October University for Modern Sciences and Arts (MSA)

Faculty of Engineering

Industrial Systems Engineering Program (ISE)

Module Outlines

2014/2015

Module Outlines:

Faculty of Engineering curricula are designed according to the most up-to-date international standards, taking into consideration the Supreme Council of Universities (Engineering Studies Section Committee) requirements, and fulfilling the local and regional needs.

All course outlines highlight the role of new and emerging technologies in meeting challenges posed by the information and communication technology.

Adopting the Greenwich University's Quality Assurance (QA) under the supervision of Britain's QAA, the course outline includes:

Aims, Syllabus, Learning Outcomes, Teaching/Learning Strategies, Learning Materials, Assessment Scheme, Assessment Pattern, Learning Unit Contact Hours, and Module Leader.

100's LEVEL MODULES

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: MAT151**
Title	**: Calculus I**
Level	**: 1**
Credit Hours	**: 3**
Prerequisites	**: None**

AIMS

This module is designed to give freshman students an in depth coverage of functions, analysis of graphical information, limits continuity, derivative of functions, Inverse functions, transcendental functions, L'hopital rule, Analysis of functions, Functions of several variables, and partial derivative.

SYLLABUS

Topics
Functions-Properties of Functions – Composite Functions.
Limits – Computational Techniques of Limits.
Continuty – Limits and Continuty of Trigonometric Functions.
The Derivative – Techniques of Differentiation – Derivative of Trigonometric Functions – The Chain Rule – Implicit and parametric Differentiation.
Inverse Functions – Logarithmic and Exponential Functions – Inverse Trignometric Functions – Hyprbolic Functions – Inverse Hyperbolic Functions.
L'Hopital Rule – Indeterminate Forms.
Taylor and Maclurin series.
Functions of Two or More Variables – Partial Derivatives – Chain Rules.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Define and enumerate the basic concepts and principles of mathematics.
2. Recall the foundations of Calculus Problems and Techniques.
3. Review the various modern techniques, used in mathematical problems.

B- Skills

After completing this module, students will be able to:

1. Solve engineering problems by suitable mathematical techniques.
2. Recognize the various mathematical terminology.
3. Develop mathematical skills through tackling and solving engineering problems.

Teaching/Learning Strategies

- Lectures.
- Tutorials.

Learning Materials

Software Requirements:

- MAPLE, DRIVE, MATHEMATICA, MATLAB.

Useful Websites:

- http://www.math.ucdavis.edu
- http://www.math.nmc.edu

- http://www.math.montana.edu
- http://www.ugrad.math.ubc.ca

Reference Text:

- Thomas, Calculus-Early Transcendentals, 11th ed., Pearson-Addition wesly, 2006, Ch. 1-4,7,14

Supplementary Readings:

- Anton, H., I. Bivens and S. Davis, Calculus: Early Transcendentals, John Wiley & Sons, 8th ed., 2005 Ch. 1-5,8,15.
- Salaas and Hille's, One and Several Variables, John Wiley Inc., 9th ed., 2003.

Assessment Scheme

- Assignments.
- Class written Tests/Quizzes.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

• Class Participation/Assignments	20%
• Tests and Quizzes	20%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours Per Week

• Lectures	3	hrs / week
• Tutorials	1.5	hrs / week
• Total class contact hours	63	hrs/semester
• Total self study hours	45	hrs/semester
• Total study hours	108	hrs/semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	: **BSC 152**
Title	: **Engineering Physics I**
Level	: **1**
Credit Hours	**: 3**
Prerequisites	: **None**

AIMS

This module is designed to give the student a broad understanding of the fundamentals of physics and their applications. The module is particularly useful for the preparation of future studies in engineering.

SYLLABUS

Topics
Units and Dimensions
Scalar and Vector Quantities
Uniform circular motion, Force, work, energy and power
Oscillations and wave motion
Elastic properties of matter
Pressure in fluids
Fluid statics – Pascal's and Archimedes' principles
Fluid dynamics – Equation of continuity and Bernoulli's equation
Viscous flow
Thermal expansion of solids and liquids
Heat and thermal energy – Heat and work
The first law of thermodynamics
Heat transfer
Kinetic theory of gases

Laboratory Experiments:

- Determination of the acceleration of gravity using a simple pendulum
- Determination of the acceleration of gravity using the free fall method
- Determination of the elastic constant of a spring
- Determination of Young's modulus
- Determination of the coefficient of viscosity for a liquid
- Determination of the value of Joule's equivalent of heat
- Determination of the specific heat of a solid

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Understand the basic concepts and principles of Sciences.
2. Match the relationships between theory and experimentation.
3. Describe basic physical theories, and prove them in the laboratory.
4. Classify scientific factors affecting the results.
5. Enable students to tackle practical problems scientifically.

B- Skills

After completing this module, students will be able to:

1. Develop laboratory experimentation skills to real-world problems.
2. Communicate effectively, particularly to the scientific community using the language of physics and mathematics.

3. Learn how to work effectively as a member of a group.
4. Handle equipment in a safe and effective manner.
5. Carry-out scientific duties in an ethical, professional manner.

Teaching/Learning Strategies

- Lectures
- Tutorials
- Laboratories
- Projects

Learning Materials

Hardware Requirements:

- Mechanics, properties of matter, and thermal experiments in Physics I Lab.

Reference Texts:

- Hafez A. Radi, *General Physics for Engineers and Scientists*, MSA Univ., Vol. I, 2 nd ed., 2008.
- Hafez A. Radi, *Laboratory Manual of Physics I*, MSA Univ., 2008.

Supplementary Readings:

- Raymond A. Serway, John W. Jewett, "*Physics for Scientists and Engineers with Modern Physics*", Brooks Cole; 7th edition, 2007.
- David Halliday, Robert Resnick, Jearl Walker, "*Fundamentals of Physics*", Wiley, 7th edition, 2004.

Assessment Scheme

- Weekly Assignments.
- Tests and Quizzes.
- Projects and Reports.
- Laboratory Final Test.
- Unseen Written Mid-Term Exam.
- Unseen Written Final-Exam.

Assessment Pattern

Assignments	10 %
Tests and Quizzes	10 %
Laboratory Test	10 %
Term Projects and Reports	10 %
Unseen Mid-Term Exam	20 %
Unseen Final Exam	40 %
Total	**100 %**

Learning Unit Contact Hours

• Lectures	3 hrs / week
• Tutorials	1.5 hrs / week
• Laboratories	1.5 hrs/ week
• Total class contact hours	84 hrs / semester
• Total self study hours	60 hrs / semester
• Total study hours	144 hrs / semester

Module Leader

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: GSE 153**
Title	**: Engineering Mechanics I**
Level	**: 1**
Credit Hours	**: 3**
Prerequisites	**: None**

AIMS

This module is designed to provide freshmen students with a perspective on Engineering Mechanics and Statics. Statics of particles. Forces and vectors. Rectangular components in a plane. Forces and vectors components in a space. Vectors addition. Scaler and vector products. Equilibrium of particle in a plane. Equilibrium of particle in a space. Rigid bodies. Equivalent system of forces, Moment of a force about a point and about a given axis in a rigid body and moment of a couple. Reduction of moments and couple into resultant of moments and wrench, equilibrium of rigid bodies for 2-D and 3-D structure. Center of gravity of 2-D and 3-D body. Centroids of areas and lines. Moment of inertia of areas and bodies.

SYLLABUS

Topics
Units and Forces.
Statics of Particles: Plane.
Statics of Particles: Space.
Statics of Rigid Bodies: Vector Product.
Statics of Rigid Bodies: Moments.
Moment – Couple and Wrench.
2-D Equilibrium Structure.
3-D Equilibrium Structure.
2-D Centroids and Center of Gravity.
3-D Centroids and Center of Gravity.
2-D Moment of Inertia.
3-D Moment of Inertia.
Real Case Studies.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Apply the concepts of engineering mechanics and statics.
2. Analyse the mechanical processes including the structure design and their different components.
3. Employ the theory of static problems and its applications.

B- Skills

After completing this module, students will be able to:

1. Develop skills in solving engineering mechanics and statics problems.
2. Apply the theory of Mechanics to structure design.
3. Analyse static problems of engineering mechanics through performing a project.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Individual/Group Projects.
- Class Presentation.

Learning Materials

Useful Websites:

- http://www.statics.com
- http://www.ent.ohiou.edu
- http://www.amazon.com

Reference Text:

- Hibbeler, R. C., Engineering Mechanics (Statics and Dynamics), Macmillan, 11th ed., 2006.

Supplementary Readings:

- Irving Shames, Engineering Mechanics (Statics and Dynamics), Prentice Hall, 4th ed., 1996.
- Beer, F. P., Jhonston, E., Jr. and Eisenberg, E.R., Vector Mechanics for Engineers, McGraw-Hill, 1996
- Meriam, J. L. and Kraige, L. G., Engineering Mechanics (Statics and Dynamics), John Wiley Inc., 5th ed., 2002.

Assessment Scheme

- Weekly written Assignments (12 home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Individual/Group Project.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	10%
Assignments	10%
Tests and Quizzes	15%
Term Paper	5 %
Unseen Mid-term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3 hrs / week
Tutorials	1.5 hrs / week
Total class contact hours	63 hrs/semester
Total self study hours	45 hrs/semester
Total study hours	108 hrs/semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: GSE 154**
Title	**: Engineering Graphics**
Level	**: 1**
Credit Hours	**: 3**
Prerequisites	**: None**

AIMS

This module is designed to provide freshmen students with an overview of engineering graphics. It deals with the graphic language development of design ideas into sketches. Drawing tools required in professional practice. Lettering styles. Definitions of terms and geometric construction in technical drawings. Methods of viewing an object to get its necessary dimensions. Showing complicated interiors of objects (Sectioning). Preparing drawings for the presentation of a design idea (Pictorial Isometric Drawing). Introduction to mechanical assembly principles:Standards of fasteners (threaded bolts and nuts, pins, gears, bearings, keys); Standards of fits and tolerances; Standards of surface finish and geometrical tolerances. Use of AutoCAD.

SYLLABUS

Topics
Graphic Language and Manual Drafting Instruments Used in Drawings.
Sheet Sizes, Drawing Scale, Lettering, Line Conventions and Dimensioning.
Geometric Construction
Orthographic Projection on One, Two, Three Planes.
Projection of a third view, and Drawing Isometric View from Given Two Views.
Sectional Views (Full, Half, Offset, Aligned, Partial, Moved and Revolved).
Dimensioning, Fits, Allowances,Geometric Tolerances, and Surface Roughness.
Threaded Fasteners (Bolts and Nuts, Washers, …..)
Miscellaneous Types of Fasteners (Keys, Pins, Retaining Rings,…..).
Working Drawing, and Assembly Drawing.
Principles of Drawing Gears and Bearings in Assembly.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Understand the fundamentals of engineering graphics.
2. Develop various technical drawings with necessary views and dimensions.
3. Enlarge students' imagination capability in understanding the mechanical drawings.
4. Understand various types of engineering component connections.
5. Identify detail parts of an assembly, then draw the assembled parts and make the required sections in the assembly.
6. Choose the type of fit between the mating parts, and calculate the allowances and tolerances for the assembled parts as needed.

B- Skills

After completing this module, students will be able to:

1. Develop skills in visualizing the various views of mechanical parts.
2. Apply skills in assembling various mechanical parts.
3. Learn the dimensional tolerances, fits, and surface finish.
4. Develop Constructional Drawings.

Teaching/Learning Strategies

- Design studio.

- Auto CAD Lab.

Learning Materials

Hardware Requirements:

- Various manual drawing tools.
- PC & Datashow Projector.
- Computer Lab, Printers.

Software Materials

- Auto CAD 2010 Program.

Useful Websites:

- http://www.ces.clemson.edu
- http://www.osu.okmulgee.edu
- http://www.ces.celemson.edu
- http://www.mhhe.com
- http://www.osu-okumulgee.edu
- http://www.ces.clemson.edu

Reference Text:

- MSA Staff, Engineering Graphics, 2009.

Supplementary Readings:

- Thomas, E. F., Fundamentals of Engineering Drawing, McGraw Hill Co., 1998.
- Hart, K. R., Engineering Drawing, English Universities Press Ltd., 1999.
- Thomas, E. F. and Vierck, C. J., Engineering Drawing and graphic Technology, McGraw Hill Co., 2001.
- Fredrick E. Giesecke et. Al., Engineering Graphics., MACMILLAN Co., 5th ed., 1993.
- David A. Madsen, Engineering Drawing and Design THOMSON Delmar Learning,4th ed., 2007.

Assessment Scheme

- Weekly Assignments (10 Home Assignments).
- Class Tests (2 1.5-hr. Tests).
- Unseen Mid-Term Exam (2-hr. Exam).
- Unseen Final-Exam (4-hr. Exam).

Assessment Pattern

• Studio Participation	10%
• Lab participation	10 %
• Assignments (Studio and Lab)	10%
• Tests and Quizzes	10%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Studio & Lab Wor	4.5 hrs / week
• Lectures	1.5 hrs/ week
• Total studio & Lab contact hours	84 hrs/semester
• Total self work hours	60 hrs/semester
• Total work hours	144 hrs/semester

Module Leader

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: COM 155**
Title	**: Introduction to Information Technology**
Level	**: 1**
Credit Hours	**: 3**
Prerequisites	**: None**

AIMS

This module is designed to familiarize freshmen students with efficient use of computers, devices and applications. The lecture part of this course serves as an introduction to computer-related terminology and concepts, and as an investigation of the internal components of a computer system (motherboard, microprocessor, primary storage, buses, ports and add-on boards, secondary storage devices, output devices). Introduction to Computer graphics and Computer networks are to be introduced as well. In addition, the course introduces common software concepts, operating systems and programming languages. The AUTOCAD and MATLAB packages are to be introduced as well. The tutorial part of this course should improve keyboarding skills. It introduces the microcomputer platform with emphasis on windows environment, the use of Internet: navigation and search capabilities. Training on popular computer application packages, mainly, Microsoft Office (including word processor, spreadsheet, presentation, graphics & databases), Working with the internet, AUTOCAD and MATLAB.

SYLLABUS

Topics
Computers: Introduction
The Central Processing Unit and numbering systems
Input and Output
Introduction to MATLAB and functions representation
Programming and Languages: Flow charting (problem solving and algorithms introduction)
Storage Devices
The Internet and searching net
Networks
Introduction to AUTOCAD and graphics designing programs

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Explore the internet and search for a specific subject.
2. Apply AUTOCAD and MATLAB Programs.
3. Present current ethical and social issues associated with computing.

B- Skill

After completing this module, students will be able to:

1. Gain a working knowledge of the most widely used applications (word processing, database, spreadsheets, presentations, and graphics).
2. Organize and retrieve information on a computer.
3. Operate with appreciated skill the MS-office.

Teaching/Learning Strategies

- Lectures.
- Computer Laboratories.
- Class Presentation.

Learning Materials

Software Requirements:

- MATLAB
- AUTOCAD
- MS-Office
- Internet Explorer

Useful Websites:

http://www.prenhall.com/~longlong
http://www.gpc.edu/
http://www.it4all.co.uk/ (ICDL Course)
http://www.howstuffworks.com/ (How stuff works)
http://www.caam.rice.edu/~timwar/MA375F03/MA375.html

Reference Text:

- Capron, H. L. and J. A. Johnson, Computers: Tools for an Information Age, Prentice Hall, 8th ed., 2003.

Supplementary Readings:

- Long, L. and N. Long, Computers, Prentice Hall, 10th ed., 2002.
- Meyer, M., Explorations in Computer Science: A Guide to Discovery. Jones & Bartlett Pub, 2003.
- Cashman, T. J. and G. B. Shelly, Essential Introduction to Computers, 5th ed. Course Technology, 2003.
- Dale, N. and J. Lewis, Computer Science Illuminated, Jones & Bartlett Pub, 2002.
- Turban, E., R. K. Rainer Jr., R. E. Potter, Introduction to Information Technology, John Wiley & Sons, 2nd ed., 2002.

Assessment Scheme

- Weekly computer Assignments (8 Home Assignments).
- Short computer quizzes (4 10-min. Quizzes).
- Class computer tests (2 1.5-hr. Tests).
- Unseen computer Mid-Term Exam (1.5-hr. Exam).
- Unseen computer Final-Exam (3-hr. Exam).

Assessment Pattern

Class participation	10%
Assignments and Quizzes	10%
Lab work and Projects	20%
Unseen Midterm Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	1.5	hrs / week
Computer Laboratory	3	hrs / week
Total class contact hours	63	hrs/semester
Total self study hours	45	hrs/semester
Total study hours	108	hrs/semester

Module Leader

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: ENG 156**
Title	**: Academic English Writing**
Level	**: 1**
Credit Hours	**: 3**
Prerequisites	**: None**

AIMS

This module is designed to help freshmen students in effectively writing academic essays and avoiding common errors, teach students how to read comprehension passages, to learn style and organization patterns to do summary writing and understand vocabulary in context and to introduce specialized vocabulary items pertaining to Engineering Sciences.

SYLLABUS

Topics
Writing: the Essay • Introduction of writing correction code • From Grammar to Writing: The Sentence
Reading: "Unit I" • Writing: Describing a Person • From Grammar to Writing: Subject/Verb agreement
Reading: "Unit II" • Writing: Describing a Place • From Grammar to Writing: Editing exercises
Reading: "Unit III" • Writing: Describing an Event • From Grammar to Writing: Parallelism
Reading: "Unit IV" • Writing: Describing a Process • From Grammar to Writing: Editing exercises
Reading: "Unit V" • Writing: Distinguishing facts from opinions • Specialized Vocabulary
Wring: Directed Free Writing/Editing • From: Grammar to Writing: Parallelism of Gerunds and Infinitives • Specialized Vocabulary
Reading "Unit VI" • Writing: Process Writing • From Grammar to Writing: Sentences and Fragments
Reading: "Unit VII" • Writing: Process Writing • From Grammar to Writing: Editing exercises
Reading: "Unit VIII" • Writing: Expository Writing (Comparison and Contrast) • From Grammar to Writing: Punctuation of Adjective Clauses
Reading: "Unit VIX" • Writing: Expository Writing (Definition and Partition) • From Grammar to Writing: Editing exercises
Reading: "Unit X" • Writing: Expository Writing (Classification) • From Grammar to Writing: Avoiding run-on sentences and comma splices
Reading: "Unit XI" • Writing: Practice – Summary Writing • From Grammar to Writing: Editing exercises

Learning Outcomes

A- Knowledge

After completing this module, students will be able to:

1. Demonstrate in the writing, a clear knowledge of the subject, awareness of the reader, appropriate organization, correct use of punctuation, style and coherence.
2. Analyze and criticize the style and organization of different texts.
3. Provide an understanding of specialized vocabulary in context.

