



---

**ARAB ACADEMY FOR SCIENCE, TECHNOLOGY  
AND MARITIME TRANSPORT**

**COLLEGE OF ENGINEERING  
AND TECHNOLOGY  
CAIRO BRANCH**

**(GRADUATE STUDIES)**

**Master of Science Programs**

**(B) Environmental Engineering**

**M.Sc. in Construction and Building Engineering**  
**(B) Environmental Engineering**

**CORE COURSES:**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>
CB 720	Water Quality Management and Waste Water Treatment	3
CB 721	Air Pollution and Indoor Air Quality	3
CB 722	Management of Solid, Hazardous and Radioactive Waste	3
CB 723	Environmental Impact Assessment of Civil Engineering Projects	3
<b>Subtotal</b>	<b>4 Courses * 3 Credit Hours</b>	<b>12</b>

**ELECTIVE COURSES:                      GROUP ( 1 )**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>
CB 724	Environmental Legislation and Regulation	3
CB 725	Ecological Concepts	3
CB 726	Noise Pollution	3
CB 727	Marine Pollution	3
CB 728	Environmental Economy and Sociology	3
CB 729	Energy and Natural Resources Conservation	3
CB 720-E	Environmental Modeling	3
<b>Subtotal</b>	<b>3 Courses * 3 Credit Hours</b>	<b>9</b>

continued/...

.../continued

**ELECTIVE COURSES:                    GROUP ( 2 )**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>
CB 714	Advanced Systems Analysis for Construction Engineers	3
CB 763	Surface and Subsurface Hydrology	3
CB 740-S	Finite Element Method	3
CB 734	Soil Stabilization Techniques	3
CB 752-T	Advanced Construction Surveying	3
CB 759	Traffic Engineering and Environment	3
<b>Subtotal</b>	<b>1 Course * 3 Credit Hours</b>	<b>3</b>

**RESEARCH THESIS:**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>
CB 701	Master's Research Thesis (Part 1)	6
CB 702	Master's Research Thesis (Part 2)	6
<b>Subtotal</b>	<b>2 Parts * 6 Credit Hours</b>	<b>12</b>

<b>Total</b>	<b>36</b>
--------------	-----------

# Courses

DETAILED STRUCTURE

**Course Code :** CB 720

**Course Title :** Water Quality Management and Waste Water Treatment

**Credit Hours :** 3

### **Course Description**

Water quality standards, water quality management in rivers and lakes, water pollutants sources, water and waste-water treatment systems, pollution of natural water bodies, ground water pollution, effects of water pollution on health and vegetation, development and implementation of pollution prevention programs.

### **Course Objectives**

To enable the student to acquire the steps of water and waste water treatment, identify the characteristics of different water pollutants, and evaluate the effects of water pollution on health and vegetation.

### **Course Topics**

- Water quality standards
- Water quality management in rivers and lakes
- Water pollutants sources, water and waste-water treatment systems
- Pollution of natural water bodies
- Ground water pollution
- Development and implementation of pollution prevention programs

### **References**

- Haigh, "*Water and Environmental Management: Design and Construction of Works*", Wiley, 1991.
- Salvato, Joseph A., "*Environmental Engineering and Sanitation*", Prentice Hall, 1992.
- Corbitt, Roberts A., "*Standard Handbook of Environmental Engineering*", McGraw-Hill, 1998.
- Peavy, "*Environmental Engineering*", McGraw-Hill, 1997.

**Course Code :** CB 721

**Course Title :** Air Pollution and Indoor Air Quality

**Credit Hours :** 3

### **Course Description**

Air pollution sources and identification, modeling of air pollution, monitoring and control instruments, green house effect, air-water exchange, emission standards from industrial sources, atmospheric dispersion, effects of air pollution on health and vegetation, automotive exhaust emissions, meteorology, acid rains, sources and control of indoor air pollution.

### **Course Objectives**

To enable the student to identify the characteristics of different air pollutants, acquire the methods of air pollution control, and evaluate the effects of air pollution on health.

