, in addition to Full-Text e-journals, e-books and e-dissertations.

The Library is equipped with (5) terminals for Library users to retrieve information from the Internet, Online Public Access Catalo (OPAC), and search our set of databases and e-journals. Users can also scan and save/print images from books or periodicals available in the library. The Architecture Library can host up to (50) users at the same time.

THE MARITIME LIBRARY

The Maritime Library in Abu-Qir campus serves the Nautical Specializations of the College of Maritime Transport and Technology. It comprises a collection of the latest publications in the maritime field which consist of (2633) titles, (406) Dissertations, (16) Printed Periodicals, as well as all (489) International Maritime Organization (IMO) publications, as the AASTMT's Library is a depository library of IMO publications, in addition to Full-Text e-journals, e-books and e-dissertations. The Maritime Library can host up to (50) users at the same time.

THE MANAGEMENT LIBRARY

The Management Library in Miami campus serves the College of Management and Technology. It comprises a collection of the latest publications in management fields. Its collection consists of (4804) titles, (34) periodicals, (263) Dissertations, (2500) Researches, in addition to Full-Text e-journals, e-books and e-dissertations, and a number of U.N. publications. The Management Library can host up to (35) users at the same time.

THE GRADUATE SCHOOL OF BUSINESS (GSB) LIBRARY (ALEXANDRIA)

The Graduate School of Business (GSB) library in Miami campus serves graduate courses in management fields. It comprises (1280) titles, (361) Dissertations, in addition to Full-Text e-journals, e-books and e-dissertations. It also comprises the Books of the College of Language and Communication: (787) titles. Photocopying services are available for all library users.

WABOUR ELMAYA LIBRARY

The Library in Wabour Elmaya campus serves Graduate studies in Engineering, Computing, and Language & Communication. It comprises (368) titles, and (496) Dissertations, in addition to Full-Text e-journals, e-books and e-dissertations. Photocopying services are available for all library users. The Library can host up to (31) users.

ENGINEERING LIBRARY – SHERATON

The Engineering Library in Sheraton branch serves the specializations the College of Engineering & Technology and the College of Computing & Information Technology in Cairo. The Library can serve (70) users at the same time. Its collection of engineering books is (4730) titles, (1112) Dissertations, and (78) Projects, (20) Periodicals, in addition to Full-Text e-journals, e-books and e-dissertations. Photocopying services are available for all library users.

MANAGEMENT & LOGISTICS LIBRARY - SHERATON

The Management & Logistics Library in Sheraton serves the specializations the College of Management and Technology and the College of International Transport & Logistics in Cairo (Sheraton). The Library can serve (40) users at the same time. Its collection of management books is (3333) titles and (147) Dissertations, (2) Periodicals, in addition to Full-Text e-journals, e-books and e-dissertations. Photocopying services are available for all library users.

MANAGEMENT & LOGISTICS LIBRARY - DOKKI

The Management & Logistics Library in Dokki serves the specializations the College of Management and Technology and the College of International Transport & Logistics in Cairo (Dokki). The Library can serve (25) users at the same time. Its collection of management books is (1380) titles, and (72) Dissertations, in addition to Full-Text e-journals, e-books and e-dissertations. Photocopying services are available for all library users.

SMART VILLAGE LIBRARY

The Library in Smart Village mainly serves the departments of the College of Engineering and Technology: Architectural Engineering & Environmental Design, Electronics & Communication, Mechatronics, and Construction & Building Engineering College of Management & Technology, and the College of International Transport & Logistics.

The Library can serve (65) users at the same time. Its collection of books is (877) titles, (307) Dissertations, in addition to Full-Text e-journals, e-books and e-dissertations. Photocopying services are available for all library users.

GANOUB ELWADY LIBRARY

The Library in Ganoub Elwady serves the specializations of Engineering and Management. It comprises (1922) titles, and (55) Dissertations, in addition to Full-Text e-journals, e-books and e-dissertations. The Library can host up to (55) users. Photocopying services are available for all library users.

PORT SAEED LIBRARY

The Library in Port Saeed campus serves the specializations of Maritime Transport, Engineering, Management, and Logistics. It comprises (1840) titles, and (132) Dissertations, in addition to Full-Text e-journals, e-books and e-dissertations. The Library can host up to (31) users. Photocopying services are available for all library users.

Engineering Day

This day is held on a yearly basis. It is the summit of all the College's activities throughout the year. Samples of all the departments' and students' academic and extracurricular activities are presented. Final year graduation projects and students' work are displayed.

The President of the Academy and the Dean of Engineering honor distinguished faculty and students who showed excellence on the academic, social and sportive levels. Students' families are invited to attend, take tours of the College and to witness the advancements made by the College and the achievements of the students.

Parents Day

On a yearly basis the College of Engineering in cooperation with all the colleges in the Arab Academy for Science and Technology celebrates the parents' days. The President of the Academy invites all the Arab countries representative and all the deans and faculty members to attend. All the Student Organizations and Associations are invited to participate in this special day, giving students the opportunity to represent and showcase their home country. Dance, Music, Lights and Fashion a true live cultural entertainment with music, and beautiful clothes inspired by different countries and ethnicities! During this festival, students from all nationalities present their tradition and get a chance to share their culture, to show their activities of all nature and to display their scientific and artistic work.

Industry Advisory Committee

Annually, the industry advisory committee of the College of Engineering and Technology meets. The committee comprises CEOs and top managers and senior engineers from different industry and services corporation sectors in addition to the College's Council and a number of faculty members.

Sectors and industries represented include the petroleum industries, food industries, construction, electrical and electronics and telecommunications. The meetings discuss industry trends and needs, and help to keep the Engineering curriculum up-to-date and to maintain department's program goals. The College Council discusses with the committee the different aspects of the engineering program, focusing on recent and planned changes, enrolment, and events.
In addition, the recommendations of the committee are taken into consideration for updating the educational courses and training plans.

Job Fair

The Job fair is an annual one-day recruiting event that provides a forum for developing productive relationships between the College of Engineering graduates and the corporate world. It is a way of applying to career opportunities and serves as a networking tool with regional corporate professionals. The program also includes training courses for graduates to inform them how to well prepare for the job fair and make the best use of this event.

Blood Donation Campaign

A campaign is organized annually for blood donation. The College of Engineering insists in preserving this campaign as a part of its social as well as its educational role.

Orphans day

The Deanship of Student affairs is honored to declare that one of the main targets from establishing the alumni is offering all social, humanitarians, cultural, and proficiency services.
The students have achieved a great effort by offering more services foremost to the orphans' cases. A specialized group has taken place for studying the cases with social supervisors in the schools. Celebrations for the orphans and day trips are usually organized in the academy in Abu-Quir. These celebrations include participation of some members of the alumni in a lyrical evening party, cultural, athletics and lyrical competitions, offering presents, toys and a lunch meal as well.

Trips

Throughout the year the College of Engineering organizes trips to different places inside Egypt. These are one or two day trips over the weekend period to main Egyptian cities. It is an opportunity for students to know their country and to have a break of the academic life.

During the semester breaks with the cooperation of the Alumni Association longer period trips are usually organized. Places like Sharm El-Sheikh, Marsa Matrouh, Luxor and Aswan, El-Ein El- Sokhna, Beirut, Paris, London, Vienna, Amsterdam, Istanbul were among the visited destinations.

Practical training

The College of Engineering and Technology has put in place a mechanism that guarantees the quality of practical training for the college students, as it has a positive effect on the students in particular, and on the educational process in general. This training is mandatory and is a college requirement for students' graduation. Using the College industrial liaisons students are guaranteed training opportunities inside and outside Egypt.

Practical Training inside Egypt

- Keeping agreements with industrial corporations and service organizations inside Egypt, to provide training opportunities for students from the College of Engineering and Technology during summer time.
- Students are mandated to finish a training period of at least one month after the completion of the sixth and the eighth semester.
- Students are being evaluated after the submission of a report that describes the nature of the training that has been performed, and presenting a thorough preview to a group of representatives from the department.
- Practical training has been an official academic requirement for the student to accomplish before graduation.

Practical Training in Foreign Countries

Coordination between the College of Engineering and Technology and the Egyptian Committee for Students Exchange for practical training to provide multiple opportunities for training outside of Egypt.
The College of Engineering and Technology provides 8 to 14 training opportunities internationally every year in (Germany, Norway, Turkey, Finland, England, Thailand, Slovenia, Jordon, Syria, Lebanon, Romania, Poland, and… etc).
The outside of Egypt training opportunities are awarded to the top students of each department.