B- Skills

After completing this module, students will be able to:

1. Write effective five-paragraph essays.
2. Apply multi-draft writing which involves revision and editing of their essays.
3. Correct earlier drafts using the feedback and the correction codes provided by the instructor.
4. Master writing effective summaries focusing on main ideas.
5. Master specialized vocabulary pertaining to pharmaceutical sciences.

Teaching/Learning Strategies

- Lectures.
- Tutorials.

Learning Materials

Useful Websites

- http://www. www.io.com
- http://www.better.english.com
- http:// www.eslcafe.com

Reference Text

- Alice Oshima, Ann Hogue, Writing Academic English, 1998, Addison Wesley.

Supplementary Readings

- Swales, JohnFeak, Christine B.Swales, John M, English in Today's Research World: A Writing Guide, 2001, Michigan Press.

Assessment Scheme

- Weekly assignment (24 assignments).
- Individual term project.
- Unseen Mid-Term Exam.
- Unseen Final-Exam.

Assessment Pattern

Class participation	10%
Assignments	10%
Quizzes	10%
Term Papers	10%
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3	hrs / week
Tutorials	1.5	hrs / week
Total class contact hours	63	hrs / semester
Total self study hours	45	hrs / semester
Total study hours	108	hrs / semester

Module Leader

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: MAT161**
Title	**: Calculus II**
Level	**: 1**
Credit Hours	**: 3**
Prerequisites	**: MAT151**

AIMS

This module is designed to enable freshman students to analyze integration, applications of definite integrals, double and triple integrals, polar, cylindrical and spherical coordinates, infinite series, Taylor and Maclurin series.

SYLLABUS

Topics
Antiderivatives- The Indefinite Integrals – Integration by Substitution.
Techniques of integration- Basic Integration formulas- Integration by parts- Reduction formulas- Integration using partial fractions- Trigonometric Integrals- Trigonometric Substitution.
The Definite Integral – Fundamental Theorem of Calculus – Evaluation Definite Integrals by Substitution.
Applications of Definite Integrals (Area – Volume – Arc Length – Surface of Revolution).
Integration Methods – Integration by Parts – Trigonometric Integrals – Trigonometric Substitutions – Integration Using Partial Fraction.
Double Integrals – Double Integrals in Polar Coordinates – Areas.
Triple Integrals – Triple Integrals in Cylindrical and Spherical Coordinates – Volumes.
Infinite Series – Convergence Tests.

LEARNING OUTCOMES

Knowledge

After completing this module, students will be able to:

1. Recall and enumerate the essential concepts and principles of mathematics.
2. Review the foundations of Calculus Problems and Techniques.
3. Study the various modern techniques used in mathematical problems.

Skills

After completing this module, students will be able to:

1. Solve engineering problems by suitable mathematical techniques.
2. Recognize the various mathematical terminology.
3. Perform integration in differnet coordinate systems.

Teaching/Learning Strategies

- Lectures.
- Tutorials.

Learning Materials

Software Requirements:

- MAPLE, DRIVE, MATHEMATICA, MATLAB.

Useful Websites:

- http://www.omega.albany.edu
- http://www.math.nmc.edu

- http://www.math.montana.edu
- http://www.ugrad.math.ubc.ca

Reference Text:

- Thomas, Calculus- Early Transcendentals, 11th ed., Pearson- Addition wesly, 2006, Ch. 4-6,8,16

Supplementary Readings:

- Kreysing, E., Advanced Engineering Mathematics, John Wiley Publishing Co., New eddition.

Assessment Scheme

- Assignments.
- Class written Tests/Quizzes.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

• Class Participation/Assignments	20%
• Tests and Quizzes	20%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours Per Week

• Lectures	3	hrs / week
• Tutorials	1.5	hrs / week
• Total class contact hours	63	hrs/semester
• Total self study hours	45	hrs/semester
• Total study hours	108	hrs/semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: BSC 162**
Title	**: Engineering Physics II**
Level	**: 1**
Credit Hours	**: 3**
Prerequisites	**: BSC 152**

AIMS

This module is designed to enable students to demonstrate the basic concepts and principles of electricity and magnetism, and their applications in the real world. It deals with electric circuits and solving circuits using the network reduction method and Kirchhoff's rules. The module also encourages students to perform practical projects in various aspects of physics.

SYLLABUS

Topics
Electric charges and Coulomb's law
Electric fields and electric lines
Gauss's law and its applications
Electric potential energy and electric potentials
Capacitors and dielectrics
Electric currents and DC circuits
Magnetic fields
Magnetic force on a charge
Magnetic field of an electric current
Magnetic induction
Electromagnetic waves - Maxwell's equations
Sound waves
Wave optics

Laboratory Experiments:

- Determination of the Dielectric constant.
- Determination of the time constant of a Capacitor.
- Determination of an unknown resistance (Ohm's law).
- Determination of the total resistance of series and parallel DC circuits
- Determination of the fill factor of a photovoltaic cell.
- Determination of the horizontal component of the earth's magnetic field.
- Determination of the velocity of sound.
- The Hall Effect.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Understand the basic concepts and principles underlying electrical and magnetic phenomena.
2. Match the relationships between theory and experimentation.
3. Express basic theories of electricity and magnetism and prove them experimentally in the laboratory.
4. Classify scientific factors affecting the results.
5. Enable students to tackle practical problems scientifically.

B- Skills

After completing this module, students will be able to:

1. Develop laboratory experimentation skills to real-world problems.
2. Communicate effectively, particularly to the scientific community using the language of physics and mathematics.
3. Work effectively as a member of a team.
4. Handle equipment in a safe and effective manner with regard to their own safety and the safety of others.
5. Carry-out all duties in an ethical and professional manner.

Teaching/Learning Strategies

- Lectures
- Tutorials
- Laboratories
- Projects

Learning Materials

Hardware Requirements:

- Electrical and Magnetic Experiments are performed in Physics II Lab.

Reference Texts:

- Hafez A. Radi, *General Physics for Engineers and Scientists*, MSA Univ., Vol. II, 2008.
- Nabila Nowaira, *Laboratory Manual of Physics II*, MSA Univ., 2008.

Supplementary Readings:

- Raymond A. Serway, John W. Jewett, "*Physics for Scientists and Engineers with Modern Physics*", Brooks Cole; 7th edition, 2007.
- David Halliday, Robert Resnick, Jearl Walker, "*Fundamentals of Physics*", Wiley, 7th edition, 2004.

Assessment Scheme

- Weekly Assignments.
- Tests and Quizzes.
- Projects and Reports.
- Laboratory Final Test.
- Unseen Written Mid-Term Exam.
- Unseen Written Final-Exam

Assessment Pattern

Assignments	10 %
Tests and Quizzes	10 %
Laboratory Test	10 %
Term Projects and Reports	10 %
Unseen Mid-Term Exam	20 %
Unseen Final Exam	40 %
Total	**100 %**

Learning Unit Contact Hours

• Lectures	3 hrs / week
• Tutorials	1.5 hrs / week
• Laboratories	1.5 hrs / week
• Total class contact hours	84 hrs / semester
• Total self study hours	60 hrs / semester
• Total study hours	144 hrs / semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: GSE 163**
Title	**: Engineering Mechanics II**
Level	**: 1**
Credit Hours	**: 3**
Prerequisites	**: GSE 153**

AIMS

This module is designed to provide students with a perspective on various issues of engineering mechanics and dynamics, kinematics of particles. rectilinear and curvilinear motion, kinetics of particles, linear and angular motion, energy and momentum of particles, kinematics of rigid bodies in translation and curvilinear motion. Forces and accelerations of plane motion for rigid bodies – energy and momentum of rigid bodies. Mechanical vibration.

SYLLABUS

Topics
Kinematics: Rectilinear Motion of Particle.
Erratic Motion.
Curvilinear Motion of Particle: Cartesian Coordinates.
Motion of Projectiles.
Curvilinear Motion of Particle: Normal and Tangential Coordinates.
Curvilinear Motion of Particle Polar Coordinates.
Kinetics of Particle: Force and Acceleration.
Mechanical Vibration.
Kinetics of Particles: Work and Energy.
Circular Motion.
Impulse and Momentum.
Real Case Studies.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Apply the concepts of engineering mechanics and dynamics.
2. Develop the motion design of mechanisms.
3. Analyse the theory of dynamics problems and its applications.

B- Skills

After completing this module, students will be able to:

1. Apply skills in solving engineering mechanics and dynamic problems.
2. Learn how to apply the theory of Dynamics to motion design of mechanisms.
3. Learn how to derive the equation of motion of a dynamic system.
4. Analyse dynamic problems of engineering mechanics through performing a project.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Individual/Group Projects.
- Class Presentation.

Learning Materials

Useful Websites:

- http://www.xav.com

- http://www.eidosinteractive.com
- http://www.mdyn.com
- http://www.ams.org

Reference Text:

- Hibbeler, R. C., Engineering Mechanics (Statics and Dynamics), Macmillan Co., 11th ed., 2006.

Supplementary Readings:

- Irving Shames, Engineering Mechanics (Statics and Dynamics), Prentice Hall Inc., 4th ed., 1996.
- Beer, F.P and E. Jhonston, Jr. and E.R. Eisenberg, Vector Mechanics for Engineers, McGraw-Hill, 1996.
- Meriam, J. L. and Kraige, L. G., Engineering Mechanics (Statics and Dynamics), John Wiley Inc., 5th ed., 2002.

Assessment Scheme

- Weekly written Assignments (12 Home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr Tests).
- Individual/Group Projects.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

• Class participation	10%
• Assignments	10%
• Tests and Quizzes	15%
• Term Paper	5 %
• Unseen Mid-term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3 hrs / week
• Tutorials	1.5 hrs / week
• Total class contact hours	63 hrs/semester
• Total self study hours	45 hrs/semester
• Total study hours	108 hrs/semester

Module Leader

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: BSC 164**
Title	**: Chemistry**
Level	**: 1**
Credit Hours	**: 3**
Prerequisites	**: None**

AIMS

This module is designed to provide students with an understanding of chemical fundamentals of air pollution, water pollution, water treatment, and electrochemistry. Chemical Processes in several industries such as ceramics industry, petroleum industry, cement industry, polymers industry and glass industry.

SYLLABUS

Topics
Air Pollution
Water Pollution
Water Treatment
Electrochemistry
Chemical Processes in Petroleum Industry
Chemical Processes in Cement Industry
Chemical Processes in Polymers Industry
Chemical Processes in Glass Industry
Chemical Processes in Ceramics Industry

LEARNING OUTCOMES

Knowledge

After completing this module, students will be able to:

1. Analyse the chemical processes used in various industries.
2. Understand the basic principles of Petroleum .cement, polymers. glass and ceramics industries.

Skills

After completing the module, students will be able to:

1. Apply skills in various techniques for solving air and water pollution.
2. Demonstrate the electrochemistry phenomena and indicate the characteristics of corrosion.

Teaching/Learning Strategies

- Lectures
- Tutorials
- Laboratories
- Projects

Learning Materials

Useful Websites:

- http://www.wiley-vch.de
- http://www.ceic.unsw.edu.au
- http://www.icsnz.com.nz

Reference Texts:

- MSA Staff, Industrial Chemistry , 2009.

Supplementary Readings:

- Steedman, W., Sandden, R.B. and Anderson, I. M., Chemistry for the Engineering and Applied Sciences, Pregamon International Library, Pergamon Press, 1980.
- Brady, J. E. and Holum, J. R., Chemistry, The study of Matter and its Changes, John Wiley Inc., 1996.
- Martin Grayson, Encyclopedia of Glass, Ceramics, and Cement, John Wiley & Sons, Inc., 1985.
- Dara, S. S., Atext Book of Engineering Chemistry, S. Chand & Co. Ltd., 10th ed., 2003.

Assessment Scheme

- Weekly Assignments.
- Tests and Quizzes.
- Projects and Reports.
- Laboratory Final Test.
- Unseen Written Mid-Term Exam.
- Unseen Written Final-Exam.

Assessment Pattern

Assignments	10 %
Tests and Quizzes	10 %
Laboratory Test	10 %
Term Projects and Reports	10 %
Unseen Mid-Term Exam	20 %
Unseen Final Exam	40 %
Total	**100 %**

Learning Unit Contact Hours

• Lectures	3	hrs / week
• Tutorials/lab	3	hrs / week
• Total class contact hours	84	hrs / semester
• Total self study hours	60	hrs / semester
• Total study hours	144	hrs / semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: GSE 165**
Title	**: Workshop Technology**
Level	**: 1**
Credit Hours	**: 3**
Prerequisites	**: None**

AIMS

This module is designed to provide freshmen students with an understanding of the traditional machine tools used in forming and machining processes: Turning, milling, grinding, drilling, boring, shaping, planning, shearing, bending, and rolling machines, as well as welding and casting equipment, wood working, and polymeric machines. An extensive coverage of health and safety into workshop practice, focussing on hazards control, safety precautions, and industrial hygiene, to develop a responsible awareness of hazards.

SYLLABUS

Topics
Health and Safety at work, Workshop Accidents. Electrical Hazards. Fire Protections
Hand Processes. Marking-out Equipment.
Workshop Measuring Equipment.
Turning machines and their elements, and cutting tools.
Milling machines and their elements, and cutters.
Grinding machines and their elements, and grinding wheels.
Drilling and Boring machines and their elements, and cutting tools.
Shaping and Planning machines and their elements, and cutting tools.
Shearing, Bending and Rolling machines.
Welding Equipment and related tools, and Electrical Connections.
Foundary Furnaces and Casting Equipment.
Wood working machines and related tools.
Pressing, Blowing, and Extrusion of polymeric machines.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Analyse various machine tools used in machining and forming processes.
2. Acquire knowledge of the various polymeric machines.
3. Become familiar with industrial health hazards and hygiene, as well as the means of safety precautions.

B- Skills

After completing this module, students will be able to:

1. Apply skills in running the various machines in the workshop.
2. Develop awareness of hazards, safety, and industrial hygiene at work environment is created.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Workshops.
- Factory Visits.

Learning Materials

Hardware Requirements:

- Various machine tools in the University workshops.
- Manufacutring Processes Video Tapes.

Useful Websites

- http://www.xtend.co.nz
- http:/www.infopeople.org

Reference Text:

- Bruce J. Black, Workshop Processes, Practices, and Materials, published by Elsevier Ltd., 3rd ed., 2004, reprinted 2008.

Supplementary Readings:

- El Wakil, S. D., Processes and Design for Manufacturing, PWS Publishing Company, 2nd ed., 2002.
- Kalpakjian, S., Manufacturing Engineering and Technology, Addison Wesley Publishing Co., 1992.
- Walker, J. R., Machining Fundamentals, The Goodheart Willcos Co., 1993.
- Krar, S.F., Technology of Machine Tools, McGraw Hill Co., 1996.
- Groover, M. P., Fundamentals of Modern Manufacturing, Prentice Hall Co., 1996.
- DeGarmo, E. Paul, I.T. Black and R.A. Kosher, Materials and Processes in Manufacturing, Prentice Hall Inc., 8th ed., 1997.

Assessment Scheme

- Weekly written Assignments (8 Team Reports).
- Short written Quizzes (4 10-min. Quizzes).
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Oral Practical Exam (at the end of the semester)
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

Class & Workshop Participation	10%
Assignments (Team Reports)	10%
Tests and Quizzes	15%
Individual Oral Practical Test	5%
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3 hrs / week
Workshops	1.5 hrs / week
Total class contact hours	63 hrs/semester
Total self study hours	45 hrs/semester
Total study hours	108 hrs/semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: ENG 166**
Title	**: Technical English Writing**
Level	**: 1**
Credit Hours	**: 3**
Prerequisites	**: ENG 156**

AIMS

This module is designed to improve students formal reports and business proposals writing, note taking and oral presentation skills. Help students to acquire study skills that would facilitate any research process. Teach students types of business writing, such as reports, business letters, memos, and curriculum vitae. There is also a focus on reading and listening skills and learning vocabulary in context.

SYLLABUS

Topics
Using Grammatical Information in Paraphrasing : Reading: Unit 1 – Chapter 2
Paraphrasing : Reading Unit 1 – Chapter 2
Organization Analysis : Reading: Unit 2 – Chapter
Organization Analysis + Outline : Reading: Unit 2 – Chapter 3
Questionnaire : Reading: Unit 2 – Chapter 4
Memo Writing : Reading: Unit 2 – Chapter 4
Writing a Curriculum Vitae : Reading: Unit 3 – Chapter 5
News Releases : Reading: Unit 3 – Chapter 5
Writing Business Letters : Reading: Unit 3 – Chapter 6
Writing Business Reports : Reading: Unit 3 – Chapter 6
Writing Technical Reports and Giving Presentations : Reading: Unit 3 – Chapter 6

Learning Outcomes

A- Knowledge

After completing this module, students will be able to:

4. Analyze the texts they need to incorporate in the reports, identify graphical and visual information

B- Skills

After completing this module, students will be able to:

6. Paraphrase, summarize and analyse the texts they need to incorporate in the reports.
7. Write clear and effective curriculum vitae, business letters and memos.
8. Outline and administer questionnaires.
9. Analyze the quantitative and qualitative data obtained from the questionnaires.
10. Integrate graphical, visual and statistical information into the reports.
11. Produce a report with an outline and a simplified “Reference” page.
12. Present the reports using slides or computer software.

Teaching/Learning Strategies

- Lectures.
- Tutorials.

Learning Materials

ENG 166

Useful Websites

- http://www. www.io.com
- http://www.better.english.com
- http:// www.eslcafe.com

Reference Text

- kitty Locker, Donna Kienzler, "Business and Administrative Communication", 8th ed., 2008.

Assessment Scheme

- Weekly assignment (24 assignments).
- Individual term project.
- Unseen Mid-Term Exam.
- Unseen Final-Exam.

Assessment Pattern

Class participation	5%
Assignments	10%
Quizzes	15%
Term Paper	10%
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	1.5	hrs / week
Tutorials / Lab	3	hrs / week
Total class contact hours	63	hrs / semester
Total self study hours	45	hrs / semester
Total study hours	108	hrs / semester

Module Leader

Staff

200's LEVEL MODULES

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: MAT 251**
Title	**: Linear Algebra**
Level	**: 2**
Credit Hours	**: 3**
Prerequisites	**: MAT 161**

AIMS

This module is designed to enable students to analyse matrices and systems of linear equations, determinants, complex numbers and variables, eigenvalues and eigenvectors, engineering applications.

