Industrial and Management Engineering laboratories

Advanced Manufacturing Laboratory

The Advanced Manufacturing Laboratory allows students to acquire knowledge and experience in CNC programming, understand basic machining processes, learn to set up and adjust the tools and fixtures and follow safety procedures. The hands-on machining experiences in this mechanical lab benefit our engineering students in their current academic course learning as well as future career plan/job searching. This machine lab can also be used to manufacture certain components from the local companies. Faculties can use the equipment to manufacture components needed in their research project. There are also two 3D printing machines in the lab that are used to introduce the concept of additive manufacturing to students, and compare the concept of additive manufacturing to that of traditional (subtractive) manufacturing.

Advanced Manufacturing Laboratory Major Equipment

No.	Equipment			Quantity
	Name	Brand	Model	
1	CNC Turning Machine (	DMG	Ecoline 310x	1
2	CNC Vertical Milling Machine	DMG	MillTAp 700	1
3	SLA 3d Printing	3D systems	Formlabs	1
4	FDM 3d printing	3D systems	Cube	1
5	Computerized Laser Engraving Machine			1

Advanced Manufacturing Laboratory Courses Served

No.	Course		Term
1	IM311E	Advanced Manufacturing Systems	5
2	IM312E	Introduction to Additive Manufacturing	5
3	IM543E	Product Design and Development	9, 10
4	IM501	Senior Project Part (1)	9
5	IM502	Senior Project Part (2)	10

CAD/CAM Laboratory

The CAD/CAM Laboratory is equipped with 24 Windows computers. Specialized software such as AutoCAD, MiniTab, Lingo and ExtendSim are installed on computers for use in coursework in many courses.

CAD/CAM Laboratory Major Equipment

No.	Equipment			Quantity
	Name	Brand	Model	
1	AutoCAD 2009 software	AutoCAD	2009	1
2	Siemens NX CAM Software	Siemens	Nx8	1

3	MiniTab 16 (For Statistical Analysis)	MiniTab	16	1
4	Lingo (Optimization Software)	Lingo	14	1
5	ExtendSim (Simulation Software)	ExtendSim	10	1
6	Microsoft Office	Microsoft	2013	1

CAD/CAM Laboratory Courses Served

No.	Course		Term
1	IM311E	Advanced Manufacturing Systems	5
2	IM312E	Introduction to Additive Manufacturing	5
3	IM333	Industrial Data Systems Management	6
4	IM434	Engineering Project Management	7
5	IM442	Quality Engineering	7
6	IM423	Stochastic Models	8
7	IM443	Reliability and Maintainability Engineering	8
8	IM421E	Optimization Techniques and Applications	8
9	IM441E	Design of Experiments	8
10	IM442E	Industrial Data Analytics	8
11	IM528	Discrete Event System Simulation	9
12	IM533E	Design and Analysis of Supply Chains	9, 10
13	IM501	Senior Project Part (1)	9
14	IM502	Senior Project Part (2)	10

Human Factors and Ergonomics Laboratory

The laboratory promotes health and productivity in the work place by producing a quality product, on schedule at the lowest possible cost, with minimum capital investment and at a maximum worker satisfaction. It provides various tests and runs numerous experiments to:

- Measure and evaluate the worker's physical and mental abilities, performance, and health related fitness, human sensibilities and ability to interface with the job, and the response and dexterity in mental and manual work.
- Build an efficient worker-facility relationship by interfacing the best method with the best available skill.

The laboratory houses a collection of equipment capable of measuring and analyzing tasks and design work places and tools. The equipment covers tests in the following areas:

- Vocational evaluation.
- Fitness evaluation.
- Range of motion measurements.
- Sensibility analysis.
- Reaction time measurement.

- Physical work capacity evaluation.
- Manual dexterity.
- Pre-employment evaluation.
- Muscular stresses measurement.
- Analysis of lifting activities and labor posture.
- Task analysis.
- Workstation assessment.
- Hand Eye Coordination