College Weekly Seminars

The College of Engineering and Technology holds a gathering for its entire faculty where a faculty member or a guest speaker is invited to give a talk about his latest research or the state of the art in his field of specialty or any matter of general interest to the College community. These seminars became a tradition of the College and present an opportunity for mutual and interdisciplinary cooperation. The event is also open to senior students and graduates.
The following is a short list of the seminars held during the last year:

- The Contest for Fast Typers
- Computer Engineering Career Advising & Domain Experience in the Field of Computer-aided Biomedical Lunge Cancer Detection
- Career Path for Market Needs
- Green Hydrogen Current & Future Prospects
- How to Prepare for an "HR" Interview
- Arduino week
- Coffee & Chat " Electrical & Control Engineering "
- Industrial Readiness
- 5th Industrial Revolution
- Key Trends & Innovations in Petrochemicals Industry
- KNX Technology & Market Needs for Engineers Seminar
- Introduction to 5G
- Robo Cup Rescue Edition
- Machine Learning
- Youth Exchange
- Understanding IBS

The College of Engineering and Technology creates an exciting environment for students to experience unlimited opportunities and to interact with other students in addition to their traditional academic life. This interactive environment provides a student development experience that fosters individual student growth.
Students are in class almost one third of the time during the normal week of college. However, student life is more than just academics it is the remaining out of class time as well. Students are encouraged to maximize their college experience through participation in a variety of campus activities.
Students are encouraged to participate in student organizations, attend campus events and become involved in leadership and community service projects. They are encouraged to explore their opportunities for involvement in campus life and enrich their college experience. They are motivated to create as well as participate in scientific, cultural, social, and sports events.

Student Organizations and Societies

Student Council

The Student Council plays a very important role in the College of Engineering and Technology. It is a way that helps share students' ideas, interests, and concerns with college faculty and administration. Student Council Representatives attend after school meetings regularly and meet with classmates to discuss ideas and concerns about the educational process at the academy. They serve as a positive role model to other students.

Student Council is a representative structure, through which students can become involved in the affairs of the College, working in partnership with college officials, faculty and staff for the benefit of the College of Engineering and Technology and its students. The student council plays a very important role as it helps share students' ideas, interests, and concerns with faculty and college administration. Representatives have regular meetings where they discuss ideas and concerns about the educational process at the College of Engineering. They often also help raise funds for different activities, including social events and community projects. They work in cooperation with all the other societies and student organization in campus.

The student council consists of the following:

- Vice Dean for Student Affairs
- Student Council President
- Vice President and Secretary
- Public Relations
- Vice President of Educational, Literature, & Arts Committee
- Members of Educational, Literature, & Arts Committee
- Vice President of the Scientific Committee
- Members of the Scientific Committee
- Vice President of the Sports Committee
- Members of the Sports Committee
- Vice President of the Social Committee
- Members of the Social Committee
- Assistant of Student's Basic Studies

IEEE

The International Electrical & Electronic Engineers Society (IEEE) comprises the student activities mainly in electrical, electronic & communication and computer engineering departments. IEEE has its board elected annually under the supervisor of a staff counsellor.

IEEE in College of Engineering & Technology in AAST&MT is a part of Egypt Chapter among international region 8, which includes Africa continent. The IEEE student branch organizes many tutorials for AAST engineering students ranging from PCB, PSPICE and EWB tutorials to advanced AVR microcontroller design and programming.

The IEEE student branch has many sections:

- **WIE:** Women In Engineering, was responsible for the organization of the Conference towards a smarter life , and Tri-profession cross roads events, they are interested in improving the role of women in the engineering fields
- **JEEE:** Junior Electrical & Electronics Engineers, concerned with the students from basic terms (1, 2, 3 and 4).The JEEE organizes a big event to inform all the new students with the faculty, the departments, fields of studies, services, and laboratories. This event is organized every semester.
- **Computer Chapter:** newly added to the branch to deal with computer engineering students, they were responsible for the organization of the IBM recruitment event.

IEEE DAY 2021

It also organizes many events like:

- IEEE Day | Egypt Gathering
- International Virtual Summit - 2021
- Problem Solving Marathon
- Industry 4.0 Technologies
- Robotics from Zero to Hero: Ultimate Edition
- IEEE Membership Privileges
- The Contest for Fast Typers

American Concrete Institute (ACI)

(ACI) has been found since 1904. It is advancing concrete knowledge to structural engineers and construction engineering students by several ways with 99 chapters, 65 students chapters and nearly 20,000 members spanning over 120 countries.

ACI in college of Engineering & Technology in AAST & MT is a part of the Egyptian student chapter. The student chapter develops many activities and various programs for students. This committee's mission is to provide students with the opportunity to better understanding concrete its uses, and properties, through seminars, researches, student projects and student competitions.

The ACI student chapter organizes many events for AAST CONSTRUCTION Engineering Students. These events have many sections like:

- Seminars (Project nationalism scientific research, the latest findings of the building material science, research ideas)
- Student projects and competitions (ACI mortar workability , ACI egg protection device)
- Tours (Engineering offices , construction sites, cement plants, ready mixed concrete plants, and chemical production plants)

It also organizes many events like:

- EPD competition (36 teams from all the Egyptian Universities)
- Seminar about "Career Path for Market Needs"
- Educational Trip to the Tunnels of Suez Canal.
- Seminar "How to be a Construction Engineer".

Arctivity Society

This society has been initiated among Architectural Engineering and Environmental Design Department in College of Engineering & Technology in AAST&MT. It has organized many student galleries which showed the students skills in painting, drawing, sculpturing.

Arctivity Society has organized many musicals playing inside the college premises by students and to students.

Computer & Computing Club (CCC)

This society has been initiated among Electrical Engineering Department since 1999 and has outputted many student projects.

CCC organized each semester ROBOT Adventure Competition where 6 or more teams (each has designed his own ROBOT) are competed to get the winner in a pre-made playground inside college premises. Also many student projects are prepared to be presented in college activities such as Engineering Day or Annual Arab Festival.

Computer Engineering Club (CEC)

CEC is one of the scientific comities in the college of engineering and technology. It was created on 2007 under the supervision of computer engineering department; however, its activities are available for all other departments. The basic objective of the CEC is to improve the knowledge and practical skills of the students in different disciplines including:

- Programming languages.
- Database programming.
- Microcontrollers' applications.
- Artificial Intelligence.
- PC assembly.
- Computer vision.
- Computer controlled applications.
- Intelligent Robots design and implementation.
- Games programming.
- CCTV systems.
- Implementing Printed Circuit Boards (PCB).
- Computer Networks installation.

Some competitions are also organized by the CEC including:

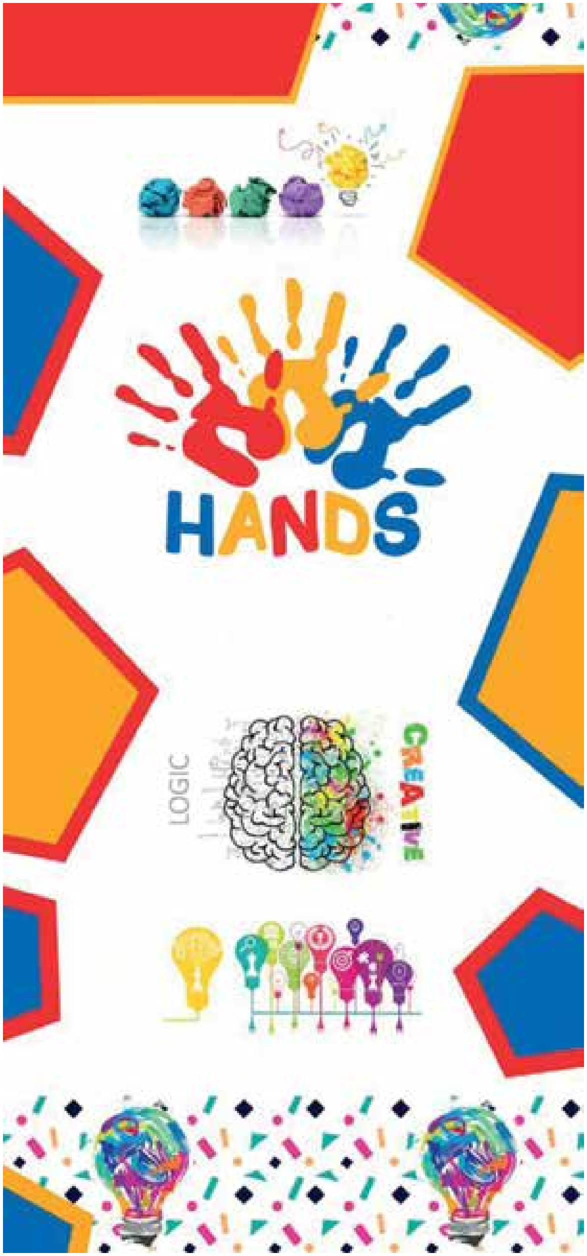
- Academy Robotics Contest (ARC).
- Games 2 Games contest. (G2G).

Hands Team

Hands student team is a non-profit student organization at the Arab Academy for Science and Technology & Maritime Transport. It was founded in fall 2002 . As a student community, The Hands gathered more than 200 students under the theme of helping each other maximize their effectiveness and efficiency .

The Hands activities included Charity, Awareness, Entertainment, and Human Development Programs and Events . The Hands target is to help students and change their minds and lives and trying to get the students out the mood of college .

The Hands is a community service club in the AAST that aims at providing Entertainment, Charity, Awareness, and Human Development programs.
The Hands society has been found in 2002 and has attracted many students. Hands has organized many social and athletic events. They adopted a campaign for promoting poor villages in Alexandria. Also, Hands shares in Collecting Clothes campaign annually. In addition, it organizes every semester a large competition for talented students "Talent Show"



Cultural, Social, Trips and Sports Activities

Sports Activities

- Holding a Sports Day for every department throughout the semester.
- Holding regular tournaments for some sports between different departments on an agreed upon day weekly.
- Participation of the college sports teams in tournaments involving other colleges.