SYLLABUS

Topics
Matrices – Matrices having Special Forms – Matrix Operations.
Determinants – Properties of Determinants.
Inverse of a Matrix – Inverse of a Matrix using Adjoint Matrix – Elementary row operations- Elementary matrices- Row Equivalence- Inverse of a Matrix by Elementary Row Operations.
System of Linear Equations – Echelon Forms – Gauss Elimination – Homogeneous System of linear Equations – Pitfalls of Elimination Methods – Techniques of Improving Solutions – Solving Linear system of equations using Gauss-Jordan – LU- factorization -Gauss-Seidel Method.
Vector spaces – Subspaces – Linear Independence – Basis and Dimension- Row Space, Column Space and Null Space of a matrix- Rank of a matrix.
Inner Product Spaces – Inner Products – Angle and Orthogonality – Orthogonal Bases – Gram-Schmidt Process – Orthogonal Matrices.
Eigen Values and Eigen Vectors – Diagonalization - Orthogonal Diagonalization.

LEARNING OUTCOMES

A. Knowledge

After completing this module, students will be able to:

1. Acquire the basic concepts and principles of mathematics.
2. Demonstrate the foundations of Linear Algebra Problems and Techniques.
3. Explore the various modern mathematical techniques used in Linear Algebra problems.

B. Skills

After completing this module, students will be able to:

1. Solve engineering problems by suitable mathematical techniques.
2. Recognize the various mathematical terminology.
3. Develop mathematical skills through tackling and solving engineering problems.

Teaching/Learning Strategies

- Lectures.
- Tutorials.

Learning Materials

Software Requirements:

- MAPLE, DRIVE, MATHEMATICA, MATLAB

Useful Websites:

- http://www.numbertheory.org
- http://www.math.odu.edu

Reference Text:

- Kolman Bernard, and David R. Hill , Elementary Linear Algebra with applications, Pearson Education Inc, 9th ed., 2008

Supplementary Readings:

- Larson, Edwards and Falvo , Elementary Linear Algebra, 6th ed.- Houghton Mifflin Co.- 2004, Ch. 1-5,7
- Anton, H., and Rorres, C; Elementary Linear Alegbra: Application Version John wiley Inc., New Eddition.

Assessment Scheme

- Assignments.
- Class written Tests/Quizzes.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

• Class Participation/Assignments	20%
• Tests and Quizzes	20%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours Per Week

• Lectures	3 hrs / week
• Tutorials	1.5 hrs / week
• Total class contact hours	63 hrs/semester
• Total self study hours	45 hrs/semester
• Total study hours	108 hrs/semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: GSE 252**
Title	**: Engineering Materials I**
Level	**: 2**
Credit Hours	**: 3**
Prerequisites	**: BSC 152**

AIMS

This module deals with metallic materials. It is designed to enable students to understand the development of material structure. Identification of different materials: ferrous and non-ferrous. Characterization of materials using mechanical testing. Basic types of failure of engineering materials during service and their prevention. Strengthening mechanisms.

SYLLABUS

Topics
Crystal Structure of Metals.
Classification of Engineering Materials.
Engineering Alloys and their properties, Solidification and Grain Formation.
Binary phase diagrams, Iron Carbon Diagram.
Strengthening mechanisms and Heat treatment.
Mechanical Behavior of Materials: Elastic, Plastic and Visco-Elastic Deformation, Modes of fracture of materials.
Mechanical Testing: Tenstion and Compression, Bending, Shear, Hardness, Impact, Creep and Fatigue.
Non Destructive Testing.
Retation of Structure and Properties (Micro / Macro)
Laboratory Experiments: Tension and Compression, Bending, Hardness, Impact Tests.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Outline various materials used in manufacturing.
2. Choose various mechanical, physical, and chemical characteristics of various materials.
3. Acquire knowledge of the basic types of failures during service and their prevention.

B- Skills

After completing this module, students will be able to:

1. Manipulate various tests to evaluate the properties of materials.
2. Carry out testing experiments to define different modes of failure.

Teaching/Learning Strategies

- Lectures.
- Tutorials.

- Laboratory.
- Technical Reports.

Learning Materials

Useful Websites

- http://www.yahoo.com/science/EngineeringMaterial
- http://www.fpl.fs.fed.us
- http://www.matweb.com

Reference Text:

- Kalpakjian, S.&S.R.Schmid, Manuafcturing Engineering and Technology, Prentice Hall,6th ed., 2009.

Supplementary Readings:

- Van Vlack, Materials for Engineering: Concepts and Applications, Addison Wesley Co., 1982.
- Smith, W., Materials and Engineering, McGraw Hill Co., 1990.
- Popov, E.P., Mechanics of Materials, Prentice Hall., London,1978.
- Khurmi, R.S., Strength of Materials, S.Ch and Company, New Delhi, 1998.
- Farag, M., Selection of Materials and Manufacturing Processes for Engineering Design, Prentice Hall Inc., 1989.
- Callister, D. J., Jr., Materials Science and Engineering, John-Wiley Inc.,1997.

Assessment Scheme

- Weekly written Assignments (12 home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Laboratory Test.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	10%
Assignments	10%
Tests and Quizzes	10%
Term Paper	5%
Final Laboratory Test	5%
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3	hrs / week
Tutorials & Laboratory	1.5	hrs / week
Total class contact hours	63	hrs/semester
Total self study hours	45	hrs/semester
Total study hours	108	hrs/semester

Module Leader:

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: MFG 253**
Title	**: Forming Manufacturing Processes**
Level	**: 2**
Credit Hours	**: 3**
Prerequisites	**: GSE 165**

AIMS

This module is designed to provide students with a thorough understanding of the processing by constitution and structure of casting , forming , and joining alloys. Properties and applications of Materials used in Manufacturing. Charactaristics of casting, charactaristics of forming, charactaristics of joining, charactaristics of ceramic and Polymer Processing.

SYLLABUS

Topics
Metal Casting Processes: Patterns, Moulding Materials, Cores, Elements of Gating Systems, Gating System Design, Risering Design, Melting Practice, Casting Cleaning, Casting Defects.
Metal Forming Processes: Rolling, Forging, Extrusion, Bending, Shearing, Deep Drawing, Wire Drawing.
Metal Joining Processes: Gas Welding, Gas Cutting, Electric Arc Welding, Resistance Welding, Soldering, Brazing.
Industrial Processing operations in Workshop
Ceramic Processes: Processing of Ceramics.
Polymers Processes: Fundamentals of Polymer Science and technology, Processing of Polymers.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

3. Outline various forming processes, especially those related to casting and joining processes.
4. Define various casting and joining processes.
5. Identify the ceramic and polymer processes.

B- Skills

After completing this module, students will be able to:

3. Conduct the processes that produce good quality, with least time, and least cost.
4. Employ modern trend in the various casting and joining processes.
5. Transfer Skills in the processing of ceramic and polymers.

Teaching/Learning Strategies

- Lectures.
- Workshops.
- Video Tapes.
- Tutorials
- Field trips.

Learning Materials

Hardware Requirements:

- Various Equipment in the MSA University Workshops.
- Various Welding and Casting Equipment at "Abou Zaabal Company for Engineering Industries" in Cairo.

Software Requirements:

- Manufacturing Processes Video Tapes.

Useful Websites:

- http://www.netcomposites.com
- http://www.bmpcoe.org
- http://www.impincorporated.com
- http://www.simulation.ie

Reference Text:

- Groover, M. P., Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, John Wiley & Sons Inc., 3rd ed., 2007.

Supplementary Readings:

- Kalpakjian S., Manufacturing Processes for Engineering Materials, Addison Wesley Longman Inc., 3rd ed., 1984.
- DeGarmo E.P., J.T. Black, and R.A. Kohser, Materials and Processes in Manufacturing, Prentice Hall Inc., 8th ed., 1997.
- Metals Handbook, V.15 –Casting, ASM Int., USA, 1998.
- Rao, P.N., Manufacturing Technology: Foundry,Forming and welding, McGraw Hill, 2nd ed., 1989.

Assessment Scheme

- Weekly written Assignments (12 Home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Practical Tests.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	10%
Assignments	10%
Tests and Quizzes	15%
Term Paper	5 %
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3	hrs / week
Workshops	1.5	hrs / week
Total class contact hours	63	hrs/semester
Total self study hours	45	hrs/semester
Total study hours	108	hrs/semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: GSE 254**
Title	**: Fundamentals of Thermodynamics & Heat Transfer**
Level	**: 2**
Credit Hours	**: 3**
Prerequisites	**: BSC 152**

AIMS

This module is designed to provide students with an understanding of the concepts of thermodynamics and its applications to real thermal processes.The first law of thermodynamics. Working fluids. Reversible and irreversible processes. Second law of thermodynamics. Heat engines and refrigerators, carnot cycle. Modes of heat transfer, steady heat conduction, Newton's law of cooling. Composite wall and electrical analog, heat flow through cylinders and spheres, Forced and natural convection. Heat exchangers.

SYLLABUS

Topics
Basic concepts of Thermodynamics.
Properties of Pure Substances.
First Law of Thermodynamics; Applications on Open –Systems and Closed - Systems.
Second Law of Thermodynamics.
Heat Engines, Refrigerators and carnot cycle.
Fourier Law of Heat Conduction.
Newton's Law of Cooling.
Heat Flow Through Cylinders and Spheres.
Forced and Natural Convection.
Heat Exchanger.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Evaluate the concepts of thermodynamics and its applications to real thermal processes.
2. Evaluate the basic concept of heat transfer and its application to heat exchangers.
3. Identify the basic theory of first and second laws of thermodynamics.
4. Develop knowledge about some engineering applications of thermodynamics such as Refrigeration, Electrical Power plants, and Combustion Engines.

B- Skills

After completing this module, students will be able to:

1. Analyze the heat cycles and its applications
2. Employ skills in designing thermal systems .
3. Manipulate the various modes of heat transfer.

Teaching/Learning Strategies

- Lectures.
- Laboratories.
- Tutorials.
- Class Presentation.

Learning Materials

Useful Websites:

- http://www.amazon.com
- http://www.wileyeurope.com
- http://www.josseybass.com

Reference Text:

- Cengel,Y.A. Cambal, J.M., Turner, R. Fundamentals of Thermal-Fluid Sciences, McGraw Hill , 4th ed. , 2012.

Supplementary Readings:

- Sonntag, R. E.; Borgnakke, C. and Van Wylen, G. J., Fundamentals of Thermodynamics, John Wiley Inc., 1998.
- Cengel, Y. A. and M.A., Thermodynamics: An Engineering Approach, WCB/McGraw Hill, 1998.
- Holman, J. P., Heat Transfer, McGraw Hill Co., 1990.
- ASTOP, T.D. and McConkey, Applied Thermodynamics for Engineering Technologists, John Wiley Inc., 4th ed., 1986.

Assessment Scheme

- Weekly written Assignments (8 Home Assignments).
- Short written Quizzes (8 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Individual/Group Projects.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	10%
Assignments & Reports	10%
Tests and Quizzes	15%
Term Paper	5 %
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Leaning Unit Contact Hours

Lectures	3	hrs / week
Tutorials	1.5	hrs / week
Total class contact hours	63	hrs/semester
Total self study hours	45	hrs/semester
Total study hours	108	hrs/semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: COM 255**
Title	**: Engineering Computer Programming I**
Level	**: 2**
Credit Hours	**: 3**
Prerequisites	**: COM 155**

AIMS

This module is designed to provide students with an in depth coverage of the basics of object oriented programming in C++, which is needed for application development. It is planned to make the students well acquainted with the syntax and semantics of the C++ programming language. This is done through teaching the Input/Output instructions, the different data type used in the language, the different arithmetic operations, control structures, arrays, and functions.

SYLLABUS

Topics
Basic Program Construction (identification, statement, function, comment, and process).
C++ Simple Data Types.
Constants and Variables Declaration.
Input and Output Statements (C_{in} and C_{out}).
Output Manipulators.
Assignment Statement Mathematical Expressions.
Automatic Type Conversions and Casting.
Decision Statements (if and which).
Logical Expressions.
Repetition Statements (for, while and do).
One and Multidimensional Arrays.
String Manipulations.
Built-In Funtions and User-Defined Functions.
Passing Value and Reference Arguments.
Local and Global Identifiers.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

4. Develop and think in computing wise a program for solving problems.
5. Outline a given program and identify any logical error in the program.
6. Divide the problem into sub-problems.

B- Skills

After completing this module, students will be able to:

4. Employ the VC++ tool professionally to convert logic and design into a computer program.
5. Manipulate skills using VC++ tool.

Teaching/Learning Strategies

- Lectures.
- Computer Laboratories.
- Tutorials.
- Class Presentation.

Learning Materials

Software Requirements:

- Borland C++, VC++ Tools.

Useful Websites:

- http://www.cplusplus.com/doc/tutorial/

Reference Text:

- Timothy BD, Orazio "Programming in C++, Lessons and Applications", McGraw Hill, 1st ed., 2004.

Assessment Scheme

- Weekly Computer Assignments (8 individual laboratory assignments).
- Short computer Quizzes (2 1.5-hr. Quizzes).
- Class computer Tests (2 1.5-hr. Tests).
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

• Class Participation	5 %
• Assignments	10 %
• Tests and Quizzes	15 %
• Term Project	10 %
• Unseen Mid-term Exam	20 %
• Unseen Final Exam	40 %
Total	**100%**

Learning Unit Contact Hours

• Lectures	3	hrs / week
• Laboratories	1.5	hrs / week
• Total class contact hours	63	hrs/semester
• Total self study hours	45	hrs/semester
• Total study hours	108	hrs/semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: ENG 256**
Title	**: Research English Writing**
Level	**: 2**
Credit Hours	**: 3**
Prerequisites	**: ENG 166**

AIMS

This module is designed to prepare students for writing research papers and project reports and books. Emphasize research skills necessary for writing research papers. Provide a survey of different articles on specialized topics and Train students on rhetorical awareness beyond traditional composition. Intensive writing practice with a thorough guidance on using references and citing sources.

SYLLABUS

Topics
Introduction and instructions explaining objectives, assignments and grading system: Library Skills and Classification Systems, Reading: Unit 1
Thesis Statement :Reading: Unit 2
Outlining (Submit research paper outline) : Reading: Unit 3
Summary Writing : Reading: Unit 4
Organization Analysis : Application of Summary Writing (Source I) , APA in-text citations
Organization Analysis : Application of Summary Writing (Source II) , Reading: Unit 5
Fallacies : Reading: Unit 6
Fallacies (Cont.) : Reading: Unit 7
APA Style Sheet : Application of Summary Writing (Source III)
APA Style Sheet (Cont.) : Application of Summary Writing (Source IV) , Reading: Unit 8
Application of Summary Writing (Source V) : Submitting Research Paper and Giving Oral Presentations

Learning Outcomes

A- Knowledge

After completing this module, students will be able to:

1. Analyze different texts to identify thesis statements and developmental functions of those texts.
2. Identify fallacies in the texts they analyze.
3. Identify different library classification systems and card catalogs.

B- Skills

After completing this module, students will be able to:

1. Write outlines and summaries.
2. Employ logical arguments.
3. Outline key elements of problems and choose appropriate methods for the resolution in a considered manner.
4. Write a research paper using correct in-text citations according to the APA style.
5. Prepare in the research paper a complete "Reference" page, prepared according to the APA style.
6. Present the papers using slides or computer software.

Teaching/Learning Strategies

- Lectures.
- Tutorials.

Learning Materials

Useful Websites

- http://www. www.io.com
- http://www.better.english.com
- http:// www.eslcafe.com

Reference Text

- James-D.Lester,"Writing Research papers: A complete guide", Longman, 12th ed., 2007.

Assessment Scheme

- Weekly assignment (24 assignments).
- Individual term project.
- Unseen Mid-Term Exam.
- Unseen Final-Exam.

Assessment Pattern

Class participation	10%
Assignments	10%
Quizzes	10%
Term project and reports	10%
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3	hrs / week
Tutorials	1.5	hrs / week
Total class contact hours	63	hrs / semester
Total self study hours	45	hrs / semester
Total study hours	108	hrs / semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: MAT 261**
Title	**: Differential Equations**
Level	**: 2**
Credit Hours	**: 3**
Prerequisites	**: MAT 161**

AIMS

This module is designed to enable students to analyse differential equations, solving first and higher order of differential equations, modeling with first and higher order differential equations. Learn special functions: Gamma, Beta and Bessel Functions.

SYLLABUS

Topics
Classification of Differential Equations – Initial and Boundary Value Problems.
First Order-First Degree Ordinary Differential Equations - Separable Differential Equations – Homogeneous Differential Equations – Exact Differential Equations – Integrating Factors– Linear Differential Equations – Bernoulli Differential Equations.
Modeling with First Order Differential Equations.
Higher Order Ordinary Differential Equations.
Homogeneous Linear DifferentialEquations with constant coefficients.
Nonhomogenous Linear Differential Equations - Undetermined Coefficients Method.
Variation of Parameters Method - Reduction of order.
Cauchy – Euler Differential Equations.
Modeling with Second Order Differential Equations.
Numerical Solution Of Ordinary Differential Equations.
Special Functions: Gamma, Beta, and Bessel Functions.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Recognize the various mathematical terminology.
2. Capture the basic concepts and principles of mathematics.
3. Apply Differential Equations Solving Techniques.
4. Employ the various modern mathematical techniques.

B- Skills

After completing this module, students will be able to:

1. Solve engineering problems by suitable mathematical techniques.
2. Develop mathematical skills through tackling and solving engineering problems.

Teaching/Learning Strategies

- Lectures.
- Tutorials.

Learning Materials

Software Requirements:

- MAPLE, DRIVE, MATHEMATICA, MATLAB

Useful Websites:

- www.wikipedia.org
- www.physics.ohio-state.edumath.odu.edu
- www.courses.cs.uiuc.edu
- www.chembio.uoguelph.ca
- www.math.montana.edu

Reference Text:

- Nagle,R.Kent, Edward B.Saff, and Arthur David Snider, Fundamentals of Differential Equations, Pearson Education Inc, 8th ed., 2012

Supplementary Readings:

- Zill, D.G., A First Course in Differential Equations with Modeling Applications, Brooks/ Cole Publishing Co., 8th ed., 2005.
- Jost, J., Partial Differential Equation., Springer Verlag new eddition.
- Blanchard, P., Differential Equations, Brooks Cole, new eddition.