Human Factors and Ergonomics Laboratory Major Equipment

No.	Equipment			Quantity
	Name	**Brand**	**Model**	
1	Physical Work Capacity and Functional Capacity Evaluation System	Lafayette	32601 PWCFC	1
2	Adult Back and Leg Dynamometer Package		32527A	1
3	Polar Heart rate watches	Polar	Vantage XL	1
4	Standard rotary pursuit	Lafayette	30010A	1
5	Photoelectric pursuit apparatus	Lafayette	30014A	1
6	Large Bone Caliper [for Human Evaluation]	Lafayette	01293	1
7	deluxe portable audiometer	Lafayette	15016	1
8	Jackson Strength Evaluation System	Lafayette	32628	1
9	Two-Arm Coordination Test (Mirror Tracing)	Lafayette	32532	1
10	Auto Scoring Mirror Tracer	Lafayette	58024E	1
11	Hand Evaluation Kit	Lafayette	J00109	1
12	Lafayette Hydraulic Pinch Gauge	Lafayette	5030P1	1
13	Purdue Pegboard Test	Lafayette	32020A	1
14	Grooved Pegboard Test	Lafayette	32025	1
15	Roeder Manipulative Aptitude Test	Lafayette	32026	1
16	Complete Minnesota Manual Dexterity Test	Lafayette	32023A	1
17	Hand Tool Dexterity Test	Lafayette	32521	1
18	Groove Type Steadiness Tester	Lafayette	32010	1
19	Hole Type Steadiness Tester	Lafayette	32011	1
20	Discrimination weights	Lafayette	16015	1
21	Kinesthesiometer	Lafayette	16014	1
22	Hydraulic Hand Dynamometer	Lafayette	J00105	3
23	Hydraulic Pinch gauge	Lafayette	J00111	2
24	Two point aesthesiometer	Lafayette	16022	2
25	Fitness Bike	Monark	818E	1
26	Occupational Skill set	Lafayette	32604	1
27	Hand Tool Set	Lafayette	32521	3
28	Rehab Trainer	Monark	881E	1
29	Stainless Steel Short Finger Goniometer	Lafayette	J00203	2
30	Sit and Reach Flexibility Test	Lafayette	01285A	1
31	Large and Small Anthropometer	Lafayette	01290	2
32	DISK-CRIMINATOR	Lafayette	F00620	1
33	Guymon Goniometer	Lafayette	01129	3
34	Plastic Goniometer	Lafayette	J00215	1
35	Skin Folder Caliper	Lafayette	01127	3

Human Factors and Ergonomics Laboratory Courses Served

No.	Course		Term
1	IM322	Work Design and Measurements	5
2	IM323	Human Factors Engineering and Design	6
3	IM501	Senior Project Part (1)	9
4	IM502	Senior Project Part (2)	10

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. The laboratory houses a collection of equipment used for the following functions:

- General and precision measurements.
- Surface texture assessment.
- Calibration of measuring instruments.
- Inspection based in dimensional, form and geometrical tolerances.
- 3-D measurement, screw thread measurements, gear measurements, and complex shape measurements.

Reverse Engineering Laboratory Major Equipment

No.	Equipment			Quantity
	Name	Brand	Model	
1	Profile projection	Mitutoyo	PJ-2500	1
2	Granite surface plate.	The Surface Flatness company Limited	Grade 1-4”*3	1
3	Precision bench centres.	Mitutoyo	Gauge 22-50 mm	1
4	Coordinate measuring machine (CMM).	Zeiss	Contura Select	1
5	Toolmaker’s microscope.	Mitutoyo	TM-500 series	1
6	Profile, roundness and roughness measuring machine.	Taylor Hobson	Form Talysurf 50-Talyrond 131	2
7	Measuring hand tools, instruments and accessories: Block gauge sets, vernier calipers and height gauges, micrometers, sine bars, sine plates, digital bevels.	Mitutoyo		Complete Set

Reverse Engineering Laboratory Courses Served

No.	Course		Term
1	IM111	Manufacturing Technology	1
2	IM213	Material Removal Processes	4
3	IM315	Material Forming Processes	6
4	IM518E	Engineering Metrology	9, 10
5	IM501	Senior Project Part (1)	9
6	IM502	Senior Project Part (2)	10

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.