Social Activities

- Visiting Egyptian museums and attend cultural performances in Bibliotheca Alexandrina.
- Holding regular fund-raising events or collection of donations for orphans and the poor.
- Arrangement of visits to orphanages and hospitals for handicapped patients and giving them gifts on special occasions.
- Invitation of orphans and handicapped patients for a visit to the Academy and organizing entertaining activities for them on special occasions.
- Art and Trips
- Organization of educational seminars under the supervision of the Student Affairs.
- Presentation of a program of trips for various departments including educational and scientific field trips.
- Organizing educational competitions between different departments.
- Organizing art and talent competitions (music and singing) and awarding prizes.
- Holding exhibitions for paintings and various art works and pieces.
- Organizing an annual arts festival as a social event.

Scientific Activities

- Forming various scientific committees by students
- Committee of Marine Engineering
- Committee of Electronics & Electrical Engineering
- Committee of Mechanical & Industrial Engineering
- Committee of Architectural & Construction Engineering
- Organization of various seminars in different fields throughout the academic year.
- Having an exhibition at the end of every semester displaying all students' graduation projects and inviting some companies to attend.
- Organization of extra-curricular workshops in various fields after school hours for all students.
- Organization of extra and revision lectures at the end of every semester held by professors and teacher assistants.

General Facilities

Clinic
A modern clinic is available at the Abu-Quir campus. Physician of all specialties are present in the clinic. The clinic provides its medical services without any additional charge. Pharmacies are also attached to the clinic.

Dorms
Three hotels were built in AAST Abu-Quir campus. All the hotels provide 4 stars accommodation along with world class restaurants. Single and double rooms are available. A separate hotel for girls was built on the campus as well. All the hotels are built to the highest standards, and are maintained by professional staff.

Gymnasium
There are two fully equipped Gymnasiums at the Abu-Quir Campus.They include saunas and massage facilities as well as all the standard equipment. Professional staff supervises the operation of the facilities and gives guidance to the trainees. Fitness assessments including body fat analysis, and cardiovascular, muscular, and flexibility tests can be carried at the Gym. Personal fitness training is available to students and members by the session and is focused on teaching beginning, intermediate, and advanced exercisers the proper techniques and habits in order to reach their desired fitness goals

Restaurant

AAST offers several restaurants and cafeterias within the campus that deliver full meals at very reasonable prices. The main restaurant serves the students living on-campus and provides meals for breakfast, lunch and dinner. Many cafeterias are also available to students offering a

Cyber Cafe

The cyber café connects the students and instructors to the world through the Internet. It is fully equipped with the latest computers and skilled information technology (IT) professionals to help deliver the best service, during a non-stop working day starting from 9 AM to 7 PM daily (Except Friday) . The cyber café provides Emails, browsing, chatting, webpage development and training services to all the students on campus.

Service Centers

Engineering Centre for Consultancy

The Engineering Centre for Consultancy, Research and Community service (ECCRCS) is a state of the art center that offers exclusive consultancy development services in the different fields of engineering. ECCRCS was established to provide the critical link between the industrial marketplace and the College of Engineering and Technology.

ECCRCS works closely with the College faculty, industry, government agencies and the local community to support and encourage the transformation of cutting edge research into innovative and commercially exploitable development services that are implemented using new and high technological procedures.

In addition, ECCRCS uses its extensive links with industry to help forge business and research partnerships and to market the College's research capabilities both nationally and internationally.

As ECCRCS continues its mission 'SHAPING THE FUTURE TODAY' it expects to maintain and enhance not only the quality of its services offerings and delivery but also adopting new approaches in design.

Fields and Scopes:

ECCRCS works with the College of Engineering and Technology faculty and researchers along with a short list of international and local experts and consultants to identify innovations with commercial potential and to offer its distinguished services within the different fields of engineering.

Architectural And Environmental Design

Urban Planning, Urban Design, Landscaping, Architectural Design, Feasibility Studies and Arbitrating Engineering Disputes.

Civil Engineering

Structural design of concrete, metallic in addition to hydraulic constructions, design and structure of road projects, site surveying, soil investigations, reconstruction and repairing recommendations, projects management and construction material testing.

Computer Engineering

Feasibility studies, analysis, design and specifications of information systems.

Electronics And Communications Engineering

Feasibility studies and design for indoor and outdoor communication systems, design and implementation of electronic equipment for industrial application in the PCBs, feasibility study and design of solar cell powered system, designing special communication system for GMDSS on board ships as well as offshore and setting technical specifications for radar system on radar ships and coastal stations.

Electrical And Control Engineering

Design of distribution networks, lighting interior and exterior, power distribution, automatic control, alarm systems and laboratory facilities.

Industrial And Management Engineering

Strategy development, business process re-engineering and asset restructuring of organizations, productivity and quality improvement, feasibility studies of planned industrial projects, engineering analysis, equipment, selection and facility planning.

Development and analysis of computerized maintenance management systems, Management Information System (MIS), and supply chain design. Design and development of manufacturing processes, Conventional Machining, Forming, Casting, and welding process. Non-conventional and computer assisted manufacturing AM), work measurement and analysis of industrial processes operations, quality system design and management. Precision management standardization and calibration of equipment process.

Mechanical - Mechatronics And Marine Engineering

Preparation of technical studies, determination of technical specifications, carrying out research and designing projects. Moreover; conducting and management of training programs and preparation of maintenance programs. Conducting and management of training programs and preparation of maintenance programs.

Center of Entrepreneurship and Strategic Marketing (CESM)

CESM is a community united for promoting and supporting entrepreneurship and innovation-driven growth in Egypt. CESM services include the provision of workshops and seminars as well as to run competitions to recognize and award entrepreneurial potentials and sponsors mentoring service. The center is a centralized unit for content marketing strategy and development.

China-Arab Technology Transfer Center

On 11-September- 2015, a Memorandum of Understanding (MoU) was signed for the establishment of China-Arab Technology Transfer Center (CATTC) in the Arab states. The MoU has been signed between the General Secretariat of the League of Arab States, represented by AASTMT as an executive body, and the People's Republic of China, represented by the Chinese Ministry of Science and Technology (MOST). The main purpose of the MoU is to add new dimensions to the China-Arab strategic partnership of comprehensive cooperation and common development in the domain of science and technology transfer.

Computer Networks & Data Center (CNDC)

CNDC provides a structured environment that effectively coordinates operational activities with all network users. AASTMT Network extends to all faculty members, administrative staff, students and classroom activities to provide services that meet the AASTMT goals. The Network is based on Giga bit Ethernet fiber optic backbone that covers a total of 31 buildings and consists of over 7500 data points distributed over five campuses.

Computer Service Center (CSC)

CSC was established in 2000 to provide opportunities within the job market, by providing the AASTMT's graduates, undergraduates and employees with the knowledge and the modern skills to meet the requirements of the labor market in the field of information technology and communications, etc.,

Industry Service Complex (ISC)

ISC was established to equip some of the productive research workshops with all design and manufacture equipment needed to produce applied projects in accordance with the standard specifications.

Information & Documentation Center (IDC)

IDC was established in 1983, with the main objective to develop administrative and management information systems that help users and managers in different departments to streamline their activities accurately and with less effort.

International Examination Center (IEC)

IEC is one of the largest language testing centers in Egypt and takes pride in providing outstanding customer service.The center provides several Cambridge exams including KET, PET, FCE, CAE, BEC & TKT. Cambridge ESOL exams have been recognized and respected over 150 years by companies, universities and governments around the globe. All Cambridge ESOL exams are aligned to the Common European Framework of Reference (CEFR), the leading benchmark of language proficiency.

International Maritime Organization (IMO)

IMO Compound was established as a distinguished unit, and was inaugurated by the IMO Secretary General and His Excellency the Egyptian Minister of Transport in August 2005.

International Research Projects Center

The Arab Academy for Science Technology and Maritime Transport contributes to many of the international Research projects from here comes the role of the International Research Projects center to coordinate between the AASTMT and the funding entities on several levels.

Integrated Simulator Complex (ISC)

ISC is one of the most important subsidiary bodies of AASTMT, it was established in 1996 with a budget exceeding 65 million dollars. ISC includes 18 simulators operating both individually and collectively. These simulators are considered the sate-of-the-art in technology, which makes ISC a unique simulators complex in the region, since 1996.

Maritime Career Center (MCC)

MCC is dedicated to helping deck/engine cadets and maritime alumni make the most of their college education by offering an array of services and resources to aid in all facets of career planning and recruitment. MCC seeks to bridge students/graduates from their roles as maritime academic learners to their roles as productive graduates with fulfilling shipping industry careers.

Maritime Examination Center (MEC)

Based on the importance of the whole examination process, the AASTMT has worked hard towards improving examination regulations in collaboration with maritime education institutes and specialized reputable consultants to keep up with the technological advances in the profession. UNDP Project EGY/7919/016/ stipulated the establishment of an Examination center responsible for conducting

Proficiency Certificates for sea personnel. The project authorized the Examination center – which represents the Ministry of Maritime Transport in Egypt- to act on its behalf in the implementation of the STCW 1978 and its amendments.