Assessment Scheme

- Assignments.
- Class written Tests/Quizzes.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

• Class Participation/Assignments	20%
• Tests and Quizzes	20%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours Per Week

• Lectures	3 hrs / week
• Tutorials	1.5 hrs / week
• Total class contact hours	63 hrs/semester
• Total self study hours	45 hrs/semester
• Total study hours	108 hrs/semester

Module Leader

Staff

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FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: GSE 262**
Title	**: Engineering Measurements**
Level	**: 2**
Credit Hours	**: 3**
Prerequisites	**: BSC 162**

AIMS

This module is designed to enable students to analyse the characters, behaviours, design, and construction of measuring systems. Treatment of measured data. Physical parameters of different measured variables, taking in consideration the installation and operations of the measuring devices.

SYLLABUS

Topics
Performance Characteristics of Measuring Instruments: Calibration, Fixed and Random Error, Error Estimation, Sensitivity, Linearity, and Dynamic Characteristics.
Pressure Measurements: Mechanical Pressure Transducers, Elastic Pressure Measurement, Electrical Pressure Transducers, Inductive Transducers, Piezo Electric Transducers, and Strain Gauges.
Flow Measurements: Ultrasonic Meters, and Velocity Measurement (pitot tube).
Temperature Measurements: Thermal Expansion Thermometers, Bimetallic Expansion, Resistance Thermometers, Semi Conductor Thermometers, Thermocouples, and Thermal Radiation Thermometers.
Force , Torque and Power Measurements: Weight and Springs, Calibrating Rings, Strain and Deflection Measurements.
Strain and Stress Measurements: Load Cells, and Gauges.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Acquire knowledge of the fundamentals and concepts of the various measurement systems.
2. Distinguish between the modern measuring devices.

B- Skills

After completing this module, students will be able to:

1. Employ the physical principles and mathematical techniques in measurement systems.
2. Manipulate skills in utilizing the various measuring instruments.

Teaching/Learning Strategies

- Lectures.
- Laboratories.
- Tutorials.
- Class Presentation.

Learning Materials

Useful Websites:

- http://www.emcoflow.com
- http://www.wiley.com
- http://www.sem.org

Reference Text:

- Holman, J. P., Experimental Methods for Engineers, McGraw Hill, 8th ed., 2012.

Supplementary Readings:

- Collet, C.V., and Hope, A.D., Engineering Measurements, Longman Scientific & Technical, 2nd ed., 1986.
- Patranabis, D., Principles of Industrial Instrumentation, Tata McGraw-Hill Co., New Delhi, 8th ed., 2002.
- Sawhney, A. K., A Course in Mechanical Measurements and Instrumentation, Dhanpat and Sons, Delhi, 1989.
- Holman, J. P., Experimental Methods for Engineers, McGraw Hill, 1999.
- Doebelin, E. O., Measurement Systems Applications and Design, McGraw Hill, 1990.

Assessment Scheme

- Weekly written Assignments (12 Home assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Laboratory Tests.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	10%
Assignments	10%
Tests and Quizzes	10%
Term Paper	5 %
Final Laboratory Test	5 %
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3	hrs / week
Tutorials & Laboratories	1.5	hrs / week
Total class contact hours	63	hrs/semester
Total self study hours	45	hrs/semester
Total study hours	108	hrs/semester

Module Leader

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: MFG 263**
Title	**: Cutting Manufacturing Processes**
Level	**: 2**
Credit Hours	**: 3**
Prerequisites	**: GSE 165**

AIMS

This module is designed to provide students with a thorough understanding of the fundamentals of chip-type machine processes. Cutting tools for machining and materials removal. Mechanics and Dynamics of Metal Cutting. Turning, boring and related machining processes. Drilling and related hole making processes, milling, broaching, sawing, shaping and planing, and abrasive machine processes. Creating processes Card, Operation Step card and Operation Sketch. Perform various machining operations, selection of tools, calculation of feed and speed, and machining time.

SYLLABUS

Topics
Fundamentals of Chip-Type and Tool Geometry.
Chip Formation and Orthogonal Cutting.
Cutting Tools for Machining: Tool Materials, and Tool Life.
Turning and Boring Processes.
Drilling and Hole Making Processes.
Milling and Broaching Processes.
Sawing and Cutting Processes.
Shaping and Planning Processes.
Grinding and Abrasive Processes.
Machining Times for various Processes.
Operation Card, Operation Step Card, Operation Sketch.
Manufacturing Operations in Workshop

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Acquire knowledge of cutting tool material and tool life.
2. Collect modern trend in the various machining and materials removal processes.

B- Skills

After completing this module, students will be able to:

1. Organize how to produce good quality, with least time, and least cost.
2. Develop machine tools to fabricate a prototype product and to demonstrate process development principles.

Teaching/Learning Strategies

- Lectures.
- Workshops.
- Tutorials.
- Field trips.

Learning Materials

Hardware Requirements:

- Machining equipment in University workshops.
- Machining and materials removing processes at "Abou Zaabal Company for Engineering Industries" in Cairo.

Software Requirements:

- Manufacturing Processes Video Tapes.

Useful Websites

- http://www.netcomposites.com
- http://www.simulation
- http://www.unl.gov
- http://www.bmpcoe.org
- http://www.impincorporated.com

Reference Text:

- Rao, P.N., Manufacturing Technology:Metal Cutting and Machine Tools, McGraw–Hill, 3rd ed., 2009.

Supplementary Readings:

- Kalpakjian S., Manufacturing Processes for Engineering Materials, Addison Wesley Longman Inc., 3rd ed., 1984.
- Lyman, T.,Metals Handbook, Machining, American Society for Metals Park, Ohio, USA, 1976.
- Paul Degarmo, E., Materials and Processes in Manufacturing, McGraw Hill 8th ed., 1997.

Assessment Scheme

- Weekly written Assignments (8 Home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Laboratory Test.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	10%
Assignments	10%
Tests and Quizzes	10%
Term Project	10 %
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3	hrs / week
Workshops	1.5	hrs / week
Total class contact hours	63	hrs/semester
Total self study hours	45	hrs/semester
Total study hours	108	hrs/semester

Module Leader:

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: GSE 264**
Title	**: Fundamentals of Fluid Mechanics**
Level	**: 2**
Credit Hours	**: 3**
Prerequisites	**: BSC 152**

AIMS

This module is designed to provide students with an understanding of the fundamental concepts, basic equations of fluid mechanics; Fluid statics: pressures including different pressure measuring devices, and hydrostatic forces on submerged surfaces. Introducing the fundamental conservation laws of mass, momentum, and energy with engineering applications. Flow in pipes and the differences between laminar and turbulent flow and how to select the pump or fan to match a pipining network. Study of different turbomachinery including pumps, fans and turbines in brief.

SYLLABUS

Topics
Basic Concepts, Pressures and Forces, Fluid Statics .
Continuity and Momentum Equations and their Applications.
Energy Equations with Applications.
Major and Minor Losses in Flowing Systems.
Incompressible Flow in Pipes and Ducts.
Fluid Machinery including Pumps, Fans and Turbines.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Study the basic concepts and the fundamentals of Fluid mechanics (at rest, and in motion) .
2. Acquire knowledge of fluid processes in different sectors of engineering plants.

B- Skills

After completing this module, students will be able to:

1. Identify and evaluate the fluid processes and their application in industry.
2. Examine and compare the design of various fluid processes through real case studies.
3. Analyze and develop the actual fluid systems.

Teaching/Learning Strategies

- Lectures.
- Laboratories.
- Tutorials.
- Class Presentation.

Learning Materials

Useful Websites:

- http://www.wielyeurop.com
- http://www.engineering-shop.com
- http://www.workover.co.ak

Reference Text:

- Cengel,Y.A. Cambal, J.M., Turner, R. Fundamentals of Thermal-Fluid Sciences, McGraw Hill , 4th ed. , 2012.

Supplementary Readings:

- Roberson Crowe, Engineering Fluid Mechanics, Houghton Mifflin Co., 1975.
- John, Jamed E. A., Introduction to Fluid Mechanics, Prentice Hall, 1983.
- Munson, Yound and Okiishi, Fundamrental of Fluid mechanics, John Wiley Inc., 1990.
- McDonald, W., Introduction to Fluid Mechanics, John Wiley Inc., 5th ed., 1998.

Assessment Scheme

- Weekly written Assignments (8 Home assignments).
- Short written Quizzes (4 -10 min. Quizzes).
- Class written Tests (2 -1.5 hr. Tests).
- Final Laboratory Test.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	10%
Assignments	10 %
Tests and Quizzes	15%
Final Laboratory Test	5%
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3	hrs / week
Tutorials & Laboratories	1.5	hrs / week
Total class contact hours	63	hrs/semester
Total self study hours	45	hrs/semester
Total study hours	108	hrs/semester

Module Leader

Staff

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FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: COM 265**
Title	**: Engineering Computer Programming II**
Level	**: 2**
Credit Hours	**: 3**
Prerequisites	**: COM 255**

AIMS

This module is designed to provide students with an in depth coverage of more advanced features of the C++ language, such as two dimensional arrays, structures, pointers and the main concepts of object orientation including designing classes and creating objects from them, operators and function overloading, class containment, inheritance, function overridden, polymorphism, multiple inheritance, abstract classes and default parameters.

SYLLABUS

Topics
Two Dimensional Arrays.
Structures and Arrays of Structures.
Pointers.
Classes Usage and Declaring.
Objects as Function Arguments.
Operator Overloading.
Inheritance.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

4. Develop and analyze a large problem in object-oriented methodoldogies (OOP).
5. Differentiate between static and dynamic allocation, and which one to choose.

B- Skills

After completing this module, students will be able to:

4. Employ VC++ tool professionally in developing a large project.
5. Evaluate how to be a team member or a team-leader in a medim-size/large project.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Computer Laboratories.
- Class Presentation.

Learning Materials

Software Requirements:

- Borland C++, VC++ Tools.

Useful Websites:

- http://www.cplusplus.com/doc/tutorial/

Reference Text:

- Timothy BD, Orazio "Programming in C++, Lessons and Applications", McGraw-Hill, 1st ed., 2004.

Assessment Scheme

- Weekly Computer Assignments (8 individual laboratory assignments).
- Short computer Quizzes (2 1.5-hr. Quizzes, one in OPP before Final).
- Class computer Tests (2 1.5-hr. Tests).
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

• Class & Laboratory Participation	5%
• Assignments	10%
• Tests and Quizzes	10%
• Term Projects and Reports	15%
• Unseen Mid-term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours Per Week

• Lectures	1.5	hrs / week
• Computer Laboratories	3	hrs / week
• Total class contact hours	63	hrs/semester
• Total self study hours	45	hrs/semester
• Total study hours	108	hrs/semester

Module Leader

Staff

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MODULE OUTLINE

Module Code	: **SOC 2661**
Title	: **Principles of Marketing**
Level	: **2**
Credit Hours	**: 3**
Prerequisites	: **ENG 256**

AIMS

This general course aims to provide students with the fundamentals of marketing. It aims to introduce the students to the elements of marketing mix, studying their nature, most popular forms or practices that exist in the market. Students will be introduced to the role of customer and the importance of customer satisfaction. The module introduces the process of market segmentation, targeting, positioning and some patterns of consumer behavior.

SYLLABUS

Topics
Introduction to marketing: Basic marketing definitions and concepts
Development of marketing thinking supported by concept of "Customer" and Customer relationship management
Different types of customer groups
Methods of customer satisfaction including quality issues.
Elements of the marketing mix: including product classification and product life cycle, methods of pricing, identification of different channels of distribution categories and channel member relationships, Promotion as part of integrated marketing communication systems (IMC), The marketing environment, The marketing environment (targeting and positioning), and Introduction to consumer buying behavior

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

6. Understand the concepts and principles of marketing in their different contexts.
7. Identify the elements of the marketing mix and relate them to real life situations.
8. Recognize the importance of the micro and macro- environmental and its influences on the marketing function.

B- Skills

After completing this module, students will be able to:

1- Conduct a simple practical marketing assignment constituting analyzing an existing small, local business and applying theoretical knowledge to its different marketing activities, and providing recommendations on improvement.
2. Relate the different mix elements together and the concepts of consumer buying behavior.
3. Give an oral presentation.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Team Projects.
- Class Presentations.

- Field Visits.
- Guest Speakers.

Learning Materials

Reference Text:

- Kotler, P., & Armstrong, G., (2008). *Principles of Marketing*, New Jersey: Pearson Prentice Hall.

Supplementary Readings:

- Pride, W., & Ferrell, O. (2007). Marketing concepts and strategies, Boston: Houghton Mifflin Company.
- Griffin, J. (2002). Customer loyalty, how to earn it, how to keep it. England: John Wiley & Sons.
- Journal of the Academy of Marketing Sciences

Assessment Scheme

- Written tests are used to assess students understanding of core topics (15%) (to asses A.1, 2 and 3)
- A field work report and presentation (15%) (to asses B1,2,3)
- Attendance, participation with ongoing pop questions (10%) (to asses A.1, 2 and B.3)
- An unseen mid-term exam of 90 minutes (20%) and an unseen final exam of 3 hours (40%) will require students to answer questions (MCQ, essays and short notes) on core concepts and theoretical issues (to asses A.1, 2,3 and B.2)

Formative feedback is provided to the students on their work during the seminars on their project work.

Assessment Pattern

• Class Participation	10 %
• Tests and Quizzes	15 %
• Report and Presentation	15 %
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100 %**

Learning Unit Contact Hours

• Lectures	3	hrs / week
• Tutorials	1.5	hrs / week
• Total class contact hours	63	hrs/semester
• Total self study hours	45	hrs/semester
• Total study hours	108	hrs/semester

Module Leader

Staff

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MODULE OUTLINE

Module Code	: **SOC 2662**
Title	: **Introduction to Micro-Economics**
Level	: **2**
Credit Hours	**: 3**
Prerequisites	: **ENG 256**

AIMS

This module is designed to teach students how individual decisions are influenced by economic forces and to study the economic reasoning and choices from the view point of individuals and firms. It builds up from there to an analysis of the industry and then the whole economy. It considers the pricing of firms, the household's decisions of what to buy and how markets allocate resources.

SYLLABUS

Topics
Scarcity and Choice: The Economic problem.
Supply and Demand: An Initial Look.
Consumer Choice: Individual and Market Demand
Appendix.
Demand and Elasticity.
Production, Input, and Cost: Supply Analysis.
The Firm and Industry under Perfect Competition.
Monopoly.
Between Competition and Monopoly.
Pricing the Factors of Production.

LEARNING OUTCOMES

Knowledge

After completing this module, students will be able to:

5. Explore detailed information and comprehension of the essential facts, concept, and principles related to micro-economics.
6. Gain knowledge and understanding of the foundations of the Egyptian micro-economic system.

Skills

After completing this module, students will be able to:

9. Comprehend and discuss contemporary micro-economic issues.
10. Identify the forces of demand and supply.
11. Apply the concepts of price effects, elasticity of demand in the micro-economic environment.
12. Apply and extend the notations of customer behavior and utility maximization.
13. Examine the four market models from a domestic and global perspective.
14. Preset, analyze and interpret data using tables and graphs.

Teaching/Learning Strategies

- Lectures.
- Team Projects.
- Field Trips.
- Tutorials.
- Class Presentations.
- Guest Speakers.

Learning Materials

Software Requirements:

- BitArts and WinEcon.

Video / Slides:

- The Standard Deviants: Economics - Microeconomics.

Useful Websites:

- http://www.msaguide.8m.net (includes the community and lots of web links)

Reference Text:

- Samuelson P., William D. Nordhaus, "Economics", McGraw Hill, 19th ed., 2009.

Supplementary Readings:

- The Economist, Al Alam Al Yom, Business Monthly and Financial Times.

Assessment Scheme

- Assignments comprising definitions, true or false, problem solving, and essay questions (5 Home Assignments).
- Short written and Oral Quizzes comprising definitions, and problem solving (8 10-min. Quizzes).
- Class written Tests comprising definitions, true or false, problem solving, and essay questions (2 1.5- hr. Tests).
- Individual or group projects comprising the Egyptian economy (1,500 word 1.5 space-fonts: Arial 12-justified alignment). Topic to choose from and deadlines will be available on the web site.
- Field research in conducting the project.
- Presentation of the project at the end of semester.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3 -hr. Exam).

Assessment Pattern

• Class Participation	5 %
• Assignments and Project	10 %
• Tests and Quizzes	15 %
• Term Project	10 %
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100 %**

Learning Unit Contact Hours

• Lectures	3	hrs / week
• Tutorials	1.5	hrs / week
• Total class contact hours	63	hrs/semester
• Total self study hours	45	hrs/semester
• Total study hours	108	hrs/semester

Module Leader

Staff

300's LEVEL MODULES

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MODULE OUTLINE

Module Code	**: MAT 351**
Title	**: Mathematical Analysis and Numerical Methods**
Level	**: 3**
Credit Hours	**: 3**
Prerequisites	**: MAT 261**

AIMS

This module is designed to introduce students to Fourier and Laplace Transforms. It also enables students to analyse the mathematical modeling of engineering problems, solving problems using computer software, Approximation and round-off errors, Truncation errors and Taylor series, Roots of equations, Linear algebraic equations, Curve fitting, Interpolation and polynomial approximation,and Numerical integration and differentiation.

SYLLABUS

Topics
Vector Fields- Gradient Fields- Divergence and curl- Laplacian operator
Laplace Transform (Definition – Laplace transform of elentary functions- Properties– Inverse Laplace Transform- Convolution Theorem) - Fourier Analysis -Fourier Transform
Introduction to Complex variables and Complex functions.
Roots of Equations – The Bisection Method – The False–Position Method – Simple Fixed – Point Iteration – The Newton-Raphson Method.
Interpolation – Newton's Divided–Difference Interpolating Polynomials – Lagrange Interpolating polynomials.
Numerical Integration – Newton-Cotes Integration Formulas – The Trapezoidal Rule – Simpson's Rules.
Numerical Differentiation – High-Accuracy Differentiation – Formulas.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

5. Manipulate various methods of Numerical Analysis Problems and Techniques.
6. Capture various modern mathematical techniques.

B- Skills

After completing this module, students will be able to:

3. Apply the basic concepts and principles of Fourier and Laplace Transforms.
4. Solve engineering problems by suitable mathematical techniques.
5. Develop mathematical skills through tackling and solving engineering problems.