### **Course Topics**

- Air pollution sources and identification
- Modeling of air pollution
- Air-water exchange
- Atmospheric dispersion
- Effects of air pollution on health and vegetation, meteorology
- Sources and control of indoor air pollution, measurement techniques

### **References**

- Sink, Michael K., "*Control Technologies for Hazardous Air Pollutants: A Handbook*", DIANE Publishing Company, 1994.
- Schmidt, "*Air Pollution Assessment and Control*", Wiley, 1998.
- Maslansky, Carol J., "*Air Monitoring Instrumentation: A Manual for Emergency, Investigatory, and Remedial Responders*", Prentice Hall, 1993.
- Market Intelligence Staff, "*World Indoor Air Quality Monitoring and Building Control System*", Frost and Sullivan Market Intelligence, 1994.

**Course Code :** CB 722

**Course Title :** Management of Solid, Hazardous and Radioactive Waste

**Credit Hours :** 3

### **Course Description**

Sources and characteristics of solid waste and hazardous, collection and transportation systems, solid waste storage and recycling, waste minimization, resource conservation and recovery, treatment technologies, ground water contamination and remediation, management of radiological solid waste, effects of radioactive waste on health and vegetation.

### **Course Objectives**

To enable the student to identify the characteristics of different Solid waste and hazardous, acquire the methods of solid waste storage and recycling, and evaluate the effects of radioactive waste on health and vegetation.

### **Course Topics**

- Sources and characteristics of solid waste and hazardous
- Collection and transportation systems
- Solid waste storage and recycling
- Waste minimization, resource conservation and recovery
- Treatment technologies
- Ground water contamination and remediation
- Management of radiological solid waste

### **References**

- Bigelow, Charles R., "*Hazardous Materials Management in Physical Distribution*", Prentice Hall, 1994.
- Hickman, H. Lanier, "*Exercise Manual to Accompany Principles of Integrated Solid Waste Management*", American Academy of Environmental Engineers, 1999.
- Liu, David H., "*Environmental Engineers Handbook*," C R C Press LLC, 1997.
- Peavy, "*Introduction to Environmental Engineering*", McGraw-Hill, 1991.

**Course Code :** CB 723

**Course Title :** Environmental Impact Assessment of Civil Engineering Projects

**Credit Hours :** 3

### **Course Description**

Origins of Environmental Impact Assessment, EIA procedure, policy options, legislative options, methods of project screening for EIA, preparation and review of an EIA, contribution of Civil Engineer in environmental control, case study.

### **Course Objectives**

To enable the student to learn the procedure for conducting an Environmental Impact Assessment (EIA), understand the civil engineer role in environmental control, and evaluate the environmental impact of civil engineering projects

### **Course Topics**

- Origins of Environmental Impact Assessment
- EIA procedure
- Policy and legislative options
- Methods of project screening for EIA
- Preparation and review of an EIA
- Contribution of Civil Engineer in environmental control
- Case studies

### **References**

- Cheremisinoff, Paul N., "*Ecological Issues and Environmental Impact Assessment*", Gulf Publishing Company, 2004.
- ReVelle, Charles S., "*Civil and Environmental Engineering Systems: An Advanced Applications*", Penguin Books, 2003.
- Bowman, Valcar A., "*Effective Environmental Management Systems (EMS)*", Cahners Business Information, 2002.
- Soares, Claire, "*Environmental Engineering and Management: ISO 14000 Standards, Regulating Compliance: A Practical Approach*" Penguin Books, 2002.
- Liu, David H., "*Environmental Engineers Handbook*", CRC Press LLC, 1997.



**Course Code :** CB 724

**Course Title :** Environmental Legislation and Regulation

**Credit Hours :** 3

### **Course Description**

Comparison of the environmental legislation and regulation in different countries, evolution of environmental regulations, international environmental agreements, law number 4 for 1994 and its executive regulations, environmental ethics.

### **Course Objectives**

To enable the student to understand the impact of environmental legislation, apply the local environmental law, and evaluate the efficiency of environmental regulation.