Marine Hotel Center (MHC)

In October 1983, the MHC launched its program to prepare and qualify candidates to work on board of commercial ships and Nile cruises. Its graduates do not only acquire a Diploma in Hospitality, but also, obtain the certificate of Marine Safety after completing the planned courses. The Certificate of the MHC was accredited by the Egyptian Ministry of Higher Education Rule 2231991/.

Maritime Research & Consultation Center (MRCC)

MRCC was established in 1984 in the framework of the organizational structure of AASTMT as a non-for-profit organization to serve the maritime transport sector in Egypt and Arab countries.

Multimedia Center (MMC)

Founded in 1995, MMC is an integrated multimedia production house specialized in the development of educational and training multimedia courses on the Internet, CD-ROM, and DVD-ROM. The MMC in Alexandria is considered one of the largest specialized centers that produce interactive educational programs in the Middle East.

Planetarium

The planetarium is in Alexandria – Main Campus (Abu Qir) campus, providing students with an exceptional educational experience through projecting educational material on the dome-shaped screen.

Regional Informatics Center (RIC)

As a new contribution to its leading role in offering higher education standards and spreading the information technology, AASTMT established the first regional informatics center in the Middle East and North Africa.

Quality Assurance Center (QAC)

QAC was established under the name" Central Unit for Accreditation & Quality Assurance" to satisfy the requirements of the NAQAAE Accreditation. It was then changed to its current name to monitor the level of quality of the educational processes adopted by AASTMT Colleges and Institutes in all related aspects to ensure continuous improvement and achievement of excellence and uniqueness.

Administration, Faculty and Staff (Alexandria)

Deanery

- Akram Soliman El-Selmy, Dean of College.
- Alaa El-Din Khalil, Vice Dean, Graduate Studies and Research.
- Iman Gamal Eldin Morsi, Vice Dean, Practical Training and Community Service.
- Ihab Farouk Badran, Vice Dean, Education Affairs.
- Nasser Mohamed El-Maghraby, Dean of Basic and Applied Science Institute.
- Tarek Mostafa Abdel-Aziz, Vice Dean, Student Affairs.

Departments

- Ahmed Samir Shehata, Head of Department of Marine Engineering.
- Ali Ismail Shehata, Head of Department of Mechanical Engineering.
- Ashraf Ibrahim Sharara, Head of Department of Oil and Gas Engineering.
- El-Badr Mohamed Osman, Head of Department of Construction and Building Engineering.
- Ibrahim Hassan Mohamed, Head of Department of Chemical and Petrochemical Engineering.
- Maha Mahmoud Sharkas, Head of Department of Electronics and Communications.
- Mahmoud Ahmed El-Sayed, Head of Department of Industrial and Management Engineering.
- Nasser Mohamed El-Maghraby, Dean of Basic and Applied Science Institute.
- Sherin Mostafa Youssef, Head of Department of Computer Engineering.
- Shereen Shafeek Aly, Head Department of Post Graduate Studies.
- Walid Maher Ghonim, Head of Department of Electrical and Control Engineering.
- Yasser Ahmed Farghly, Head of Department of Architectural Engineering and Environmental Design.

Special Units

- Moustafa Ahmed Abdel Gelil, Head of Energy Research Unit.
- Wael Abd Ellatif Ali, Head of Quality Assurance Unit.

Faculty

Architectural Engineering and Environmental Design

- Adel Sami El-Menchawy, Professor, PhD, 1997 Arch. Dept., Faculty of Fine Arts, Alexandria University, Egypt, Tourism Urbanisation.
- Adham Hany Abulnoor, Associate Professor, PhD, 2010, Politicnico di Milano, Milano, Italy, Architecture & Conservation.
- Ahmed Abdel Rahman Wasfy, Assistant Professor, PhD, Faculty of Fine Arts, Alexandria University, Egypt
- Ahmed Bahaa El-Seragy, Associate Professor, PhD, 2004, University of Nottingham, Nottingham, UK, Environmental Design and Sustainable Architecture.
- Ahmed Fekry Abu El Wafa, Assistant Professor, PhD, 2018, Faculty of Fine Arts, Alexandria University, Egypt
- Ahmed Kamal Taher, Assistant Professor, PhD, 2021, Welsh School of Architecture, Cardiff University, Cardiff, UK.
- Ahmed Mohamed Nasr Eldin, Assistant Professor, PhD, 2019, Faculty of Fine Arts, Alexandria University, Egypt
- Alaa El Din Sarhan, Associate Professor, PhD, 1994, Faculty of Engineering, Alexandria University, Egypt, Architecture and Urban design.
- Amal Mamdouh Fathallah, Assistant Professor, PhD, 2004, Faculty of Engineering, Alexandria University, Egypt, Environmental Design.
- Amira Nagy El Semellawy, Assistant Professor, PhD, 2019, University of Strathclyde, Glasgow, UK
- Amr Atef Elhamy, Assistant Professor, PhD, 2020, Faculty of Fine Arts, Alexandria University, Egypt
- Assem Monir Abdelrazek, Assistant Professor, PhD, 2018, Faculty of Fine Arts, Alexandria University, Egypt.
- Bakr Mohameed Gomaa, Associate Professor, PhD, 2010, University of Nottingham, Nottingham, UK, Environmental Design (Natural ventilation in buildings).
- Fahd Abdel Aziz Hemaida, Assistant Professor, PhD, 2014, Faculty of Engineering, Alexandria University, Egypt, Nano Materials in Architecture.
- Gihan Mosad Hannallah, Professor, PhD, 2002, Faculty of Fine Arts, Alexandria University, Egypt, Environmental Design & Sustainable Design.

Faculty

- Hussein Ezzat Abul khair, Professor, PhD, 1982, Faculty of Fine Arts, Alexandria University, Egypt, Interior Design, Architecture & Urban Design.
- Ingy Ragaai Elgebaly, Assistant Professor , PhD, 2020, Faculty of Fine Arts, Alexandria University, Egypt
- Maye Abbas Yehia, Associate Professor, PhD, 2007. Faculty of Engineering, Alexandria University, Egypt, Architecture & Urbanism.
- Magdy Wissa, Assistant Professor, PhD, 2014. Faculty of Fine Arts, Alexandria University, Egypt, Architecture & Urban Design.
- Mohamed Adel El Desoky, Assistant Professor, PhD, 2012, Faculty of Engineering, Cairo University, Egypt, Architectural Conservation.
- Mohamed Mostafa Ayoub, Associate Professor, PhD, 2012, Faculty of Fine Arts, Alexandria University, Egypt
- Mohamed Mostafa Gabr, Assistant Professor, PhD, 2018, Faculty of Fine Arts, Alexandria University, Egypt
- Mostafa Mohamed Gabr, Professor, PhD, 1990, Edinburgh University, UK,
- Nada Ahmed Talaat, Assistant Professor, PhD, Faculty of Fine Arts, Alexandria University, Egypt.
- Nermine Aly Hani, Assistant Professor, PhD, 2016, Faculty of Fine Arts, Alexandria University, Egypt.
- Rania Abdel Galil, Associate Professor, PhD, 2007, Sheffield University, UK, Sustainable Urban & Regional Planning.
- Sally Said El-Deeb, , Assistant Professor, PhD, 2017, Faculty of Engineering, Alexandria University, Egypt
- Sherine Shafik Aly, Associate Professor, PhD, 2008, Faculty of Fine Arts, Alexandria University, Egypt, Sustainable Urban Design.
- Sondosse Aly Ragheb, Assistant Professor, PhD, 2018, Faculty of Engineering, Alexandria University, Egypt
- Wael Mahmoud Hassab, Associate Professor, PhD, 2004, Faculty of Engineering, Alexandria University, Egypt, Sustainable Architecture.
- Yasmin Sobhy Kandil, Assistant Professor, PhD, 2011, Faculty of Engineering, Cairo University, Egypt, Urban Design.
- Yasser Ahmed Farghaly, Associate Professor, PhD, 2005, Faculty of Fine Arts, Alexandria University, Egypt, Architectural Education, Urban Landscape.