Teaching/Learning Strategies

- Lectures.
- Tutorials.

Learning Materials

Software Requirements:

- MAPLE, DRIVE, MATHEMATICA, MATLAB.

Useful Websites:

- www.cs.laurentian.ca
- www.math.jbpub.com
- www.ma.utexas.edu

- www.cl.cam.ac.uk

Reference Text:

- Chapra, S.C, Applied Numerical Methods with Matlab for Engineers and Scientists, 2nd ed.McGraw Hill, 2008

Supplementary Readings:

- Chapra, S.C. & Canole, R.P. Numerical Methods for Engineers, McGraw Hill, 1998.
- Chaney, W. and Kincaid, D., Numerical Mathematics and Computing, Brooks, Cole Publishing Co., 1996.

Assessment Scheme

- Assignments.
- Class written Tests/Quizzes.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

• Class Participation/Assignments	20%
• Tests and Quizzes	20%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours Per Week

• Lectures	3 hrs / week
• Tutorials	1.5 hrs / week
• Total class contact hours	63 hrs/semester
• Total self study hours	45 hrs/semester
• Total study hours	108 hrs/semester

Module Leader

Staff

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MODULE OUTLINE

Module Code	:	**DES 352**
Title	:	**Stress Analysis**
Level	:	**3**
Credit Hours	:	**3**
Prerequisites	:	**GSE 252**

AIMS

This module is designed to provide students with a thorough understanding of the basic components of stress analysis necessary for analyzing mechanical elements. These include tension, bending, shear, torsion , and combined stresses. Determination of principal stress in structures. It is necessary to develop mathematical relationships in a rational and logical manner, and clearly indicate the conditions that apply safely to the analysis and design of actual engineering structures and machine components.

SYLLABUS

Topics
Mechanical Behaviour of Materials.
Stress Strain Diagram, Hooke's Law, Poisson's Ratio.
Axial Stresses (Normal & Thermal Stresses).
First and Second Moment of Area.
Bending Stresses.
Shear Stresses, and Torsion of Circular Shafts.
Transverse Loading of Beams, Shear Force & Bending Moment Diagrams, Relation Between Shear Force & Bending Moments.
Combined Loading, Stresses on inclined planes, Two Dimensional Stress & Strain Transformation, and Mohr's Circle.
Principle Stresses in Two Dimension, Strain Gauges and Strain Rosettes.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Analyse the forces acting on mechanical components.
2. Evaluate the stresses in actual machine components.

B- Skills

After completing this module, students will be able to:

1. Enhance capabilities in calculating stresses on various mechanical components
2. Develop skills in solving engineering problems.

Teaching/Learning Strategies

- Lectures.
- Class Presentation.
- Tutorials.

Learning Materials

Useful Websites

- http://www.cadinfo.net
- http://www.gardenerweb.com

- http://www. cetem.gov.br
- http://www.kellysearch.com/

Reference Text:

- Beer, Ferdinand B., E. Russell Johnston, and John T. Dewolf, "Mechanics of Materials", McGraw Hill, 5th ed., 2008.

Supplementary Readings:

- Hibbeler, R. C. , Mechanics of Materials, Petarson Prentice Hall, 6th ed., 2005.
- Gere, J. M. , Timoshenko, S.Mechanics of Materials, PWS-Kent Publishing, 3rd ed., 1991.
- Popov, E. P., Engineering Mechanics of Solids, Prentice Hall Inc., 2nd ed. 1999.

Assessment Scheme

- Weekly written and graphical Assignments (8 home Assignments)
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Course Project.
- Unseen written and graphical Mid-Term Exam (1.5-hr. Exam).
- Unseen written and graphical Final-Exam (3-hr. Exam).

Assessment Pattern

• Class Participation	5%
• Assignments	10%
• Tests and Quizzes	15%
• Term Project	10%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3 hrs / week
• Tutorials	1.5 hrs / week
• Total class contact hours	63 hrs/semester
• Total self study hours	45 hrs/semester
• Total study hours	108 hrs/semester

Module Leader:

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: MFG 353**
Title	**: Numerical Control Machines**
Level	**: 3**
Credit Hours	**: 3**
Prerequisites	**: MFG 263**

AIMS

This module is designed to provide students with a capability of numerically controlling machining operations by a series of coded instructions (programs). Focus on Numerical Control (NC), Computerized Numerical Control (CNC), and Direct Numerical Control (DNC). Concepts, terminology, and functions of Numerical Control Machines. CNC programming language and programs for lathes, milling, boring, and machining Centers. Using the same component used in MFG 253, and MFG 263 to create the CNC program manually for various operations. Manufacturing of small components, using CNC Turning and Milling Machines in a CNC training center.

SYLLABUS

Topics
Numerical Control Machining Terminology and Concepts..
NC, CNC, DNC. Machine Functions.
Input /Output Devices.
Data, Coding Sstem, Data Entry and Axes.
Programming of CNC Machines.
Warm up Program and CNC Calibration.
Real Case Study.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Review the CNC Machines, and their use.
2. Understand programming language for CNC Machines to manufacture parts.
3. Evaluate the modern trend in the field of metal cutting processes.

B- Skills

After completing this module, students will be able to:

1. Identify and evaluate the advanced process alternatives to minimize processing time, and obtain a good quality with least cost.
2. Generate skills in developing CNC programs and running CNC machines.

Teaching/Learning Strategies

- Lectures.
- Video Tapes.
- Machining Workshops.
- CNC Machine Training Center.

Learning Materials

Hardware Requirements:

- Machining equipment at MSA workshops.
- Various machining and materials removing machines at "Abou Zaabal Company for Engineering Industries" in Cairo.

Software Requirements:

- Manufacturing Processes Video Tapes.

Useful Websites:

- http://www.rohan.sdsn.edu
- http://www.rmit.edu.an
- http://www.ie.ttu.edu

Reference Text:

- Krar, S., A. Gill and P. Smid, Computer Numerical Control Simplified, Industrial Press Inc. New York, 1st ed. 2001.

Supplementary Readings:

- John Ploywka and Stanley Gabrel, Programming of Numerical Controlled Machines, Industrial Press Inc.1992.
- Mikel Ynch, Computer Numerical Control for Machining, McGraw-Hill Inc., 1992.
- Paul Degarmo, E., Material and Processes in Manufacturing, McGraw Hill, 8th ed., 1997.

Assessment Scheme

- Weekly written Assignments (12 Home Assignments)
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Individual Practical Project.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final Exam (3-hr. Exam).

Assessment Pattern

Class Participation	5 %
Assignments	10%
Tests and Quizzes	10%
Term Project	15%
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3	hrs / week
Workshops	1.5	hrs / week
Total class contact hours	63	hrs/semester
Total self study hours	45	hrs/semester
Total study hours	108	hrs/semester

Module Leader:

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: ISE 354**
Title	**: Work Analysis & Measurement**
Level	**: 3**
Credit Hours	**: 3**
Prerequisites	**: MFG 263**

AIMS

This module is designed to provide students with an understanding of the scope of methods engineering and time study. Graphic tools for methods analysis. Operation analysis. Worker and machine relationships. Motion study. Micromotion analysis. Human factors considerations. Job analysis and evaluation. Time study requirements and equipment. Performance rating and allowances. Standard time calculation. Predetermined time systems. Work sampling studies.Productivity,wages and incentives. Computer aided time study.

SYLLABUS

Topics
Productivity: Factors Affecting Productivity and Role of Management.
Method Study: Documenting the Present Method, Analysis, Guidelines for Improvement.
Principles of Motion Economy, Fundamental Hand Motions, Micro-Motion Study and Equipment, Improving hand Motions, Mechanization, Automation, and Standardization.
Working Conditions: Temperature, Ventilation, Illumination, Colour, Noise, Safety,… Ergonomics and Human Factors in the Workplace..
Work Measurement: Standard Time Concepts, Time Study (Equipment, Concepts, Procedure), Work Sampling (Equipment, Concepts, Procedure) and Predetermined Time Systems.
Wage Incentive Plans.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Demonstrate Knowledge of the underlying theory and implementation of work analysis, as well as motion and time studies.
2. Evaluate Human Factors/Ergonomic principles that influence the performance and safety of work systems .
3. Develop capabilities in applying work sampling, productivity, wages, and incentive plans.

B- Skills

After completing this module, students will be able to:

1. Generate Work Systems using Standard techniques: flow diagrams, process charts, operation charts, activity charts, block diagrams and process maps for purposes of work system documentation analysis and design.
2. Excercise a structured engineering process to work system development including Analysis, design, implementation and evaluation.

3. Identify value and non-value added work elements; design efficient work equipment and methods; prevent fatigue and related worker health problems and predict work performance.
4. Determine the time required to do a job using standard data, occurrence sampling, time study, and predetrmined time systems.
5. Generate and constructively address ethical, social and environmental issı arise in a work systems engineering project.

ISE 354

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Class Presentation.

Learning Materials

Hardware Requirements:

- Ideal Workplace Model.
- Time Measuring Tools.

Useful Websites

- http://www.caubo.ca
- http://www.em.tsu.edu
- http://www.virginie.edu
- http://hfes.org
- http://www.osha.gov

Reference Text:

- Groover M. P. ,Work Systems and the Methods, Measurement, and Management of work, Prentice Hall, 2007.

Supplementary Readings:

- Benjamine W. Niebel, Motion and Time Study, McGraw Hill Co., 1993.
- Stevenson, W. J., Operation Management, McGraw Hill, 8th ed., 2003.
- Currie, R. M., Work Study, Pitman, London, 1997.
- International Labour Office ILO, Introduction to Work Study, Geneva, 1995.

Assessment Scheme

- Weekly written Assignments (12 Home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

• Class Participation	10%
• Assignments	10%
• Tests and Quizzes	10%
• Term Project and Presentation	10 %
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3 hrs / week
• Tutorials & Laboratories	1.5hrs / week

- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader

Staff

ISE 354

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: ISE 355**
Title	**: Operations Research**
Level	**: 3**
Credit Hours	**: 3**
Prerequisites	**: MAT 251**

AIMS

This module is designed to provide students with skills in modelling to describe, analyse, and predict the behaviour of an operating system. Appropriate Fundamental Models of Operations Research are applied in practical engineering situations. Operations Research models covered in the course include linear programming, sensitivity analysis and network models. The use of computer software in solving the optimization problems is an integrated part of the course.

SYLLABUS

Topics
Introduction to Modeling, and Optimization concepts.
Linear Programming: Formulation, Graphical Solution and Simplex Method..
Duality Theory and Sensitivity Analysis.
Transportation and Assignment Problems.
Minimal Spanning Tree Problems.
Shortest Route Problem.
Maximum Flow Problem.
Travelling Salesman Problem.
Introduction to Stochastic Techniques.
Use of Computer Software.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Analyse the scope of operations research and the meaning of modeling and optimization in the decision making situations.
2. Evaluate the differences between the fundamental operations research models and their applications to the practical engineering problems.

B- Skills

After completing this module, students will be able to:

1. Select and Perform the appropriate operations research models to use with the various decision making situations.
2. Determine appropriate assumptions based on inputs from practical decision making situations, to develop useful optimization models.
3. Interpret the outcomes of solving the optimization models and assess their usability.
4. Demonstrate the ability to utilize computer software in solving the optimization models and interpret their outputs.

Teaching/Learning Strategies

- Lectures.
- Tutorial.
- Computer Lab.

Learning Materials

Software Requirements:

- WinQSB, MS EXCEL Solver and Management Scientist (Come with the textbook).

Useful Websites:

- http://www.ieror.berkely.edu
- http://www.iitb.ac.in
- http://www.ipt.dtn.dk
- http://www.orsoc.org.uk
- http://www.informs.org

Reference Text:

- David R. Anderson, Dennis J. Sweeney,Thomas A. Williams, R. Kipp Martin. An Introduction to Management Science: A Quantitative Approach to Decision Making,Thomson South-Western,12th ed., 2008.

Supplementary Readings:

- Taha, Hamdy A., Operations Research, Prentice-Hall Co., 6th ed., 1997.
- Frederick, S. Hillier and Lieberman, Gerald J., Introduction to Operations Research, McGraw Hill Co., 1995.
- Wagner, H. M., Principles of Operations Research, Prentice-Hall Inc., 1969.
- Wayne L. Winston, Operations Research : Applications and Algorithms (with CD-ROM and InfoTrac., 4th ed., 2003.

Assessment Scheme

- Weekly written Assignments (12 Home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

• Class Participation	5 %
• Assignments	10%
• Tests and Quizzes	15%
• Term Project	10%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3 hrs / week
• Tutorials	1.5 hrs / week
• Total class contact hours	63 hrs/semester
• Total self study hours	45 hrs/semester
• Total study hours	108 hrs/semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: GSE 356**
Title	**: Fundamentals of Electrical Engineering**
Level	**: 3**
Credit Hours	**: 3**
Prerequisites	**: BSC 162**

AIMS

This module is designed to provide students with an understanding of the current and voltage, power sources. D.C. circuits: Ohm's Law, Kirchoff's law, resistor combinations, superposition, nodal analysis, mesh analysis, Thevennin's and Norton theories, capacitors and inductors. A.C. circuits sinusoidal functions, phasors, impedance and admittance, Δ/y transformation, nodal and mesh analysis, magnetic circuits. D.C.Machines and A.C Machines.

SYLLABUS

Topics
Current and Voltage, Reference Directions and Polarities, Power, Ideal Circuit Elements, Sources.
Ohm's Law, Kirshoff's Law, Resistor Combinations.
Nodal Analysis, Loop and Mesh Analysis, Superposition.
Thevenin's and Norton's Theorems.
Capacitors and Inductors, First Order Networks.
Second Order Circuits.
The Sinusoidal Functions, Complex Numbers.
Phasors, Impedance and Admittance, Δ/y Transformation.
Nodal Analysis, Mesh and Loop Analysis, Source Transformation.
Magnetic Circuits, Mutual Inductance, Linear Transformer.
The Ideal Transformer, Transformer Applications.
D.C. Machines: Fundamental concepts, Basic D.C. Machine.
Equivalent Circuits and Analysis, D.C. Machine Applications.
The Polyphase Synchronous Machine, Basic Principles of Operation, A.C. Motor Applications.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Acquire knowledge of the fundamental concepts and theory of electrical engineering to non-professionals.
2. Analyse the electrical circuits and electro-mechanical systems.

B- Skills

After completing this module, students will be able to:

1. Synthesise the various magnetic circuits, D.C. and A.C. machines.
2. Design simple electrical systems.

Teaching/Learning Strategies

- Lectures.
- Laboratories.
- Tutorials.

Learning Materials

Hardware Requirements:

- Electrical Experiments are performed in our Electrical and Electronic Laboratories, at Faculty of Engineering, MSA University.

Useful Websites:

- http://www.electronic_circuits_diagrams.com

Reference Text:

- Floyed, Thomas, Electrical Circuits Fundamentals, Prentice Hall, 8th ed., 2009.

Supplementary Readings:

- Nilsson, J. W., Electric Circuits, Addison Wesley Co., 1995.
- Jacob Millman and Arvin, Microelectronics, McGraw Hill Co., 2nd ed, 1987.
- Sedra, A. S. and Smith, K. C., Microelectronic Circuits, Oxford University Press, 4th ed., 1998.

Assessment Scheme

- Weekly written Assignment (12 Home Assignments)
- Short written quizzes (4 10-min. Quizzes)
- Class written tests (2 1.5-hr. Tests).
- Final Laboratory Tests.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	5 %
Assignments	5 %
Tests and Quizzes	15%
Term Project	10 %
Final Laboratory Test	5 %
Unseen Mid-Term Exam	20 %
Unseen Final Exam	40 %
Total	**100%**

Learning Unit Contact Hours

Lectures	3	hrs / week
Tutorials & Laboratories	1.5	hrs / week
Total class contact hours	63	hrs/semester
Total self study hours	45	hrs/semester
Total study hours	108	hrs/semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: MAT 361**
Title	**: Probability and Statistics**
Level	**: 3**
Credit Hours	**: 3**
Prerequisites	**: MAT 351**

AIMS

This module is designed to enable students to analyse random numbers and random variables, measures of central tendency, measures of dispersion, probability theory, discrete and continuous statistical distributions, sampling methods, testing hypotheses, goodness of fit tests, auto and cross correlation coefficients, and random processes.

SYLLABUS

Topics
Presentation of Data.
Measures of Central Tendency.
Measures of Dispersion.
Fundamentals of Probability.
Discrete Probability Distributions: Binomial & Poisson
Continuous Propability Distributions: Uniform, Exponential & Normal.
Sampling Distribution.
Random processes and cross correlation
Confidence Limits & Confidence Interval.
Significance Testing Hypotheses: X^2-test & Goodness of Fit Test.
Correlation : Measurement, & Coefficients.
Regression Analysis and Least Squares Method.

LEARNING OUTCOMES

Knowledge

After completing this module, students will be able to:

1. Incorporate the role that statistics can play in the engineering problem – solving process.
2. Prescribe the importance of using statistical techniques to make decesions.
3. Rate the various probability and statistical terminology.
4. Integrate the basic rules of probabilities.
5. Assess random and stochastic processes.

Skills

After completing this module, students will be able to:

1. Determine probabilities from Cumulative Distribution Functions (CDF) and CDF from Probability Density Functions (PDF), and the reverse.
2. Develop statistical skills through tackling and solving engineering problems.
3. Calculate probabilities means, and variances for each discrete and continuous probability distributions.
4. Gain statistical skills in the presentation of data, analysis of data, and testing the hypothesis.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Projects.

Learning Materials

Software Requirements:

- MINITAB, SPSS, MICROSTAT, SAS.

Useful Websites:

- http://www.mathforum.org/library/topics
- http://www.math.uah.edu
- http://www.stat.stanford.edu

Reference Text:

- Montgomery, D. C., & G. C. Runger, "Applied Statistics and Probability for Engineering", John Wiley & Sons Inc., 4th ed., 2007.

Supplementary Readings:

- Johnson, R. A. and Bhattacharyya, G. K., Statistics: Principles and Methods, John wiley Inc., New Eddition.