### **Course Topics**

- Comparison of the environmental legislation and regulation in different countries
- Evolution of environmental regulations
- International environmental agreements
- Law number 4 for 1994 and its executive regulations
- Environmental ethics

### **References**

- Simpson, Struan, "*Business, Pollution and Regulation*", British Library, 1997.
- Mercuro, Nicholas, "*Ecology, Law and Economics: The Simple Analytics of Natural Resources and Environmental Economics*", University Press of America, 1997.
- Soares, Claire, "*Environmental Engineering and Management: ISO 14000 Standards, Regulating Compliance: A Practical Approach*", Penguin Books, 1997.
- Gilbert, Mike, "*Achieving Environmental Standards*", Penguin Books, 1998.

**Course Code :** CB 725

**Course Title :** Ecological Concepts

**Credit Hours :** 3

### **Course Description**

Ecological perspective, the value of the environment, atmosphere constitution, solar radiation, flow of energy in ecosystem, climatic diagram of globe, microclimate, water cycle, rainfall, geological cycle, soil classification, ecological classification, ecosystems constitution, biosphere, population biology, substances cycle.

### **Course Objectives**

To enable the student to learn the ecological basics of changing environments, acquire the water and substances cycle, and evaluate the effects of stresses in ecosystems.

### **Course Topics**

- Ecological perspective
- The value of the environment
- Atmosphere constitution
- Flow of energy in ecosystem, and climatic diagram of globe
- Water cycle, rainfall, and geological cycle
- Soil classification
- Ecological classification
- Substances cycle

### **References**

- Molles, Manuel C., "*Ecology: Concepts and Applications*", McGraw-Hill Co, 1998.
- Pianka, Eric R, "*Evolutionary Ecology*", Addison-Wesley Educational Publishers, 1999.
- Shugart, Herman H., "*Terrestrial Ecosystems in Changing Environments*", 03/1998.
- Cech, Joseph J., "*Multiple Stresses in Ecosystems*", C R C Press LLC, 1998.

**Course Code :** CB 726

**Course Title :** Noise Pollution

**Credit Hours :** 3

### **Course Description**

Physical properties of sound, effects of noise on people, noise sources and criteria, noise standards, noise measurement, outdoor propagation of sound, noise section of an Environmental Impact Assessment, traffic noise prediction, noise pollution control and prevention, noise regulation.

### **Course Objectives**

To enable the student to learn the physical properties of sound, identify the noise sources and the means of noise reduction, and evaluate the effects of noise on human beings.

### **Course Topics**

- Physical properties of sound
- Effects of noise on people
- Noise sources, criteria, and noise standards
- Outdoor propagation of sound
- Noise section of an Environmental Impact Assessment
- Traffic noise prediction
- Noise pollution control and prevention
- Noise regulation

### **References**

- Cowan, James P., "*Handbook of Environmental Acoustics*", Van Nostrand Reinhold Inc, 1994.
- Solomon, Norman, "*Environmental Analysis, Air Quality, Noise, Energy, and Alternative Fuels*", National Research Council, 1994.
- Liu, David H., "*Environmental Engineers Handbook*", C R C Press LLC, 1997.
- Soares, Claire, "*Environmental Engineering and Management: ISO 14000 Standards, Regulating Compliance: A Practical Approach*", Penguin Books, 1997.

**Course Code :** CB 727

**Course Title :** Marine Pollution

**Credit Hours :** 3

### **Course Description**

Sources of marine pollution, marine ecology, oil and seashore pollution, monitoring and control instruments, modeling of marine pollution, ecological effects, prevention and regulation in marine sector, effect of marine pollution on birds and aquatic beings, marine pollution costs, case studies.

### **Course Objectives**

To enable the student to identify the sources of marine pollutants, learn new techniques of monitoring and control instruments, and evaluate the effects of marine pollution on health and economy.

### **Course Topics**

- Sources of marine pollution
- Monitoring and control instruments
- Modeling of marine pollution
- Prevention and regulation in marine sector
- Effect of marine pollution on birds and aquatic beings
- Marine pollution costs, case studies

### **References**

- Walker, C. H., "*Persistent Pollutants in Marine Ecosystems*", Pergamon Chess, 1992.
- Good, James W., "*Coastal Natural Hazards: Science, Engineering, and Public Policy*", Oregon Sea Grant, 1993.
- Earle, Sylvia A., "*Sea Change: The Message of the Oceans*", Fawcett Book Group, 1998.
- April P., "*Seashore*", Twenty-First Century Books, 1995.