Basic and Applied Science

- Alaa Abdel-Wahed Abdel-Bary, Professor, Ph.D. (1999) Zagazig University, Egypt, Applied Mathematics.
- Allam A. Allam, , Professor, Ph.D. (2011) Alexandria University, Egypt, Applied Mathematics.
- Aly Abdel-Moneim Abdel-Halim, Professor, Ph.D. (2006) Zagazig University, Egypt, Mathematical Physics.
- Amany Mohamed Elsayed, Assistant Professor, Ph.D. (2008) Alexandria University, Egypt, Applied Mathematics.
- Amr Thabit, Assistant Professor, Ph.D. (2018) Alexandria, Egypt, Electrical Engineering.
- Braa Adel, Assistant Professor, Ph.D. (2022) Alexandria, Egypt, Applied Mathematics.
- El-Hady I Soliman, Assistant Professor, Ph.D. (2015) Alexandria University, Egypt, Pure Mathematics.
- Eman Shafik El-Malah, Associate Professor, Ph.D. (1999) Alexandria University, Egypt, Environmental Physics.
- Houssam-Eldin Shawky Mohamed, Professor, Ph.D. (2006) Alexandria University, Egypt, Engineering Mathematics.
- Ingy Attia, Assistant Professor, Ph.D. (2019) Aston, England, Electrical Engineering.
- Khaled T Ramadan, Professor, Ph.D. (2010) Alexandria University, Egypt, Applied Mathematics.
- Mahmuod Abd- Elraouf, Assistant Professor, Ph.D. (2020) Tanta ,Egypt ,Applied Mathematics.
- Mervat Aly Mohamed, Assistant Professor, Ph.D. (1998) Alexandria University, Egypt, Production Engineering.
- Moatz M. Amer, Associate Professor, Ph.D. (2015) Aix- Marsielle, France, Electrical Engineering.
- Mohamed A Elsayed, Professor, Ph.D. (2005) Virginia Tech University, USA, Engineering Mechanics.
- Mohamed Abdel-Aziz Ibrahim, Professor, Ph.D. (1976) McGill University, Communication Engineering.
- Mohamed Abdel-Moneim Abbasy, Professor, Ph.D. (1985) Washington State University, USA, Mechanical Power Engineering.
- Mohamed Abdel-Zaher Abdel-Rasoul, Professor, Ph.D. (2003) Alexandria University, Egypt, Nuclear Physics.
- Mohamed El-Sayed Amer, Professor, Ph.D. (1982) Alexandria University, Egypt, Analytical Chemistry.
- Mohammed A. Omar, Professor, Ph.D. (2009) Alexandria University, Egypt, Engineering Mathematics.
- Mohamed Fathy Zaky, Assistant Professor, Ph.D. (2021) Alexandria, Egypt, Applied Mathematics.
- Mohamed Fawzy Abbas, Assistant Professor, Ph.D. (2021) Alexandria, Egypt, Applied Mathematics.
- Nasser Mohamed El-Maghraby, Professor, Ph.D. (2001) Alexandria University, Egypt, Applied Mathematics.

- Radwa A. Osman, Associate Professor, Ph.D. (2017) Aston, England, Electronics Engineering.
- Samar A. Mahrous, Assistant Professor, Ph.D. (2020) UTM, Malesia, Mechanical Engineering.
- Shady Yousry, Associate Professor, Ph.D. (2016) Alexandria University, Egypt, Environmental Physics.
- Sherief Gamal El-Sharkawy, Professor, Ph.D. (2009) Zagazig University, Egypt, Computational Physics.
- Sherief Zafer Eldegany, Assistant professor, Ph.D. (2021) Staffordshire, England, Mechanical Engineering
- Tahany A. Ehsan, Assistant Professor, Ph.D. (2008) Alexandria University, Egypt, Applied Mathematics.

Chemical and Petrochemical Engineering

- Ibrahim Hassan Mohamed, Professor, Ph.D. (2002) Alexandria University, Egypt, Chemical Engineering.
- Yehia M. Youssef, Professor, Ph.D. (2003) Imperial College, UK, Materials Science and Engineering

Computer Engineering

- Amani Saad, Professor, Ph.D. (1996) on a Channel system between University of Milano, Italy, and University of Alexandria, Egypt, Object Oriented Database Management Systems.
- Cherine Fathy, Assistant Professor, Ph. D. 2013, Cairo University, Egypt Computer Networks.
- Dalia M. Sobhy, Assistant Professor, Ph.D. (2019), Birmingham University, UK, Software Engineering.
- Hany H. Mahmoud, Assistant Professor, Ph.D. (2015) University of Stafordshire, UK, Video coding
- Hesham El-Zouka, Associate Professor, Ph.D. (2006) University of Nottingham, UK, Network Security.
- Karma M. Fathalla, Assistant Professor, Ph.D. (2019), Aston University, UK. Machine Learning, Medical Informatics, Data mining and analysis.
- Marwa El-Shenawy, Assistant Professor, Ph. D. (2013), University of Salford , UK, Biomedical image processing.
- Mazen N. Elagamy, Assistant Professor, Ph. D. (2018), Staffordshire University , UK, Stock Market.
- Mohamed Taher El-Sonni, Assistant Professor, Ph.D. (1978) University of Illinois, Urbana-Champaign, USA, Computer Architecture and Pattern Recognition.
- Ossama Ismail, Professor, Ph.D. (1994) Queens University, Canada, Robotics, Mechatronics, Computer Control.
- Noha Ghatwary, Assistant Professor, Ph.D. (2020) University of Lincoln, UK, Biomedical Image Processing, Machine Learning.
- Noha S. Tawfik, Assistant Professor, Ph.D. (2020) Utrecht University, Netherlands, Text Mining , Natural Language Processing, Medical informatics.

- Omar O. Shalash, Assistant Professor, Ph.D. (2019) University of Strathclyde, UK, Robotics.
- Rania Ahmed Kadry, Assistant Professor, Ph. D. (2013), University of Salford, UK, Biomedical Image Processing.
- Sherine Nagy Saleh, Assistant Professor, Ph. D. (2016), Aston University, UK, Image Processing.
- Sherin Youssef, Professor, Ph.D. (2004) University of Nottingham, UK, Artificial Intelligence, Intelligent Mobile Agents, Swarm Intelligence.

Construction and Building Engineering

- Ahmed Osman Idris, Associate Professor, Ph.D. (2013) University of Toronto, Canada, Transportation Engineering & Planning.
- Ahmed Ragheb, Associate Professor, Ph.D. (1994) Rensselaer Polytechnic Institute, USA, Geotechnical Engineering.
- Akram Soliman, Professor, Ph.D. (2003) Nottingham University, UK, Coastal Engineering and Hydraulics.
- Alaa Morsy, Associate Professor, Ph.D. (2010) Alexandria University, Egypt, Structural Engineering.
- Aly I. Eldarwish, Professor, Ph.D. (1994) Michigan State University, USA, Construction Materials and Reinforced Concrete Structures.
- Ehab El-Kassas, Professor, Ph.D. (2001) Dundee University, UK, Structural Engineering.
- El-Badr Mohamed Osman, Assistant Professor, Ph.D. (2017) University of Salford, Manchester, UK, Construction Engineering
- Hesham Bassioni, Professor, Ph.D. (2004) Loughborough University, UK, Construction Management.
- Karim M. Helmy, Assistant Professor, Ph.D. (2007) University of Manitoba, Canada, Structural
- Khaled Shawki, Associate Professor, Ph.D. (2003) Alexandria University, Egypt, Construction Engineering.
- Mohamed Foda, Assistant Professor, Ph.D. (1988) McGill University, Canada, Transportation and Highway Engineering.
- Mohamed Ihab El-Masry, Professor, Ph.D. (2004) University of Southern California, USA, Structural Engineering.
- Nabil El-Ashkar, Professor, Ph.D. (2002) Georgia Institute of Technology, USA, Construction Materials.
- Tarek Mostafa Abdel-Aziz, Assistant Professor, Ph.D. (2007) Alexandria University, Egypt, Geotechnical Engineering.

- Wael Kamel, Professor, Ph.D. (1994) University of Paul Sabatier, France, Environmental Engineering.
- Youssef Khairy Ahmed, Assistant Professor, Ph.D. (2020) University of Salford, Manchester, UK, Civil Engineering.

Electronics and Communications Engineering

- Abdel Moneim AbdelBary, Professor, Ph.D. (1992) Kent University, UK, Chaotic Behavior of Nonlinear Circuits.
- Ahmed Abd El-Aziz, Assistant Professor, Ph.D. (2012) Northumbria University UK, Optical Communication and Photonic Devices.
- Ahmed Fathi Al-Kabbany, Associate Professor, Ph. D., 2016, University of Ottawa, Canada
- Amira Ibrahim Zaki, Associate Professor, Ph.D. (2012) Alexandria University, Wireless Communication, Antenna and Wave Propagation.
- Amr Magd El-Helw, Associate Professor, Ph.D. (2008) Staffordshire University, UK, Pattern Recognition Using Spread Spectrum.
- Darwish Abdel-Aziz, Professor, Ph.D. (1988) Military Technical College, Egypt, Antennas.
- Ehab Farouk Badran, Professor, Ph.D. (2002) Louisiana State University, USA, Communications and Signal Processing.
- Eman Galal Ibrahim Hassan, Assistant Professor, Ph. D., 2019, University of Salford, UK.
- Hassan Shokry Mohamad EL-Dib, Assistant Professor, Ph. D., 2015, Virginia Tech.
- Heba Ahmed Fayed, Assistant Professor, Ph.D. (2011) Alexandria University, Optical Communications.
- Heba Ahmed Shaaban, Associate Professor, Ph.D. (2010) Virginia Tech, Wireless Communication.
- Hossam Gawesh, Assistant Professor, Ph.D. (1983) Alexandria University, Integrated Navigation Systems.
- Iman Gamal Morsi, Professor, Ph.D. (2002) Alexandria University, Egypt, Measurements and Instrumentation.
- Islam abdellatif mohamed, Assistant Professor, Ph. D., 2020, Sorbonne University, France.
- Khaled Hassan Elzaafrany, Assistant Professor, Ph. D., 2018, University of Alabama at Birmingham, USA.
- Maha Ahmed Sharkas, Professor, Ph.D. (2002) Alexandria University, Egypt, Digital Signal Processing.
- Mohamed Essam Khedr, Professor, Ph.D. (2004) University of Ottawa, Canada, Wireless Communications.
- Mohamed Essam Moussa, Assistant Professor, Ph.D. (2015) Queen›s University, Canada, Navigation and Wireless Localization.