Assessment Scheme

- Assignments.
- Class written Tests/Quizzes.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

• Class Participation/Assignments	20%
• Tests and Quizzes	20%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours Per Week

• Lectures	3	hrs / week
• Tutorials	1.5	hrs / week
• Total class contact hours	63	hrs/semester
• Total self study hours	45	hrs/semester
• Total study hours	108	hrs/semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: DES 362**
Title	**: Machine Design**
Level	**: 3**
Credit Hours	**: 3**
Prerequisites	**: DES 352**

AIMS

This module is designed to enable students to understand the basic concepts of Power transmission elements design: shafts, gears and pulleys. Design of fasteners. Design of gears: Straight Spur, Helical, Bevel, and Worm. Design of journal Bearings, as well as Selection of Rolling Bearings. Manufacturing considerations in Mechanical Design.

SYLLABUS

Topics
Design Considerations, Mechanical Elements Design, Interaction between Design Process Elements, Design Factors and Safety Factors.
Material Selection and Factor of Safety.
Load and Stress analysis, Theories of Failure for Ductile and Brittle Materials, Fatigue Failure.
Design of Power Transmission Shafts and gears.
Design of Fasteners.
Design of Gears: Straight Spur, Helical, Bevel , and Worm. Gear Design Load Equation Forms (Static, Dynamic, Endurance, and Wear Resistance).
Design of journal Bearings. Selection of Rolling Element Bearings

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

3. Analyse static failure of machine components using relevant theories.
4. Determine loads and stresses, using static and fatigue failure theories, exerted in transmission shafts.
5. Design of mechanical power transmission elements: shaft, gears, belts and roller bearings.
6. Design of reduction gear trains.

B- Skills

After completing this module, students will be able to:

3. Enhance capabilities in designing of transmission shafts and gears.
4. Utilize the computer-aided design.

Teaching/Learning Strategies

- Lectures.
- Computer Graphics.
- Tutorials.
- Individual/Group Project.

Learning Materials

Useful Websites

- http://www.cadinfo.net
- http://www.gardenerweb.com
- http://www. cetem.gov.br
- http://www.kellysearch.com/

Reference Text:

- Shigley's, Mechanical Engineering Design , McGraw Hill , 9th ed. , 2012.

Supplementary Readings:

- Dobrovolsky, Machine Elements, MIR Publisher Co., 1977.
- Olover, Fundamentals of Machine Design, MIR Publisher Co., 1998.
- Jain, R. K., Machine Design, Khanna Publisher Co., 1999.
- Reshetov, D. N., Machine Design, MIR Publisher Co., 1978.

Assessment Scheme

- Weekly written and graphical Assignments (8 home Assignments)
- Class written Tests (2 1.5-hr. Tests).
- Unseen written and graphical Mid-Term Exam (1.5-hr. Exam).
- Unseen written and graphical Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	5 %
Assignments	10%
Tests & Quizzes	15%
Term Project	10%
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3 hrs / week
Tutorials	1.5 hrs / week
Total class contact hours	63 hrs/semester
Total self study hours	45 hrs/semester
Total study hours	108 hrs/semester

Module Leader:

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Lu Code	**: DES 363**
Title	**: Tool Design**
Level	**: 3**
Credit Hours	**: 3**
Prerequisites	**: MFG 263**

AIMS

This module is designed to provide students with the principles of tool design. The study includes the design of Jigs and Fixtures, Die design, single point tool design, and multiple points' tool design. Applications are concentrated on operations studied in GSE 252, MFG 263, and MFG 353.

SYLLABUS

Topics
Basic Concepts of Tool Design.
Design of Jigs and Fixtures: Supporting and locating principles, Clamping and Work holding principles, Construction principles.
Die design: Shearing, Bending, Deep Drawing, Progressive dies.
Single point tool design: design of Turning tools.
Multiple points' tool design: Design of Milling and broaching cutters.
Design Economics.
Computer – Aided tool Design.
Individual Projects.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Identify and Review the manufacturing considerations in design of jigs and fixtures, Dies, single and multiple points cutting tools.
2. Transfer Knowledge of the concepts and fundamentals of tool design.

B- Skills

After completing this module, students will be able to:

1. Enhance capabilities in designing jigs and fixtures, Dies and cutting tools.
2. Utilize Computer-Aided Design and Computer-Aided Manufacturing Software.

Teaching/Learning Strategies

- Lectures.
- Computer Graphics.
- Tutorials.
- Project.

Learning Materials

Useful Websites

- http://www.carlan.com
- http://www.mech.ust.hk

- http://www.infobanc.com
- http://www.vanik.com

Reference Text:

- Hoffman, E.G., Jigs and Fixture Design, Thomson Delmar Learning, 5th ed., 2006.
- Wilson, F.W., Fundamental of Tool Design, Prentice Hall of Indian Private Limited, New Delhi, Latest edition.

Supplementary Readings:

- De Crisroforo, R.J., Jigs, Fixtures, Shop Accessories, McGraw Hill Co., 1993.
- Boyes, W.E., Handbook of Jigs and Fixtures Design, Society of Manufacturing Engineers, 2nd ed., 1989.
- Wilson, F. W., Die Design handbook, McGraw-Hill Co., Latest edition.

Assessment Scheme

- Weekly written and graphical Assignments (8 Home Assignments).
- Short Written Quizzes (4 10 min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Individual Practical Project.
- Unseen written and graphical Mid-Term Exam (1.5-hr. Exam).
- Unseen written and graphical Final-Exam (3-hr. Exam).

Assessment Pattern

• Class Participation	5 %
• Assignments	10%
• Tests & Quizzes	10%
• Term Project	15%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3 hrs / week
• Tutorials	1.5 hrs / week
• Total class contact hours	63 hrs / semester
• Total self-study hours	45 hrs / semester
• Total study hours	108 hrs / semester

Module Leader:

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: ISE 364**
Title	**: Engineering Economy**
Level	**: 3**
Credit Hours	**: 3**
Prerequisites	**: MAT 251**

AIMS

This module is designed to provide students with a thorough understanding of the fundamentals of engineering economy. Economic analysis in engineering management systems. Economic evaluation of engineering projects. Time value of money: Equivelance, present worth, future worth, and cash flows. Effects of economic time, interest rate, capitalized cost and depreciation. Evaluation of alternatives based on use of interest computations, valuations, depreciation's, and cost estimates.

SYLLABUS

Topics
Engineering and Economics.
Time Value of Money, Factors of Equivalence, Present Worth Method of Comparison, Equivalent Annual Worth Method of Comparison.
Rate of Return Method of Comparison.
Break Even Analsis, Replacement Analysis, Benefit–Cost Analysis and Payback Method of Comparison.
Present and Annual Worth Analysis.
Depreciation.
After Tax Economic Considerations.
Effect of Inflation.
Economic Analysis under Risk (Decision Trees).
Economic Analysis under Uncertainty (Decision Matrices).

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Explore the fundamental concepts of engineering economy and their use in performing feasibility studies.
2. Demonstrate Knowledge of Equivalence,present worth, annual worth and cash flows.
3. Analyse the time value of money, interest rate, capitalized cost, and depreciation methods.

B- Skills

After completing this module, students will be able to:

1. Develop an overall engineering economic awareness to tackle production problems in the manuafcturing and service industries.
2. Perform economic calculations involving the time value of money, using Standard Formulas or Interest Tables.
3. Compare alternatives on the basis of Net Present Worth, Equivalent Annual Worth, Internal Rate of Return and Benefit Cost analysis.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Class Presentation.

Learning Materials

Software Requirements

- EXCEL SpreadSheets

Useful Websites

- http://www.lehigh.edu
- http://www.engecon.ienet.org
- http://www.amazon.com
- http://www.rollanet.org

Reference Text:

- Sullivan G., *Engineering Economy,* Prentice Hall, 14th Ed., 2008.

Supplementary Readings:

- DeGarmo, E. P., Sullivan, W., Bontadelli, J., and Wicks, E., Engineering Economy, prentice Hall Inc., 10th ed., 1997.
- Engineering Economy Abstracts, Industrial Engineering Dept., Iowa State Univ., Ames, IA.
- The Engineering Economist, Institute of Industrial Engineers, Norcross, GA, Quarterly.

Assessment Scheme

- Weekly written Assignments (12 home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	5 %
Assignments	10%
Quizzes	15%
Term Project	10%
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3	hrs / week
Tutorials	1.5	hrs / week
Total class contact hours	63	hrs/semester
Total self study hours	45	hrs/semester
Total study hours	108	hrs/semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: GSE 365**
Title	**: Engineering Materials II**
Level	**: 3**
Credit Hours	**: 3**
Prerequisites	**: GSE 252**

AIMS

This module deals with non-metallic and nano materials. It is designed to enable students to understand the development of polymeric and ceramics material structure. Characterization of these materials using mechanical testing. Their basic types of failure during service and their prevention. Strengthening mechanisms. The concepts and characteristics of composite materials. The use of Natural fibers. The module, also, introduces students to the world of Nano-technology and Nano-materials.

SYLLABUS

Topics
Polymers: Structure, Types, Properties, Deformation, Testing, and Applications.
Ceramics: Structure, Types, Properties, Deformation, Testing, and Applications.
Composite Matreials and Natural Fibers.
Introduction to Nanotehnology and Nano Materials: nanoscale phenomena, nano particles, carbon nanostructures, nanowires, nanostructured materials, self assembly, surface probe microscopy, other nanoscale characterization, nanolithography, nano devices and systems, applications of nanotechnology.

LEARNING OUTCOMES

C- Knowledge

After completing this module, students will be able to:

4. Acquire knowledge about various non metallic materials used in manufacturing.
5. Understand various mechanical, physical, and chemical characteristics of non-metallic materials.
6. Acquire knowledge of the basic types of failures during service and their prevention.

D- Skills

After completing this module, students will be able to:

3. Manipulate various tests to evaluate the properties of materials.
4. Carry out testing experiments to define different modes of failure.
5. Use knowledge about Nano-Materials in dealing with the selection of materials for specific applications.

Teaching/Learning Strategies

- Lectures.
- Laboratory.
- Tutorials.
- Technical Reports.

Learning Materials

Useful Websites

- http://www.yahoo.com/science/EngineeringMaterial
- http://www.fpl.fs.fed.us
- http://www.matweb.com

Reference Text:

- Kalpakjian, S.&S.R.Schmid, Manuafcturing Engineering and Technology, Prentice Hall,6th ed., 2009.

Supplementary Readings:

- Van Vlack, Materials for Engineering: Concepts and Applications, Addison Wesley Co., 1982.
- Smith, W., Materials and Engineering, McGraw Hill Co., 1990.
- Popov, E.P., Mechanics of Materials, Prentice Hall., London,1978.
- Khurmi, R.S., Strength of Materials, S.Ch and Company, New Delhi, 1998.
- Farag, M., Selection of Materials and Manufacturing Processes for Engineering Design, Prentice Hall Inc., 1989.
- Callister, D. J., Jr., Materials Science and Engineering, John-Wiley Inc.,1997.

Assessment Scheme

- Weekly written Assignments (12 home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Laboratory Test.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	10%
Assignments	10%
Tests and Quizzes	10%
Term Paper	5%
Final Laboratory Test	5%
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3	hrs / week
Tutorials & Laboratory	1.5	hrs / week
Total class contact hours	63	hrs/semester
Total self study hours	45	hrs/semester
Total study hours	108	hrs/semester

Module Leader:

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: GSE 366**
Title	**: Fundamentals of Electronics Engineering**
Level	**: 3**
Credit Hours	**: 3**
Prerequisites	**: GSE 356**

AIMS

This module is designed to provide students with an understanding of the electric energy and power, signals and pulse, analog and digital, modulation and demodulation, encoding and decoding, A/D and D/A converters, logic gates, p- and n- type semiconductors, The p-n junction diode, diode circuit models, power supply circuits, photo diodes and light emitting diodes, The transistor as a switch, FET and BJT for digital applications, ideal logic gates, Real logic gates.

SYLLABUS

Topics
Energy and power.
Signals and pulse, analog and digital.
Modulation and demodulation, encoding and decoding.
A/D and D/A converters, logic gates.
p- and n- type semiconductors.
The p-n junction diode.
Diode circuit models.
Power supply circuits.
Photo diodes and light emitting diodes.
The transistor as a switch.
FET and BJT for digital applications.
Ideal logic gates.
Real logic gates.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Acquire knowledge of the fundamental concepts and theory of electronics engineering to non-professionals.
2. Analyze the semiconductors, diodes and their applications, as well as the transistors for digital applications to understand the digital systems.

B- Skills

After completing this module, students will be able to:

1. Synthesize the various energy and power, signals and pulse, analog and digital, modulation and demodulation and encoding and decoding.
2. Design simple electronic systems.

Teaching/Learning Strategies

- Lectures.
- Laboratories.
- Tutorials.

Learning Materials

Hardware Requirements:

- Electronic Experiments are performed in our Electrical and Electronic Laboratories at Faculty of Engineering, MSA University.

Useful Websites:

- http://www.circuit_magic.com

Reference Text:

- Floyd, Thomas L., "Electronic Devices ", Prentice Hall, 8th ed., 2007.

Supplementary Readings:

- Nilsson, J. W., Electric Circuits, Addison Wesley Co., 1995.
- Jacob Millman and Arvin, Microelectronics, McGraw Hill Co.
- Sedra, A. S. and Smith, K. C., Microelectronic Circuits, Oxford University Press, 4th ed., 1998.

Assessment Scheme

- Weekly written Assignment (12 Home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Laboratory Test.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

• Class Participation	5%
• Assignments	10%
• Tests and Quizzes	10%
• Term Project	10 %
• Final Laboratory Test	5%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3	hrs / week
• Tutorials & Laboratories	1. 5	hrs / week
• Total class contact hours	63	hrs/semester
• Total self study hours	45	hrs/semester
• Total study hours	108	hrs/semester

Module Leader

Staff

400's LEVEL MODULES

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Lu Code	**: ISE 451**
Title	**: Production Planning & Control**
Level	**: 4**
Credit Hours	**: 3**
Prerequisites	**: ISE 355**

AIMS

This module is designed to provide students with the knowledge and understanding of the concepts, principles, techniques, and applications of production planning and control. Forecasting techniques, inventory control, planning and scheduling, capacity planning and location, supply chain management, and the current trends in production and service operations management.

SYLLABUS

Topics
Operations and Productivity.
Forecasting Techniques.
Process Strategy and Capacity Planning.
Inventory Management.
Materials Requirements Planning.
Aggregate Production Planning.
Loading, Scheduling and Sequencing.
Just In Time Systems.
Supply Chain Management.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Review the scope of production and operations management.
2. Utilize and practice the basic concepts and principles of production and operations management, applied to manufacturing and service sectors.
3. Identify and analyze engineering problems related to production of goods and service.

B- Skills

After completing this module, students will be able to:

1. Develop and use an organized problem solving approach utilizing critical thinking capabilities and relevant computer resources.
2. Exercise and apply the appropriate quantitative and/or qualitative models to the common operations management processes.
3. Communicate effectively in a professional role with specific capability to present technical materials effectively.

Teaching/Learning Strategies

- Lectures.
- Tutorials.

Learning Materials

Useful Websites:

- http://www.wspc.com
- http://www.tmac.org
- http://www.prospects.ac.uk
- http://www.slac.standford.edu
- http://www.nationjob.com

- http://www.apics.org/default.htm

Reference Text:

- Heizer J., and & Render B., "Operations Management", Bearson Prentice Hall, 9th ed., 2008.

Supplementary Readings:

- Bozarth C., and R. Handfield, Introduction to Operations and Supply Chain Management, BEARSON Prentice Hall, 2nd ed., 2008.
- Elsayed E., and T. Boucher, Analysis and Control of Production Systems, Prentice Hall, 2nd ed., 1994.
- Stephenson, William J., Production and Operations Management, McGraw Hill, 6th ed., 1999.

Assessment Scheme

- Weekly written Assignments (12 Home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

• Class Participation	5%
• Assignments	10%
• Tests and Quizzes	10%
• Term Project	15%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3 hrs / week
• Tutorials	1.5 hrs / week
• Total class contact hours	63 hrs/semester
• Total self study hours	45 hrs/semester
• Total study hours	108 hrs/semester

Module Leader

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: ISE 452**
Title	**: Statistical Quality Control**
Level	**: 4**
Credit Hours	**: 3**
Prerequisites	**: MAT 361**

AIMS

This module is designed to provide students with the understanding of modern concepts and trends in Quality Control. The utilization of statistical techniques used in quality control. Data presentation and statistical analysis. Charts for process control. Process capability assessment, sampling plans for acceptance inspection, and reliability models and acceptance testing.

SYLLABUS

Topics
Quality Definitions and Concepts.
Control Charts for Variables (X-bar, R and S)
Control Charts for Attributes (P, np, 100p, c, u)
Process Capability Analysis.
Lot for Lot Acceptance Sampling by Attributes: Concept, Sampling Plans Design for Single, Double and Multiple Plans.
Sequential and Dodge Romig Plans.
MIL-STD-105D.
Acceptance Sampling Plans by Variables.
Reliability analysis and Testing.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

4. Review quality, quality control, quality assurance, and total quality management.
5. Plan the uses of quality control charts and relevant analysis tools.
6. Familiarize the uses of the process capability tools in the manufacturing settings.
7. Transfer the objectives and basics of the international quality standards.

B- Skills

After completing this module, students will be able to:

4. Demonstrate the quality control charts and other quality analysis tools to situations in manufacturing systems.
5. Evaluate the data contained in the quality control and analysis tools.
6. Evaluate process capabilities with the process capability indices.
7. Develop a system perspective of the roles of quality in manufacturing.
8. Plan ways to improve the quality and process capability levels.
9. Exercise appropriate data for the application of the quality control and analysis tools.
10. Diagnose systems and processes based on the use of the quality analysis tools.
11. Support establishing total quality systems and quality standards.
12. Learn how to meet customer requirements.

Teaching/Learning Strategies

- Lectures.
- Tutorials.

- Individual/Team Projects
- Class Presentation.

Learning Materials

Useful Websites:

- http://www.statsoftinc.com
- http://www.spssscience.com
- http://www.wisegeek.com/what-is-quality-control.htm
- http://www.statsoft.nt
- http://www.ncss.com
- http://www.asq.org/learn-about-quality/basic-concepts.html

Reference Text:

- Montgomery, D.C., Introduction to Statistical Quality Control, John Wiley Inc., 5th ed., 2008.

Supplementary Readings:

- Gitlow & Gitlow, The Deming Guide to Quality and Competitive Position, Prentice Hall, 1987.
- Besterfield, D., Quality Control, Prentice Hall, 8th Ed., 2005.
- Grant, E.L., Statistical Quality Control, McGraw Hill Co., 1996.
- Jerry banks, Principles of Quality Control, John Wiley & Sons, 1989.
- DeVor R., Chang T., Sutherland J., Statistical Quality Design and Control, Prentice Hall, 2nd ed., 2007.