**Course Code :** CB 728

**Course Title :** Environmental Economy and Sociology

**Credit Hours :** 3

### **Course Description**

Estimation of pollution damages, economic evaluation of benefits, risk assessment, development of information required for the analysis of design problems in environmental engineering, analysis of alternatives, cost assessment and analysis, impact of human activities on environment, environmental policy and social development, impact of political consideration, public participation in environmental decision-making, industrial ecology, demographic impact, desertification, social problems.

### **Course Objectives**

To enable the students to estimate the economic damage of pollution, appreciate the role of public participation in environmental decision-making, and evaluate the impact of social development on environment.

### **Course Topics**

- Estimation of pollution damages
- economic evaluation of benefits and risk assessment
- analysis of alternatives, cost assessment and analysis
- impact of human activities on environment
- environmental policy and social development
- impact of political consideration and public participation in environmental decision-making
- industrial ecology, demographic impact

### **References**

- Daly, Herman E., "*Ecological Economics and the Ecology of Economics*", Elgar (Edward) Publishing, 1999.
- Sauer-Thompson, Gray, "*Nature, Society, Sustainability: Greening Social Theory*", Krieger Publishing Company, 1999.
- Kibert, Charles J., "*Reshaping the Built Environment: Ecology, Ethics, and Economics*", Island Press, 1999.
- Odum, Eugene P., "*Ecology: A Bridge between Science and Society*", Sinauer Associates Inc, 1997.

**Course Code :** CB 729

**Course Title :** Energy and Natural Resources Conservation

**Credit Hours :** 3

### **Course Description**

Methods of energy conservation in buildings, natural resources conservation, environmental architecture, selection of green materials, resource recovery, recycling, life cycle strategy, elements of waste minimization strategy, benefits of waste minimization, waste reduction techniques, case study

### **Course Objectives**

To enable the student to acquire the methods of energy conservation and selection of green materials, understand the vitality of natural resources conservation, and learn new techniques of recycling and waste minimization.

### **Course Topics**

- Methods of energy conservation in buildings
- Natural resources conservation, environmental architecture
- Selection of green materials
- Resource recovery, recycling, life cycle strategy
- Elements of waste minimization strategy
- Benefits of waste minimization
- Waste reduction techniques
- Case study

### **References**

- Hart, "*Energy and the Environment: Physics Principles and Applications*", Kendall/Hunt Publishing Company, 1998.
- Owen, Oliver S., "*Natural Resources Conservation: Management for a Sustainable Future*", Wiley, 1997.
- ReVelle, Charles S., "*Civil and Environmental Engineering Systems: An Advanced Applications*", Penguin Books, 1997.
- Krigger, John T., "*Residential Energy: Cost Savings and Comfort for Existing Buildings*", Saturn Resource Management, 1996.

**Course Code :** CB 720-E

**Course Title :** Environmental Modeling

**Credit Hours :** 3

### **Course Description**

Mechanism of pollutant fate in the environment, models of physical systems, hydrodynamics modeling for rivers, modeling water quality in lakes and reservoirs, groundwater modeling, modeling of waste water treatment, air quality modeling.

### **Course Objectives**

To enable the student to apply the different methods of environmental modeling, apply the computer methods for simulating the environmental pollution, and exploit the numerical data on ecological modeling.

### **Course Topics**

- Mechanism of pollutant fate in the environment
- Models of physical systems
- Hydrodynamics modeling for rivers
- Modeling water quality in lakes and reservoirs
- Groundwater modeling
- Modeling of waste water treatment
- Air quality modeling

### **References**

- Zannetti, Paolo, "*Environmental Modeling: Computer Methods and Software for Simulating Environmental Pollution and Its Adverse Effects*", Wiley, 1994.
- Jorgensen, Sven E., "*Handbook of Environmental and Ecological Modeling*", 1995.
- Stein, A., "*Data Models in Action: Methodological Issues in Production Ecology*", Kluwer Academic Publishers, 1999.
- Clark, Colin W., "*Dynamic State Variable Models in Ecology: Methods and Application*", Oxford University Press, 1996.