- Mohamed Essam Tamazin, Assistant Professor, Ph.D. (2015) Queen›s University, Canada, Navigation and Wireless Localization.
- Mohamed Mahmoud Omar, Associate Professor, Ph.D. (2007) Alexandria University, Egypt, Communications Engineering.
- Mohamed Saad Zaghloul, Assistant Professor, Ph.D. (2002) Monofeia University, Egypt, Communications Engineering.
- Moustafa Hussein Aly, Professor, Ph.D. (1987) Alexandria University, Egypt, Optical Fiber.
- Nour ElDin Hassan ElMadany, Assistant Professor, Ph. D., 2019, Ryerson University, Canada.
- Omnia Amr Attallah, Assistant Professor, Ph.D. (2015) Aston University, UK, Signal Processing.
- Radwa Khalil Hamad, Assistant Professor, Ph.D, 2015, Alexandria University, Egypt..
- Roshdi Abu-Elazayem, Professor, Ph.D. (1981) University of Houston, USA, Electronic Devices and Circuits.
- Shaimaa Mohamed Farghaly Sayed, Assistant Professor, Ph. D., 2021, University of Salford, UK.
- Tamer Farouk Mohammad Farid Badran, Assistant Professor, Ph. D., 2020, Sorbonne University, France.
- Wael Abd El-Latif, Professor, Ph.D. (2012) Alexandria University, Antennas & Electromagnetic Wave Propagation.
- Waleed Kamal Badawi, Assistant Professor, Ph.D. (2012) Stanford University, UK, Communication and Signal Processing.

Electrical and Control Engineering

- Abd ELaal Elsaied Asran, Assistant Professor ,Ph.D (2003) at Alexandria University, Egypt ,Automatic Control.
- Ahmed Amer, Professor, Ph.D.(1989) Laboratoire d'Automatique,L'Univestie des sciences et Technique de Lille Flandres ,Artois,France .
- Ahmed Anas Helal, Professor, Ph.D. (2004) Heriot-Watt University, UK, Electrical Machines and Drives.
- Ahmed Elkashlan, Professor, PH.D. (1984),Alexandria University, Egypt, Powe System Nonlinear Dynamic Analysis and Renewable Energy Applications
- Ahmed Lotfy, Professor, Ph.D. (1997) Alexandria University, Egypt, Electrical Power.
- Ahmed Kadry Abdelsalam, Professor, Ph.D. September 2009, University of Strathclyde, UK.

- Ahmed K. El Shenawy, Assistant professor, Ph.D. April 2010, University of Mannheim, Germany.
- Alaa Khalil, Professor, Ph.D. (1999) Ain Shams University, Egypt, Electrical Machines and Drives.
- Amany El-Zonkoly, Professor, Ph.D. (2003) Tanta University, Egypt, Power Systems Engineering.
- Ezz Eldin Zakzouk, Professor ,PHD.(1977) Antonim Zapotocky Academy ,Brno Czecoslovakia, Electrical (Control System Engineering)
- Hamdy Ashour, Professor, Ph.D. (1999) Heriot-Watt University, UK, Electrical Machines and Drives.
- Hussien Dessuky, Professor, Ph.D. (1990), Suez University, Egypt, Electrical Power Systems.
- Mahmoud Abouzeid, Professor, Ph.D. (1991) Alexandria University, Egypt, Electrical Machines and Drives.
- Medhat I. Singaby, Professor, Ph.D. (1987), Alexandria Univrsity, Egypt, Automatic Control Systems Analysis and Design.
- Mohamed M. Abd Elrehim, Assistant Professor, Ph.D. (1994) Alexandria University, Egypt, Automatic Control Systems Analysis and Design.
- Mona Ibrahim, Assistant Professor, PH.D. (2017) Alexandria University, Egypt, Electrical Engineering.
- Mostafa S.Hamad, Professor, Ph.D. 2009, Strathclyde University, United Kingdom.
- Mostafa Abd Elgelil, Professor, Ph.D. (2006) University of Mannheim, Germany, Control Engineering.
- Nahla E.Zakzouk, Associate Professor, Ph.D. 2015, Strathclyde University, United Kingdom.
- Osama Hebala, Assistant Professor, Ph.D. (2019), Robert Gordon University, Aberdeen, UK.
- Rana Maher, Associate Professor, Ph.D. November (2015), Aix-Marseille University, France. Automatic control.
- Rania A.Ibrahim, Assistant Professor, Ph.D. (2015) Strathclyde University, United Kingdom.
- Samah El-Safty, Professor, Ph.D. (1998) Ain Shams University, Egypt, Electrical Power.
- Walid Ghoneim, Professor, Ph.D. (2003) Heriot-Watt University, UK, Electrical Machines and Drives.
- Yasser G. Dessouky, Professor, Ph.D. (1998) Heriot-Watt University, UK, Electrical Machines and Drives.

Industrial and Management Engineering

- Aly Owida, Assistant Professor, Ph.D. (2018) University of Limerick, Ireland, Operations and Supply Chain Management.
- Amira A. Ahmed, Assistant Professor, Ph.D. (2020) Alexandria University, Egypt, Industrial Engineering.
- Aziz Ezzat Elsayed, Professor, Ph.D. (1983) Alexandria University, Egypt, Industrial Planning.
- Hala A. Farouk, Assistant Professor, Ph.D. (2011) Cairo University, Egypt, Electronics and Electrical Engineering.
- Ingy A. El-Khouly, Assistant Professor, Ph.D. (2015) Dublin City University, Ireland, Industrial Engineering.
- Khaled S. El-Kilany, Professor, Ph.D. (2004) Dublin City University, Ireland, Systems Modelling and Analysis.
- Lina El-Sherif Ismail, Assistant Professor, Ph.D. (2021) University of Central Florida, United States, Industrial Engineering and Management Systems.
- Mahmoud A. El-Sayed, Professor, Ph.D. (2012) University of Birmingham, UK, Metallurgy and Materials.
- Mohamed Khamis, Associate Professor, Ph.D. (2004) University of Akron, USA, Quality Engineering and Material Science.
- Mohamed H. Mourad, Assistant Professor, Ph.D. (2018) University of Bath, UK, Mechanical Engineering.
- Mootaz Ghazy, Professor, Ph.D. (2012) Newcastle University, UK, Mechanical and Systems Engineering.
- Noha M. Galal, Associate Professor, Ph.D. (2010) Alexandria University, Egypt, Production Engineering.

Marine Engineering

- Ahmed Samir Shehata, Associate Professor, Ph.D. (2017) University of Strathclyde, Glasgow, UK, Ocean and Marine Engineering.
- Ahmed Khalifa Mehana, Associate Professor, Ph.D. (2015) Port Said University, Egypt, Marine Engineering and Naval Architecture Engineering.
- Ahmed Naguib Ahmed, Assistant Professor, Ph.D. (2007) University of Alexandria, Egypt, Marine Engineering and Naval Architecture.
- Ahmed M. Abdelhamid Osman, Assistant Professor, Ph.D. (2019) Swinburne University of Technology, Melbourne, Australia, Mechanical Engineering.
- Amr Ali Hassan, Professor, Ph.D. (2002) University of Nottingham, UK, Computational Fluid Dynamics, Heat Transfer.
- Ashraf Sharara, Associate Professor, Ph.D. (2010) Ain Shams University, Egypt, Mechanical Engineering.
- El-Sayed Hegazy, Professor, Ph.D. (1973) University of Alexandria, Egypt, Structural Ship Design.
- Hamdy Hassan, Professor, Ph.D. (1983) De Montfort University Leicester, UK, Mechanical Engineering.
- Khaled I. Elsherbiny, Assistant Professor, Ph.D. (2020) University of Strathclyde, Glasgow, UK, Ocean and Marine Engineering.
- Mohamed Fahmy Shehada, Professor, Ph.D. (2006) University of Heriot-Watt, UK, Material Engineering.
- Mohamed El Shaib, Associate Professor, Ph.D. (2012) University of Heriot Watt, UK, Material Engineering.
- Nagi El Semelawy, Professor, Ph.D. (1984) University of Glasgow, UK, Naval Architecture Engineering.
- Omar Abdulaziz, Professor, Ph.D. (1982) Paisley University, Scotland, UK, Welding And Quality.

Mechanical Engineering

- Ahmed Abd El Salam Taha, Assistant Professor, Ph.D. (2017) Alexandria University, Egypt, Applied Mechanics.
- Ahmed Ahmed Hanafy, Professor, Ph.D. (2010) Alexandria University, Egypt, Thermal Engineering.
- Ahmed F. El-Safty, Professor, Ph.D. (2001) Coventry University, UK, Renewable Energy, Absorption Air Conditioning.
- Ahmed Seif Eldin Bayoumi, Associate Professor, Ph.D. (2013) Strathclyde University, UK, Mechanical Power, Renewable Energy.
- Ali Ismail Sheahata, Professor, Ph.D. (2012) Ain Shams University, Egypt, Mechanical Power, Refrigeration & Air Conditioning.