Assessment Scheme

- Weekly written Assignments (6 Home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Individual/Group Projects.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	5%
Assignments	10%
Tests and Quizzes	10%
Term Project and Reports.	15%
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3 hrs / week
Tutorials	1.5 hrs / week
Total class contact hours	63 hrs/semester
Total self study hours	45 hrs/semester
Total study hours	108 hrs/semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: MFG 4531**
Title	**: Theory of Metal Forming & Metal Cutting**
Level	**: 4**
Credit Hours	**: 3**
Prerequisites	**: MFG 253 & MFG 263**

AIMS

This module is designed to introduce the students to the practical and industrial applications of the theories of metal Forming and metal Cutting. The module is composed of two parts. The first part provides the students with the classification of forming processes and explains the effect of temperature, speed of deformation, and the structure of metal on the forming processes. The second part introduces the students to the Mechanics of metal cutting, cutting tool materials, cutting fluids, tool wear, tool life and economics of metal cutting.

SYLLABUS

Topics
Part I: Theory of Metal Forming
Stress strain curves, models of mechanical behaviour, and effect of temperature and strain rates on stress strain curves.
Deformation and recrystallization, Cold and Hot working, strain hardening, elastic and plastic deformation of metals, yield criteria.
Methods of calculating loads in friction and frictionless processes: Forging, Rolling, Extrusion, Wire drawing, Tube drawing, Deep drawing.
Part II: Theory of Metal Cutting
Tool geometry, Tool materials, and Chip formation.
Cutting forces (measurement and emperical relationships).
Heat in metal cutting, tool life, tool wear, and their measurements.
Chatter in machining.
Cutting fluids and Surface roughness.
Machining economy: optimum tool life and optimum cutting conditions.
Machinability.

Learning Outcomes

A- Knowledge

After completing this module, students will be able to:

1. Get acquainted with the mechanical and metallurgical fundamentals of different metal forming processes.
2. Be acquainted with the various types of cutting tools and their applications.
3. Identify the tool geometry and optimum cutting conditions.
4. Analyze the mechanics of metal cutting.
5. Recognize the types of chips appeared during metal cutting

B- Skills

After completing this module, students will be able to:

1. Analyze the effect of different process variables.
2. Plan the required forming calculations.
3. Utilize the flow patterns of metal as it is being cut.
4. Review the factors which affect the machinability of metals.
5. Calculate loads required for the various metal forming processes.

Teaching/Learning Strategies

- Lectures
- Tutorials
- Experiments and project.
- Video Tapes

Learning Materials

Software Requirements

- Labs at MAS.
- Video Tapes.

Reference Text

- Dieter G.E., "Mechanical metallurgy", McGraw-Hill, 3rd ed., 1986.
- Stephenson, D.A. and Agapiou, J.S., Metal Cutting Theory and Practice, CRC, Latest Edition.

Supplementary Readings

- McGannon, H.E., "Making, shaping and treating of steel", U.S. Steel corp, Pittsburgh, Pennsylvania, 10th ed., 1984.
- Pandy, P.C. and Singh, C.K., Production Engineering Sciences, Standard Publishers Distributers, Delhi, Latest edition.

Assessment Scheme

- Weekly Written Assignments (12 Home Assignments).
- Short Written Quizzes (4-10 min. Quizzes)
- Class Written Tests (2-1.5 hr. tests).
- Individual Practical Project.
- Unseen Written Mid- Term Exam (1.5-hr Exam).
- Unseen Written Final-Exam (3-hr Exam).

Assessment Pattern

• Class Participation	5 %
• Assignments	10 %
• Tests and Quizzes	10%
• Term Projects	15%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3	hrs / week
• Tutorials	1.5	hrs / week
• Total class contact hours	63	hrs/semester
• Total self study hours	45	hrs/semester
Total study hours	**108**	**hrs/semester**

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	:	**ISE 4532**
Title	:	**Lean-Six Sigma Manufacturing Systems**
Level	:	**4**
Credit Hours	:	**3**
Prerequisites	:	**ISE 354**

AIMS

This module is designed to provide students with an understanding of the fundamental concepts of the lean manufacturing system and the existing practices based on them. Emphasis is on the comprehension of the implication of targeting the elimination of waste, in all of its forms, on the approaches and techniques of planning and controlling the manufacturing activities. Relevance of the lean system to six-sigma and supply chain management will provide students with a comprehensive framework to managing the modern manufacturing system.

SYLLABUS

Topics
Using DMAIC to improve Speed, Quality and Cost.
Working with ideas: Brainstorming, …..
Value Stream Mapping and Process Flow Tools.
Voice of the Customer and Data Collection.
Descriptive Statistics, Data Displays and Variation Analysis.
Identifying and Verifying Causes.
Reducing Load Time and Non-Value-Add Cost.
Complexity Value Stream Mapping and Complexity Analysis.
Selecting and Testing Solutions.

Learning Outcomes

A- Knowledge

After completing this module, students will be able to:

1. Review the evolution of the manufacturing system from mass to lean-six sigma system.
2. Review the characteristics of the lean-six sigma manufacturing system.
3. Evaluate and understand the different forms of waste and the impact of their presence in the manufacturing system.
4. Distinguish the difference between traditional and lean-six sigma systems.
5. Evaluate the lean-six sigma-based practices and how to implement them.

B- Skills

After completing this module, students will be able to:

1- Identify and analyze engineering problems related to production of goods and services from a lean-six sigma system perspective.

2- Develop and use organized problem solving skills consistent with the lean-six sigma manufacturing concepts.

3- Recognize waste and suggest approaches to minimize or eliminate it.

4- Identify value-added from non-value added activities in the manufacturing system.

5- Evaluate the appropriate quantitative and/or qualitative models in the lean-six sigma environment.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Projects.

Learning Materials

Useful Websites

- The Lean Enterprise Institute: http://www.lean.org/

Reference Text

- Askin, Ronald G.; Goldberg, Jeffrey B., Design and Analysis of Lean Production Systems, John Wiley & Sons, Student ed., 2008.
- Class notes to be complied by the instructor based on the supplementary references below to cover topics (e.g. value stream mapping , Kanban, Lean Six Sigma) not covered in the required textbook.

Supplementary Readings

- Womack, James Jones; Daniel; Roos,Daniel, "The Machine that changed the world : The Story of Lean Production ", Harper Perennial, 1991.
- Zylstra, Kirk , Lean Distribution : Applying Lean Manufacturing to Distribution, Logistics, and Supply Chain, John Wiley & Sons, 2006.
- William M. Feld, Lean Manufacturing: Tools, Techniques and how to use them, CRC Press , 2000.
- George, Michael , Lean Six Sigma: Combining Six Sigma Quality with Lean Production Speed, McGraw –Hill, 2002.

Assessment Scheme

- Weekly Design Assignments (12 Home Assignments).
- Real Industrial Enterprise Case-Study Project.
- Unseen Mid- Term Exam (1.5-hr Exam).
- Unseen Final-Exam (3-hr Exam).

Assessment Pattern

Class Participation	5 %
Assignments	10 %
Tests & Quizzes	10 %
Term Project	15 %
Unseen Mid-Term Exam	20 %
Unseen Final Exam	40 %
Total	**100%**

Learning Unit Contact Hours

Lectures	3 hrs / week
Tutorials	1.5 hrs / week
Total class contact hours	63 hrs/semester
Total self study hours	45 hrs/semester
Total study hours	108 hrs/semester

Module Leader

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: ISE 454**
Title	**: Automatic Control**
Level	**: 4**
Credit Hours	**: 3**
Prerequisites	**: MAT 361**

AIMS

This module is designed to provide students with a thorough understanding of the control systems, modeling of control components and systems, analogies between different physical systems (mechanical, electrical, fluid, thermal), transfer functions and stability analysis; that includes rout locus technique and Routh-Hurwitz stability criterion; time domain and frequency domain analysis, state space analysis and control system performance.

SYLLABUS

Topics
Mathematical Modeling of Control Components and Systems.
Transfer Function and Characteristic Equation.
MATLAB Program Applications to Control Systems.
Time Domain Analysis: Transient and Steady State Responses.
Time Domain Analysis: Steady State Errors with Applications.
Feedback Control Systems.
Control Systems Stability Criterion.
Control Systems Stability Using MATLAB.
Frequency Domain Analysis: Polar Plot.
Frequency Domain Analysis: Bode Plot.
State Variable Models.

LEARNING OUTCOMES

Knowledge

After completing this module, students will be able to:

1. Extend knowledge of the control systems' concepts and their use in various manufacturing and service systems.
2. Utilize the performance and dynamics of the controlled system.

Skills

After completing this module, students will be able to:

1. Review the basic principles of the control systems.
2. Evaluate physical systems and obtain their mathematical models.
3. Analyze the performances and stability of control systems.
4. Design and analyze controller using variety methods according to a certain desired performances.
5. Evaluate and compare the performance of the designed controller using Software packages.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Individual Project.
- Class Presentation.

Learning Materials

Software Requirements:

- MATLAB control tool box.
- SIMULINK tool box.

Useful Websites:

- http://www.shef.ac.uk
- http://www.aut.ee.ethz.ch
- http://www.isa.org
- http://www.ieee.org

Reference Text:

- Dorf, R. and Bishop, R., Modern Control System, Prentice Hall Inc., 11th ed., 2007.

Supplementary Readings:

- Boris, J. and Paul, J., Classical Feedback Control, Marcel Dekker Inc., 2000.
- Franklin, GF, Powell, JD and Emami-Naemi, A., Feedback Control of Dynamic Systems, 5th ed., Prentice Hall, 2006.
- Nise, NS, Control System Engineering, 3rd ed, Willey, 2001.
- Lala, Parag K., Practical Digital Logic Design and Testing, Prentice Hall, 1995.
- Ozbay, H., Introduction to Feedback Control Theory, CRC Press, 1999.
- Levine, W. S., Control System Applications, CRC Press, 1999.
- Kuo B. C., Automatic Control Systems, Prentice Hall, 2002.
- Ogata K., Modern Control Engineering, Prentice Hall, 2003.

Assessment Scheme

- Weekly written Assignments (8 home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	5%
Assignments	10%
Tests and Quizzes	10%
Term Project and Reports	15%
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3	hrs / week
Tutorials	1.5	hrs / week
Total class contact hours	63	hrs/semester
Total self study hours	45	hrs/semester
Total study hours	108	hrs/semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: MFG 455**
Title	**: Introduction to CAD/CAM**
Level	**: 4**
Credit Hours	**: 3**
Prerequisites	**: MFG 353**

AIMS

This module is designed to enable students to understand the concepts of a closed-loop feedback production system whose prime inputs are product requirements and whose prime outputs are finished products. The CAD/CAM system comprises Computer Aided Design (CAD) and 3-D parametric solids modeling concepts, and integrates these concepts into Computer Aided Manufacturing (CAM) and processes. Implementation of CAD/CAM is performed through the mechanization, optimization, and computerization of various processes in synchronization with the automation of information flow. Using the same component in MFG 253, MFG 263 and MFG 353 to create master model for designing each component, and a master model for machining each operation.

SYLLABUS

Topics
Concepts and Functions of CAD/CAM/ CAE software.
Information of Solid Modeling.
Positional form features
Design with Expressions.
Face operations and Edge Operations.
Datum Plane Reference Features, and Datum Axis Reference Features.
Swept Features and Boolean Operations.
Editing the Model.
Instance Arrays.
Assemblies, Adding Components, and Mating Conditions.
Drafting Parts and Assembly.
Real Case Projects.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Apply the standards used in the class.
2. Demonstrate the theory of CAD/ CAM / CAE software.
3. Create and edit parametric solid models.
4. Create and modify basic assembly structures, simple drawings and existing geometry.

B- Skills

After completing this module, students will be able to:

1. Utilize the use of various modules of CAD/CAM/CAE softwares.
2. Design the mechanical parts using CAD software.

Teaching/Learning Strategies

- Lectures.
- Computer Laboratory.

Learning Materials

MFG 455

Hardware Requirements:

- Computer Laboratory.

Software Requirements:

- CAD/CAM/CAE Software.

Useful Websites:

- www.ugs.com

Reference Text:

- Lee H.F, Computer Aided Design with Unigraphics NX., Latest Version.
- Chalou R., Engineering Design Modeling with Unigraphics, Latest Version.

Supplementary Readings:

- Student Guide , Practical Applications of Unigraphics , volume-I.
- Student Guide, Practical Applications of Unigraphics , volume-II.

Assessment Scheme

- Computer Laboratory Tests.
- Mid Term Exam (Computer Lab-1.5 hr. Exam).
- Final Term Exam (Computer Lab-3 hr. Exam).

Assessment Pattern

Class Participation	5 %
Quizzes & Tests	10 %
Laboratory Tests	10 %
Term Project	15 %
Unseen Mid-Term Exam	20 %
Unseen Final Exam	40 %
Total	**100%**

Learning Unit Contact Hours

Lectures	4.5	hrs / week
Total class contact hours	63	hrs/semester
Total self study hours	45	hrs/semester
Total study hours	108	hrs/semester

Module Leader:

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: ISE 456**
Title	**: Facilities Planning & Design**
Level	**: 4**
Credit Hours	**: 3**
Prerequisites	**: ISE 355**

AIMS

This module is designed to provide students with an understanding of the Facilities Planning Strategy. The Facilities Planning for Manufacturing and assembly is based on product, process, schedule, and facilities design. Analytical approaches and computerized procedures are introduced to find the optimal location and layout of the plant, as well as material handling equipment used in warehousing and manufacturing.

SYLLABUS

Topics
Defining Requirements, Space Requirements.
Flow Paterns, Quantitative and Qualitative Flow Measurements.
Personal Requirements: Parking, Locker Rooms, Restrooms, Road Services, Health Services, Measures for Disabled Persons.
Material Handling: Principles, Design, Equipment.
Layout Design Methods, Methods for Improving Layout Design, Computer-Aided Layout.
Storage and Warehousing Departments Designs, Receiving and Shipping Departments Design.
Quantitative Facilities Planning Models: Single and Multiple Facility Location Problems, Warehouse Facility and Location Allocation Models.
Site Location.

Learning Outcomes

A- Knowledge

After completing this module, students will be able to :

6. Plan to use appropriate techniques, and tools to identify, formulate, analyze plant location, plant layout, and material handling systems.
7. Review some of the basic types of quantitative layout models.
8. Evaluate requirements and apply facility design concepts to the design of an actual facility or through a case study.

B- Skills

After completing this module, students will be able to:

13. Analyse the quantity of flow and space requirements, and characterize adjacency requirements for a facility.
14. Apply basic quantitative models to layout data.

Teaching/Learning Strategies

- Lectures
- Tutorials

- Class Presentation
- Individual/Group Projects

ISE 456

Learning Materials

Useful Websites:

- http://www.fpm.iastate
- http://www.utsystem.edu
- http://www.fpd.ohio-stste.edu

Reference Text

- Meyers Fred, Manufacturing Facilities Design and Material Handling , Prentice Hall, 4th ed., 2009.

Supplementary Readings

- Apple, J.M., Plant Layout and Materials Handling, John Wiley and Sons, 2000.
- Francis, L.R. and White, J. A., Facility Location and Layout: An Analytical Approach, Prentice Hall Inc., 1998.
- Tompkins, White, Bozer, Frazelle, Tanchoco, & Trevino, Facilities Planning, John Willey Inc., 3rd ed., 1996.
- Clark, J.E., Facility Planning: Principles, Technology, Guidelines, Pearson Prentice Hall, 2008

Assessment Scheme

- Weekly written Assignments (12 Home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Individual/Group Projects.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

• Class Participation	5%
• Assignments	10%
• Tests and Quizzes	10%
• Term Projects and Reports	15%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3	hrs / week
• Tutorials	1.5	hrs / week
• Total class contact hours	63	hrs/semester
• Total self study hours	45	hrs/semester
Total study hours	**108**	**hrs/semesterr**

Module Leader

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: ISE 461**
Title	**: Maintenance Planning & Control**
Level	**: 4**
Credit Hours	**: 3**
Prerequisites	**: ISE 451**

AIMS

This module is designed to provide students with an understanding of the objectives and organization of maintenance systems. Planning of maintenance operations. Estimation of time and cost of maintenance operations. Manpower requirements planning. Spare parts requirements planning. Preparation of maintenance budgets. Annual and monthly maintenance plans. Planning plant shutdown. Equipment reliability and failure. Control of maintenance operations. Performance evaluation of maintenance systems. Analysis and solution of maintenance problems. Maintenance management by computer. Real case studies.

SYLLABUS

Topics
Maintenance Systems.
Maintenance Operations and Control.
Preventive Maintenances, Concepts Modeling, and Analysis.
Maintenance Work Measurement.
Maintenance Forecasting and Capacity Planning.
Maintenance Planning and Scheduling.
Maintenance Material Control.
Maintenance Quality Control.
Computerized Maintenance Management Systems.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Review detailed information of the types of maintenance systems including preventive maintenance.
2. Develop an in-depth understanding of the planning, time estimation, operation cost, manpower requirements, spare parts needed, and maintenance budget.

B- Skills

After completing this module, students will be able to:

1. Critically review modern concepts and techniques utilized in maintenance management.
2. Evaluate the managerial capabilities to improve the performance of maintenance operations.

Teaching/Learning Strategies

- Lectures.
- Tutorials.

- Individual/Group Project.
- Class Presentation.

Learning Materials

Useful Websites:

- http://www.ttp.co.za
- http://www.bus-perf.co.uk
- http://www.asu.edu
- http://www.enre.umd.edu
- http://www.wisdom.arl.psu.edu
- http://www.smrp.org
- http://www.sre.org

Reference Text:

- Duffuaa, S.O. and Raouf, A., Planning and control of maintenance Systems: Modeling and Analysis, John Wiley Inc., 1999.

Supplementary Readings:

- Joshi, S., and R. Gupta. Scheduling of Routine Maintenance Using Production Schedules and Equipment Failure History, Computer and Industrial Engineering, 1992.
- Maggard, B.N. and Rhyne, D.M., Total Productive Maintenance: A Timely Integration of Production and Maintenance, Production and Inventory Management Journal 1992.
- Mann, L., Jr., Maintenance Management. Lexington, MA: Lexington Books, 1983
- Schneeweiss, C.A., and Schroder, H., Planning and Scheduling the Repair Shops of the Deutsche Lufthansa AG: A Hierarachical Approach., Production and Operations Management 1992.