Engineering Workshop Major Equipment

No.	Equipment			Quantity
	Name	Brand	Model	
1	Turning machines (engine lathes)	viceroy	Metrio TD5.2/1G/561	10
		Harrison	M400	2
		Luna	GK195	2
2	Milling machines.	Senior		2
3	Drilling machines.		DM40	2
4	Grinding machines.	Surface-wilton	512APSG6188	1
5	Tool grinder.	KOLEE	B2060	1
6	Shaper.	SENIOR		1
8	Broaching machine.	BROACHS	MC-548	1
9	Honing machine.	SUNNEN	MBB-1660-P	1
10	Welding equipment	ESSAB MAXWELD	FLASH HD403	10
		MICORMIG350	LORCH	1 CO2
		COSMO	P45C	1 SPOT
		LINCOLN TIG	SPEEDTEC405SP	1
		TOMAHAWK	LINCOLIN ELECTRIC 1538	1 PLASMA
		LINCOLN	ALPHA 850	1 STUD WELDING

		KEMPER	SYSTEM9000	1 FILTERATION UNIT
		GAS WELDING	SET	3
11	Hand tools and measuring equipment.			Complete Set
12	Educational casting kits.			Complete Set
13	Lathe dynamometers and twist drill dynamometer.			Complete Set
14	HYDRAULIC SAWING MACHINE	E315	SCORTEGAGNA	1

Engineering Workshop Courses Served

No.	Course		Term
1	IM111	Manufacturing Technology	1
2	IM213	Material Removal Processes	4
3	IM315	Material Forming Processes	6
4	IM501	Senior Project Part (1)	9
5	IM502	Senior Project Part (2)	10

Materials Testing and Characterization Laboratory

Material testing and characterization is a key function in assessing and ensuring the quality, properties, and behavior of engineering materials and is thus an important step in guaranteeing the quality and success of the finished product. Materials Testing and Characterization Laboratory provides the students the necessary equipment for analysis of a wide range of conventional and advanced materials. This includes sample preparation, imaging, testing and measurement. Materials characterization facilities include various optical microscopy techniques for structural and surface analysis, spectrometer as well as machines for measuring different mechanical properties including tension, compression, bending and hardness properties.

Materials Testing and Characterization Laboratory Major Equipment

No.	Equipment			Quantity
	Name	Brand	Model	
1	Computer Controlled Electronic Universal Testing Machine	WDW-E Series	WDW-100E	1

2	Rockwell Hardness Testing Machine.	Tinius Olsen	FH!	1
3	Light microscope Equipped with Axio Vision 4.9.1 Image Analysis Software	Zeiss	Axio Imager 2	1
4	Optical Emission Spectrometer (Spark Analyser)	Hitachi	FOUNDRY-MASTER Smart	1

Materials Testing and Characterization Laboratory Courses Served

No.	Course		Term
1	IM214	Material Technology	4
2	IM416	Failure Analysis	7
3	IM501	Senior Project Part (1)	9
4	IM502	Senior Project Part (2)	10

Non-Destructive Testing Laboratory

Non-Destructive Testing (NDT) Laboratory provides the students varied group of test and inspection processes used to detect surface and sub-surface defects or inconsistencies in test samples, without affecting the future operating performance of the inspected parts. NDT offers reliable and accurate results which can provide stability. Since this testing method does not damage the components, all pieces of equipment and machinery can be tested which can minimize the inaccuracy of test results and any undermined irregularities. Non-destructive testing methods are used in quality control of gears, castings and weld inspection of final products without compromising components final use. NDT laboratory provides facilities to carry out non-destructive testing and services for researchers as well. It is also used for conducting training courses for practice engineers from different industrial sectors.

Non-Destructive Testing Laboratory Major Equipment

No.	Equipment			Quantity
	Name	Brand	Model	

1	Ultrasonic Thick Gauge	CYGNUS instruments	CYGNUS 3	1
2	Ultrasonic Thick Gauge	Krutkramer Branson	DME	1
3	Magnetic particles tester	Magnaflux		1
4	Magnetic Yoke	Tiede		1
5	Coating Thick Gauge	Magnaflux		1
6	Ultrasonic flaw detector	Sonatest	Masterscan UFD 300	1
7	Ultrasonic flaw detector	Sonatest	sitescan140	1
8	Ultrasonic flaw detector	TenEleven	SG	1
9	Eddy Current flaw detector	Magnaflux	ED 1500	1
10	Dye penetrant testing unit			Complete set
11	Metascope: Spark Metal Analyzer (to be replaced by a new OES spark analyzer)	Clandon scientific	metascope	1
12	Radiography demonstration unit			Complete set

Non-Destructive Testing Laboratory Courses Served

No.	Course		Term
1	IM416	Failure Analysis	7
2	IM514E	Polymers, Ceramics and Composite Materials	9, 10
3	IM515E	Selection of Engineering Materials	9, 10