- Ali M. El Haridi, Assistant Professor, Ph.D. (2017) University of Strathclyde, Glasgow, UK, Thermal Engineering.
- Elaraby Morsi, Visiting Professor, Ph.D. (1995) Alexandria University, Egypt, Applied Mechanics, Tribology and CFD.
- El-Sayed Saber, Professor, Ph.D. (1995) Alexandria University, Egypt, Applied Mechanics, Tribology, CFD.
- Enass Zakaria Massoud, Assistant Professor, Ph.D. (2019) University of Strathclyde, Glasgow, UK, Thermal Engineering.
- Hassan Abdel-Hamid, Visiting Professor, Ph.D. (1966) University of Manchester, UK, Applied Mechanics, Stress Analysis.
- Hassan Rashid, Professor, Ph.D. (1966) Alexandria University, Egypt, Applied Mechanics.
- Hesham El Sayed Saber, Assistant Professor, Ph.D. (2022) University of Oviedo, Spain, Applied Mechanics,
- Iham Farid Zidane, Assistant Professor, Ph.D. (2019) Aston University, UK, Engineering & Applied Science.
- Khaled Mohamed Abdou, Associate Professor, Ph.D. (2003) De Montfort University, UK, Concurrent Engineering.
- Khaled Mohi Eldin Saqr, Assistant Professor, Ph.D. (2011) Universiti Teknologi Malaysia, Mechanical Power, CFD.
- Mahmoud Hosny Salem, Assistant Professor, Ph.D. (2018) aston University, UK, Applied Mechanics.
- Mahmoud Z. El-Feki, Visiting Professor, Ph.D. (1988) Alexandria University, Egypt, Nuclear Engineering.
- Mina Atta Saad, Assistant Professor, Ph.D. (2022) University of Oviedo, Spain, Fluid Engineering.
- Mohamed Abou El-Azm, Professor, Ph.D. (2008) Ain Shams University, Egypt, Mechanical Power, CFD.
- Mohamed A. Teamah, Visiting Professor, Ph.D. (1988) Faculty of Engineering, University of Alexandria, Egypt, Thermal Engineering.
- Rola Samir Afifi, Associate Professor, Ph.D. (2009) Alexandria University, Egypt, Fluid Engineering.
- Sohair F. Rezeka, Visiting Professor, Ph.D. (1984) Wayne State University, USA, Control systems and Mechatronics.

Staff

- Abdelghany Elsaid ,Administrative Specialist
- Ahmed Shaaban, Electrical and Control Engineering Department.
- Asia Mohamed Shaalan, Educational Specialist, Dean's Educational Office.
- Dalia Mohamed Gomaa, Industrial and Management Engineering Department.
- Doaa Hassan, Mechanical Engineering Department.
- Doaa Mostafa Khamis, Quality Specialist Dean's Office.
- Nehal Abdel Monsef, Mechanical Engineering Department.
- Heba Azzab, Computer Engineering Department.
- Marwa Aly Magdy, Registration Specialist, Dean's Office.
- Magdy Seif, Marine Engineering Department.
- Nermeen Talat Moustafa, Architecture Engineering and Environmental Design Department.
- Nermine Farag Halim, Planning Specialist
- Nevin Daif, Postgraduate Office.
- Ragaa Mohamed Elhenawy, Dean's Office.
- Safaa Abdelhamid, Basic and Applied Science Department.
- Qabary Mohamed Mahmoud, Head of the Administrative Follow-up Department

Administration, Faculty and Staff (Cairo)

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- Yasser Galal Mostafa, Dean of College.
- Mohamed Hassan Abdelazi m, Vice Dean, Education Affairs.
- Mostafa Rostom Atia, Vice Dean, Student Affairs.
- Hanady Hussein Issa, Vice Dean, Graduate Studies and Research.
- Rania Metwally El Sharkawy, Vice Dean, Practical Training and Community Service.

Departments

- Akram Soltan Kotb, Head of Department of Construction and Building Engineering.
- Mohammed Saad ElMahallawy, Head of Department of Electronics and Communication.
- Noha Hany El-Amary, Head of Department of Electrical and Control Engineering.
- Sameh Abdelhamid Shaaban, Head of Department of Mechanical Engineering.
- Sherif M. Elfiki, Head of Department of Architectural Engineering and Environmental Design.
- Sherif Fadel Fahmy, Head of Department of Computer Engineering.
- Wael Abbas Mohamed, Head of Department of Basic and Applied Science.

Special Units

- Ahmed A. Elhakeem, Head of Quality Assurance Unit.
- Sameh A. Ahmed, Head of Technical Consultations Unit

Faculty

Architectural Engineering and Environmental Design

- Ahmed El Antably, Associate Professor, Ph.D. (2011) California University, Berkeley, USA, Design Theories and Methods.
- Aly Abdelalim, Assistant Professor, Ph.D. (2017) Carleton University, Ottawa, Canada, Environmental Studies.
- Amgad Fahmy, Associate Professor, Ph.D. (2011) Karlsruhe Institute of Technology, Germany, Environmental Studies.
- Hala El-Naggar, Associate Professor, Ph.D. (2009) Helwan University, Egypt, Interior Design.
- Lobna Sherif, Professor, Ph.D. (1988) Michigan University, USA, Design and Theories of Architecture.
- Marwa Khalil, Associate Professor, Ph.D. (2008) Cairo University, Architectural Design and Theories of Architecture.
- Mohamed El-Azzazy, Assistant Professor, Ph.D. (2019) Bauhaus University, Weimar, Germany, Theories of Architecture and Urban Studies.
- Mona A. Abdel Wahab, Associate Professor, Ph.D. (2011) Newcastle University, UK, Theories of Architecture and Urban Studies.
- Osama Tolba, Professor, Ph.D. (2001) Massachusetts Institute of Technology, USA, Landscape Design and Computation in Architecture.
- Rami Bakir, Assistant Professor, Ph.D. (2016) Ain Shams University, Egypt, Architectural Design and Research.
- Rana Bahaa, Assistant Professor, Ph.D. (2020) Ain Shams University, Egypt, Environmental Studies and Building Technology.
- Shaimaa Ashur, Associate Professor, Ph.D. (2014) Cairo University, Egypt, Community and Urban Design.
- Sherif Elfiki, Professor, Ph.D. (2003) Heriot-Watt University, UK, Architectural Design and Theories of Architecture.
- Sherif Ezz El-Din, Associate Professor, Ph.D. (2011) De Montfort University, UK, Environmental Studies.
- Tarek Hanafi, Assistant Professor, Ph.D. (2012) Ain Shams University, Egypt, Visual Studies.
- Tarek Kamel, Assistant Professor, Ph.D. (2018) Cairo University, Egypt, Environmental Studies.

- Tarek Kattaria, Assistant Professor, Ph.D. (2019) Cairo University, Egypt, Building Technology.
- Yasser Mostafa, Associate Professor, Ph.D. (2004) Wisconsin University, Milwaukee, USA, Environmental Design.
- Yomna El-Ghazi, Assistant Professor, Ph.D. (2019) Newcastle University, UK, Environmental Studies and Building Technology.

Basic and Applied Science

- Abdel Rehim A. Abdel Hamid, Professor, Ph.D. (1981) Sussex University, England, Applied Mathematics.
- Ahmed Mostafa El-Bakly, Professor, Ph.D. (1999) Virginia Tech. University, USA, Microwave.
- Ahmed Ramadan Ahmed, Associate Professor, Ph.D. (2015) Helwan University, Egypt, Engineering Physics.
- Bassem Hossam Roushdy, Assistant Professor, Ph.D. (2012) Ain Shams University, Egypt, Industrial Engineering.
- Eliwa M. Roshdy Rabia, Associate Professor, Ph.D. (2000) Military Technical College, Egypt, Engineering Mathematics.
- Hany Kamel Kaldus, Associate Professor, Ph.D. (2000) Texas University, USA, Applied Physics.
- Mohamed Fathy Ali, Assistant Professor, Ph.D. (2015) Mansoura University, Egypt, Engineering Mathematics.
- Mohsen Salah El-Din Mousa, Professor, Ph.D. (1986) Iowa State University, USA, Applied Mathematics.
- Mostafa A. Elogail, Assistant Professor, Ph.D. (2013) Ain Shams University, Egypt, Mathematics.
- Nehad Nashaat Morsi, Professor, Ph.D. (1985) Technical Military College, Egypt, Applied Mathematics.
- Samir Youssuf Marzouk, Professor, Ph.D. (1999) Menoufia University, Egypt, Applied Physics.
- Tamer Ahmed Ismail, Assistant Professor, Ph.D. (2012) Ain Shams University, Egypt, Industrial Engineering.
- Tantawy Farid Tantawy, Associate Professor, Ph.D. (1999) Ain Shams University, Egypt, Applied Engineering Mechanics.
- Wael Abbas Mohamed, Professor, Ph.D. (2011) Mansoura University, Egypt, Applied Mathematics (Engineering Mechanics).

Computer Engineering

- Ahmed F. A. Mahrous, Professor, Ph.D. (1987) Naval Postgraduate School, USA, Computer and System Engineering.
- Ashraf Tammam, Associate Professor, Ph.D. (2011) Ain Shams University, Egypt, Computer Security.
- Hisham S. M. Rashad, Assistant Professor, Ph.D. (2017) Virginia Polytechnic Institute and State University, USA, Trust and Reputation Management, Big Data, Computer Networks.
- Marwa A. Elmenyawi, Assistant Professor, Ph.D. (2017) Ain Shams University, Egypt, Hardware and Machine Learning.
- Mohamed W. Fakhr, Professor, Ph.D. (1993) University of Waterloo, Canada, Pattern Recognition and Machine Learning.
- Nada M. Abdel Azeem, Assistant Professor, Ph.D. (2021) Ain Shams University, Egypt, Computer Security and Networks.
- Salah A. Elewa, Assistant Professor, Ph.D. (1991) Air-force Institute of Technology, USA, Database Systems.
- Sherif F. Fahmy, Associate Professor, Ph.D. (2010) Virginia Polytechnic Institute and State University, USA, Distributed Systems, Real Time Systems.

Construction and Building Engineering

- Abdel Hamid Eltahan, Professor, Ph.D. (2009) Ain Shams University, Egypt, Irrigation and Hydraulic Engineering.
- Abdel M. Sanad, Professor, Ph.D. (1997) Institut National des Sciences Appliquées de Rennes, France, Structural Engineering.
- Adel M. Belal, Professor, Ph.D. (1997) University of Mississippi, USA, Structural and Geotechnical Engineering.
- Ahmed A. Elhakeem, Associate Professor, Ph.D. (2006) University of Waterloo, Canada, Construction Engineering and Management.
- Akram S. Kotb, Professor, Ph.D. (2003) Ain Shams University, Egypt, Transportation and Railway Engineering.
- Ebtisam Yehia, Assistant Professor, Ph.D. (2012) Ain Shams University, Egypt, Structural Engineering.
- El Baraa El ghazy, Assistant Professor, Ph.D. (2020) Ain Shams University, Egypt, Environmental Engineering.
- Hassan A. Hassan, Assistant Professor, Ph.D. (2019) Cairo University, Egypt, Materials and Structural Engineering.

- Mahmoud Kassem, Assistant Professor, Ph.D. (2017) Western University, Canada, Geotechnical Engineering.
- Mohamed Elsayyad, Assistant Professor, Ph.D. (2018) Cairo University, Egypt, Structural Engineering.
- Mohamed Refaat, Assistant professor, Ph.D. (2018) Ain Shams University, Egypt, Transportation and Highway Engineering.
- Mohamed Saeid, Associate Professor, Ph.D. (2017) University of Tennessee, USA, Construction Engineering and Management.
- Mohamed Salem, Assistant Professor, Ph.D. (2020) Universiti Teknologi, Malaysia, Hydrology and Hydraulics.
- Mostafa Yousef, Assistant Professor, Ph.D. (2017) Iowa State University, USA, Structural Engineering.
- Ola El Monayeri, Associate Professor, Ph.D. (2009) Zagazig University, Egypt, Environmental Engineering.
- Sameh A. Ahmed, Professor, Ph.D. (2002) Cairo University, Egypt, Geotechnical Engineering.
- Wael H. Khedr, Professor, Ph.D. (1996) Ain Shams University, Egypt, Hydraulics and Water Resources.

Electronics and Communication Engineering

- Al-Basheer A. Mohamed, Assistant Professor, Ph.D. (2019) Ain Shams University, Egypt, Information Theory and Coding.
- Azza Kamal, Assistant Professor, Ph.D. (2021) University of Western Brittany, France, Signal Processing, Modern Wireless Communication.
- Hanady H. Abdel-Qader, Professor, Ph.D. (2008) Ain Shams University, Egypt, VLSI Design.
- Hazem H. Ali, Professor, Ph.D. (1993) George Washington University, USA, VLSI Systems and Circuits, MEMs, NEMs.
- Hussein M. El-Attar, Associate Professor, Ph.D. (2011) Ain Shams University, Egypt, Ad-hoc Wireless Sensor Networks, Wireless Communications.
- Khalid A. Shehata, Professor, Ph.D. (1996) Naval Postgraduate School, USA, Design and Testing of Integrated Systems, Nano-Technology, FPGA.
- Mohamed A. Aboul-Dahab, Professor, Ph.D. (1986) Alexandria University, Egypt, Adaptive Antennas, Satellite and Maritime Communications.
- Mohamed F. Abousreia, Assistant Professor, Ph.D. (2019) Ain Shams University, Egypt, Antenna and Microwave Design.

- Mohamed H. Abdelazim, Professor, Ph.D. (1996) Kent University, UK, Electronic Circuits Design and Analysis, Micro-strip Circuits Design.
- Mohamed K. Shehata, Assistant Professor, Ph.D. (2019) Politecnico di Milano, Italy, Telecommunication Network.
- Mohammed S. ElMahallawy, Professor, Ph.D. (2008) Cairo University, Egypt, Signal Processing, Pattern Recognition and Remote Sensing.
- Moustafa H. Fedawy, Associate Professor, Ph.D. (2014) Ain Shams University, Egypt, Optoelectronics, Material Science.
- Nawal A. Zaher, Assistant Professor, Ph.D. (2019) Aston University, United Kingdom, DSP, Pattern Recognition, Communication Systems.
- Safa M. Gasser, Associate Professor, Ph.D. (2011) University of California Santa Cruz, USA, Wireless Ad-hoc Networks, Signal Processing.
- Sherif K. El-Dyasti, Assistant Professor, Ph.D. (2018) Ain Shams University, Egypt, Signal Processing for Antennas.

Electrical and Control Engineering

- Emam Fathy Mohamed, Assistant Professor, Ph.D. (2014) Cairo University, Egypt, Electrical Engineering.
- Eman Hassan Beshr, Associate Professor, Ph.D. (2009) Ain Shams University, Cairo, Egypt, Electrical Power and Machines.
- Hadi Maged El-helw, Professor, Ph.D. (2009) Staffordshire University, UK, Electrical Engineering.
- Hassan Elsayed Ibrahim, Professor, Ph.D. (2002) Oakland University, MI, USA, Electrical Engineering.
- Ibrahim Abdallah Abdelsalam, Associate Professor, Ph.D. (2016) University of Strathclyde, Glasgow, UK, Electrical Engineering.
- Marwa Ahmed Hassan, Assistant Professor, Ph.D. (2018) University of Sapienza, Rome, Italy, Automatic Engineering, Bioengineering and Operation Research.
- Mohammed Adel Alhasheem, Assistant Professor, Ph.D. (2019) Aalborg University, Denmark, Energy Technology.
- Noha Hany El-Amary, Professor, Ph.D. (2009) Ain Shams University, Cairo, Egypt, Electrical Power and Machines.
- Rania Metwally El Sharkawy, Professor, Ph.D. (2002) Cairo University in collaboration with Ilmenau University, Germany, Electrical Power and Machines.

- Salwa Mohamed Yousry, Assistant Professor, Ph.D. (2018) Staffordshire University, UK, Electrical Engineering.
- Yasser Galal Mostafa, Professor, Ph.D. (1997) Ain Shams University, Cairo, Egypt, Electrical Power and Machines.

Mechanical Engineering

- Ahmed Abdelatif Hamed, Assistant Professor, Ph.D. (2018) Paris-Saclay University, Mechatronics, Hydraulic System and Mechanical Vibrations.
- Ahmed Mahmoud Elsawaf, Associate Professor, Ph.D. (2012) Shiamne University, Japan, Mechanical Design.
- Amany Khaled Ahmed, Assistant Professor, Ph. D (2019) Ain Shams University, Material Engineering, Image Processing and Surface Coating.
- Essam Mahrous Elgenady, Associate Professor, Ph.D. (2011) Otto-von-Guericke University, Magdeburg, Germany, Thermal-fluid Sciences.
- John Maher Boutros, Assistant Professor, Ph.D. (2008) Nottingham University, England, Maintenance Planning.
- Mostafa Rostom Atia, Professor, Ph.D. (2002) Ain Shams University & Glamorgan Univ., Wales, UK, Mechanical Design and Production.
- Moustafa Ahmed Fouz, Assistant Professor, Ph.D. (2019) Paris-Saclay University, Robotics Applications, Mechatronics Systems and Experimental Methods.
- Ramadan Mohamed Taher, Professor, Ph.D. (1988) Lehigh University, PA, USA, Industrial Engineering.
- Sameh Abdelhamid Shaaban, Professor, Ph.D. (2004) Hanover University, Germany, Thermal-fluid Sciences.

Staff

- Amal H. Mohamed, Postgraduate Office.
- Basma I. ElSabroot, Construction and Building Engineering Department.
- Evit A. Salah, Dean's Office.
- Hadeer F. Mohamed, Administrative Specialist, Mechanical Engineering Department.
- Hazem M. Adib, Dean's Office.
- Iman S. El-Essawy, Dean's Office.
- Marwa M. Elrawy, Computer Engineering Department.
- May A. Mohammed, Basic and Applied Science Department.
- Mohamed A. Ibrahim, Architecture Engineering and Environmental Design Department.
- Nourhan A. Soliman, Head of the Administrative Follow-up Department.
- Rehab Ismail, Dean's Office.
- Waad M. Eldeeb, Electrical and Control Engineering Department.
- Weam S. Ibrahim, Electronics and Communication Engineering Department.

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