Assessment Scheme

- Weekly written Assignments (12 Home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Individual/Group Projects.
- Unseen written and Computer Mid-Term Exam (1.5-hr. Exam).
- Unseen written and Computer Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	5%
Assignments	10%
Tests and Quizzes	10%
Term Project and Reports	15%
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3 hrs / week
Tutorials	1.5 hrs / week
Total class contact hours	63 hrs / semester
Total self study hours	45 hrs / semester
Total study hours	108 hrs / semester

Module Leader

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Lu Code	**: DES 462**
Title	**: Product Development & Design**
Level	**: 4**
Credit Hours	**: 3**
Prerequisites	**: DES 352**

AIMS

This module is designed to enable students to practice the development and design processes of a product within a project, starting from the recognition of a need, passing through conceptual design, materials selection, analysis, optimization, evaluation, prototyping and/or modeling simulation. Criteria for product development to be taken into consideration: ergonomics, safety, manufacturability, Packaging, costing, marketing, uses, reliability, maintainability, environmental impact and product life cycle.

SYLLABUS

Topics
Product Development Processes and Organization.
Business Fundamentals: Product Life Cycle, Learning Curve and Competitive Forces.
Product Planning and Environmental Impact.
Product Development Economics.
Patent and Intellectual Property.
Managing Projects.
Identifying Customer Needs.
Product Specifications and Concept Generation.
Concept Selection and Concept Testing.
Product Architecture and supply chain
Industrial Design and Ergonomics.
Design for Manufacturing Optimization.
Prototyping and Simulation.
Robust Design and Taguchi Loss.

LEARNING OUTCOMES

Knowledge

After completing this module, students will be able to:

1. Explore all aspects required to develop and design a new product.
2. Critically review the various factors affecting the development and design of a new product.

Skills

After completing this module, students will be able to:

1. Synthesize the structure of a systematic design process in a basic design cycle.
2. Enhance capabilities in the best product design by presenting several alternatives.
3. Judge, evaluate, and select the optimum design.

Teaching/Learning Strategies

- Lectures.
- Projects.
- Tutorials.

Learning Materials

Useful Websites:

- http://www.manufacturing.net
- http://www.ulrich-eppinger.net
- http://www.sdmagazine.com
- http://www.ideo.com
- http://www.logicpd.com
- http://www.hbs.edu

Reference Text:

- Ulrich, Karl T. & Steven D. Eppinger, Product Design and Development, McGraw Hill, Fourth Edition, 2008.

Supplementary Readings:

- Bralla, Handbook of Product Design for Manufacturing, 2nd ed., 1986.
- Booker, J. D., Design capable and Reliable Products, Heinmann, 2001.
- Roozenburg, N.F.M. and Eekels, J., Product Design: Fundamentals and Methods, John Wiley Inc., 1995.

Assessment Scheme

- Weekly Design Assignments (6 Home Assignments).
- Individual and/or Team Project.
- Unseen Mid-Term Exam (1.5-hr. Exam).
- Unseen Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	5%
Quizzes & Tests	10%
Individual Design Notebook (Assignments)	10%
Final Written Report and Oral Presentation	15 %
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3 hrs / week
Tutorials	1.5 hrs / week
Total class contact hours	63 hrs/semester
Total self study hours	45 hrs/semester
Total study hours	108 hrs/semester

Module Leader:

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: MFG 4631**
Title	**: Materials and Process Selection**
Level	**: 4**
Credit Hours	**: 3**
Prerequisites	**: MFG 4531**

AIMS

This module is designed to introduce students to a systematic approach for the selection of the best material for a given application. It also introduces the complex cases for applications requiring multiple criteria. Ashby plots and cost issues are studied in details. The concepts are treated through several case studies.

SYLLABUS

Topics
Behaviour and Processing of Engineering Materials: Metals, Polymers, Ceramics and Composites.
Effect of Material Properties and Manufacturing Process on Design.
Material Selection Charts, Selection of Material and Shape.
Multiple Constraints and Compound Objectives.
Data Sources.
Economics of Materials.
Economics of Manufacturing Processes.
Aesthetics and Industrial Design.
Forces for Change.
Case Studies and Project.

Learning Outcomes

Knowledge

After completing this module, students will be:

1. Review use of the materials.
2. Optimize the over-all cost, including both of the material and of fabricating it.
3. Recognize the material specifications systems and available forms.

Skills

After completing this module, students will be able to:

1. Use the most important properties of different materials for different applications and fabrication processes.
2. Optimize the selection of material for design and manufacturing processes for both metallic and non-metallic material as well as the combinations of them.

Teaching/Learning Strategies

- Lectures .
- Video Taps.

- Tutorials.
- Experimentation Project.

Learning Materials

Software Requirements

- Lap. at MAS.
- Video Tapes.

Reference Text

- Young, J.F., "Materials and processes", Marcel.Dekker, 3rd ed., 1985.
- Doam, "principles of physical metallurgy", Latest Edition.

Hardware Requirements

- Standard devices for Lab. Experiments.

Supplementary Readings

- Elsabbagh, "Introduction to Production Engineering", Ein Shams University, Cairo.
- Elsabbagh, "Physical Metallurgy", Ein Shams University , Cairo, Latest Edition.
- Van vlack, "Elements of Materials Science", Prentice Hall, 6th ed., 1989.
- Kohn and Star Field, "Materials and processes", Macmillan, 1952.
- Rollason, "Metallurgy for Engineer", Edward Arnold, London, 1987.

Assessment Scheme

- Weekly Written Assignments (12 Home Assignments).
- Short Written Quizzes (4-10 min. Quizzes)
- Class Written Tests (2-1.5 hr. tests).
- Individual Practical Project.
- Unseen Written Mid- Term Exam (1.5-hr Exam).
- Unseen Written Final-Exam (3-hr Exam).

Assessment Pattern

• Class Participation	5%
• Assignments	10 %
• Tests and Quizzes	10%
• Term Projects	15%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3 hrs / week
• Tutorials	1.5 hrs / week
• Total class contact hours	63 hrs/semester
• Total self study hours	45 hrs/semester
Total study hours	**108 hrs/semester**

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: ISE 4632**
Title	**: Green Manufacturing Systems**
Level	**: 4**
Credit Hours	**: 3**
Prerequisites	**: ISE 4532**

AIMS

This module is designed to provide students with a systems view of the manufacturing process that aims to efficiently use energy, water and raw materials in order to minimize air and water pollution and generate solid waste per unit of manufactured product. Ways to decrease energy consumption, industrial safety and loss prevention. Design to promote by-product use and product recycling, establish optimization strategy, devise treatment strategies for manufacturing wastes, maximize yield and minimize waste effluents, environmental strategy and policy making, environmental engineering systems.

SYLLABUS

Topics
Mass and Energy Transfer
Environmental Chemistry
Mathematics for Growth
Risk Assessment
Water Pollution
Water Quality Control
Air Pollution
Global Atmosphere Change
Solid Waste Management
Recourse Recovery and Recycling

Learning Outcomes

Knowledge

After completing this module, students will be:

9.Review the basic concepts of Green Manufacturing

10. Analyze the Environmental Engineering Systems and their utilization in an Environmental Friendly Enterprise

Skills

After completing this module, students will be able to:

1. Gain in-depth the understanding of various efficient energy consumption Techniques through real case studies
2. Develop capabilities in applying various green manufacturing techniques through in-class project

Teaching/Learning Strategies

- Lectures.
- Projects.

- Tutorials

Learning Materials

Software Requirements

- Microsoft Office 2007, Microsoft Project 2007

Useful Websites

- Annual Rev. of Energy and Environment
- Association of Manufacturing Excellence

Reference Text

- Gilbert M. Masters, Introduction to Environmental Engineering and Science, Prentice Hall, 3rd ed., 2007.

Supplementary Readings

- David T. Allen and David R. Shonnard, Green Engineering, Prentice Hall, 2002.
- Mackenzie L. Davis and David A. Cornwell, Introduction to Environmental Engineering, Mc Graw Hill, 4th edition
- Joseph A. Salvato, Nelson L. Nemerow, and Franklin J. Agardy: Environmental Engineering, John Wiley & Sons Inc. 2003
- Green Manufacturing: Case Studies in Leadership and Improvement (Enterprise Excellence) by the Association of Manufacturing Excellence
- Pamela J Gordon, Lean and Green: Profit for Your Workplace and Environment
- Daniel Esty and Andrew Winston, Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value & Build Competitive Advantage
- Ame, Green Manufacturing: Case Studies in Leen and Sustainability, Productivity Pr, 2007.

Assessment Scheme

- Weekly Designed Assignments (12 Home Assignments)
- Real Industrial Enterprise Case-Study Project
- Unseen Mid-Term Exam (1.5-hr Exam)
- Unseen Final-Exam (3-hr Exam)

Assessment Pattern

• Class Participation	5%
• Tests & Quizzes	10 %
• Term Project	15%
• Homework Assignments	10%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3	hrs/week
• Tutorials	1.5	hrs/week
• Total Class contact hours	63	hrs/semester
• Total self study hours	45	hrs/semester
Total study hours	**108**	**hrs/semester**

Module Leader

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: ISE 464**
Title	**: Robotics**
Level	**: 4**
Credit Hours	**: 3**
Prerequisites	**: ISE 454**

AIMS

This module is designed to provide students with a thorough understanding of the robot technology including definition, classification, applications, components, and specification characteristics, robot selection, robot geometry and workspace. Homogeneous transformation matrix, robot kinematic-modeling, and robot motion planning.

SYLLABUS

Topics
Introduction, Robot Components, Degrees-of-Freedom, and Joints.
Robot Coordinates Workspace, Reference and Applications.
Robot kinematics and Position Analysis, Matrix Representation.
Homogeneous Transformation Matrices.
Robot Kinematic-Modeling (Forward and Inverse Kinematics).
Denavit-Hartenberg Representation in Kinematic Analysis of Robot
Differential Motions and Velocities, Differential Relationships, Jacobian.
Trajectory Planning: joint space and Cartesian space trajectory planning,
Robot Economics: Analysis and Justifications.
Robot Safety and Maintenance.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Explore the basics of robot technology and its mathematical modeling tools.
2. Evaluate the robot geometry and workspace.

B- Skills

After completing this module, students will be able to:

1. Evaluate the structure of any robot, degrees of freedom, type of joints, sensors attached and the robot workspace. Explore the kinematics and dynamics analyses of the robot.
2. Analyze the forward and inverse kinematics using Denavit-Hartenberg representation.
3. Utilize the robot Jacobian and apply it to control the motion of the robot.
4. Design the robot trajectory either in joint space or Cartesian space for specified tasks.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Individual Project.
- Class Presentation.

Learning Materials

Software Requirements:

- MATLAB

Useful Websites:

- http://www.robotics.org
- http://www.irobot.com
- http://www.robtics.com
- http://www.thetech.org

Reference Text:

- Niku,S. B., Introduction to Robotics, Analysis, Systems, Applications, Prentice Hall, 2001.

Supplementary Readings:

- Craig, J. J., Introduction to Robotics, 3rd ed., Prentice Hall**,** 2005**.**
- Murphy, Robin R., Introduction to Al Robotics, MIT Press, 2000.
- Fuller, J. L., Robotics: Introduction, Programming, and Projects, Prentice Hall, 1999.
- Megahed S.M., Principles of Robot Modeling and Simulation, John Wiley Inc., 1993.
- Gonzalez, FU, K. S., Lee, C.S.G., Robotics: Control, Sensor, Vision and intelligence, McGraw Hill Co., 1986
- Tsai L-W**,** Robot analysis: The Mechanics of Serial and Parallel Manipulators, John Wiley, 1999**.**

Assessment Scheme

- Weekly written Assignments (8 Home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	5 %
Assignments	10%
Tests and Quizzes	10%
Term Project and Reports	15%
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3 hrs / week
Tutorials	1.5 hrs / week
Total class contact hours	63 hrs/semester
Total self study hours	45 hrs/semester
Total study hours	108 hrs/semester

Module Leader

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: ISE 465**
Title	**: Quality Management & Assurance**
Level	**: 4**
Credit Hours	**: 3**
Prerequisites	**: ISE 452**

AIMS

This module is designed to provide students with a good understanding of the theories and concepts of total quality management and systems. The topics covered are the views and philosophies of the quality gurus, the development of the quality field from the inspection level to the modern six sigma and Total Quality Management levels, the pillars of total quality, the six sigma perspective to quality management, the implementation and use of the six sigma tools, and the international quality standards. Case studies will be used to introduce and discuss the various components of the course.

SYLLABUS

Topics
Definitions of Quality, Quality Control, Quality Assurance, and Total Quality Management (TQM).
Philosophies and Views of the Quality Gurus.
Basic Concepts of TQM: Customer Focus, Management Commitment, Employees Involvement, Supplier Partnership, Continuous Improvement, Process Measurement.
Ethics and Quality Statements.
Customer Satisfaction and Customer Retention.
Performance Measures.
Quality Costs and Quality Awards.
Benchmarking, Quality Function Deployment.
International Quality Standards (ISO 9000 & ISO 14000 Series).

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Define Quality, Quality Control, Quality Assurance, and Tool Quality Management with a total-system perspective.
2. Review the basic concepts of Philosophies of the Quality Gurus.
3. Gain knowledge of the Total Quality Management perspective and appraise its basic concepts.
4. Plan the roles of statistical thinking in quality management.
5. Review the goals of the international quality standards and their systems.

B- Skills

After completing this module, students will be able to:

1. Design a perspective for implementing the Total Quality Management concepts.
2. Develop the statistical thinking skills in controlling and monitoring quality.
3. Develop an in-depth understanding of the Quality Management Systems and standards and participate in their implementation.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Individual/Group Projects.
- Class Presentation.

Learning Materials

Useful Websites:

- http://www.quality.de
- http://www.americanquality.com
- http://www.iso.ch
- http://www.airquality.org

Reference Text:

- Evans J., Lindsay W., The Management and Control of Quality, South Western College Publications, 7th ed., 2008.

Supplementary Readings:

- Juran, J. M. and Blanton, Godfery A., Juran's Quality Control Handbook, McGraw Hill Book Co., 2000
- Gryna, F. M., Quality Planning and Analysis, McGraw Hill Book Co., 2001.
- Grant, E.L., Statistical Quality Control, McGraw Hill, Co., 1996.
- Besterfield D., C. Besterfield, G. Besterfield, and M. Besterfield, Total Quality Management, Prentice Hall Co. 2nd ed., 1999.

Assessment Scheme

- Weekly written Assignments (12 Home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Individual/Group Projects.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

• Class Participation	5%
• Assignments	10%
• Tests and Quizzes	10%
• Term Projects and Reports	15%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3 hrs / week
• Tutorials	1.5 hrs / week

- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader

Staff

ISE 465

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: ISE 466**
Title	**: Project Management**
Level	**: 4**
Credit Hours	**: 3**
Prerequisites	**: ISE 355**

AIMS

This module is designed to provide students with an analysis of real world complex project systems including planning phase, scheduling phase and control phase. The Planning Phase includes network development, precedence diagramming as well as expansion, condensation and elimination of activities. The scheduling phase includes deterministic and probabilistic duration times, forward and backward pass computation, slack time calculation, and critical path identification. The control phase includes cost control monitor, resource constrains, and time-cost tradeoff. Organization staffing and evaluating alternatives are also included. Real case studies.

SYLLABUS

Topics
Principles of Project Management.
Project Planning and Work Breakdown.
Structure of Networks: Arrow Diagram, Precedence Diagram, Overlapping Networks.
Duration Time Estimates: Deterministic and Probabilistic.
Project Scheduling Phase .
Basic Scheduling Computations (CPM, PERT, Overlapping).
Slack Time Computation, Critical Path Identification
Project Control: Gantt Chart, S-Curve.
Resource Constraints & leveling.
Time-Cost Trade-Off & Crashing.
Real Case Study.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Review the basic concepts and principles of project management.
2. Develop an in-depth understanding of the three phases of project management: planning phase, scheduling phase and control phase.

B- Skills

After completing this module, students will be able to:

1. Apply project management software to create project management documents

such as work breakdown structures, Gantt charts, network diagram, schedules, financial reports and status reports; as well as to complete project management analyses such as sensitivity analysis, resource allocation, leveling and cost analysis.

2. Plan and analyze of the project managemenet phases through real case studies.
3. Plan to communicate potentialities and strategies for resolving issues which occur during the project.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Individual Project.
- Class Presentation.

Learning Materials

Software Requirements:

- Win QSB, MS Project 2003.

Useful Websites:

- http://www.csiwin.com , http://www.jsaproj.com
- http://www.arch.uiuc.edu , http://www.criticaltools.com
- http://www.cher.eda.doc.gov

Reference Text:

- Nicholas, John M. , "Managing Business and Engineering Projects", Prentice Hall, 2nd ed., 2001.

Supplementary Readings:

- Moder, J.J., Philips, C.R. and Davis, E.W., Project Management with CPM, PERT and Precedence Diagramming, Blitz Publishing Co., U.S.A., 3rd ed., 1983.
- Cleland,D. I., and W.R. King. Project Management Handbook. New York: Van Nostrand Reinhold Co., 1984.
- Keefer, D.L., and W.A. Verdini. Better Estimation of PERT Activity Time Parameters. Journal of Management Science, 1993.
- Kerzner, H., and H. Thamhain. Project Management for Small and Medium Size Business. Van Nostrand Reinhold Co., 1984.
- Kim, S., and R.C. Leachman. Multi-Project Scheduling with Explicit Lateness Costs., IIE Transactions, 1993.
- Cleland, D. I., Project Management, McGraw-Hill, 3rd ed., 2004.

Assessment Scheme

- Weekly written Assignments (12 Home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Individual Projects.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

- Assignments 10%
- Tests and Quizzes 10%
- Term Project and Reports 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

Total	**100%**

Learning Unit Contact Hours

- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader

Staff

ISE 466

500's LEVEL MODULES

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: ISE 551**
Title	**: Design of Experiments**
Level	**: 5**
Credit Hours	**: 3**
Prerequisites	**: ISE 465**

AIMS

This module is designed to provide students with Design of Experiments Techniques that are effective for studying the factors that may affect a product or process. It also provides students with the capability to analyze experimental results in order to identify the significant factors and evaluate ways to improve and optimize the design.

SYLLABUS

Topics
Statistical Concepts.
Experiments of Evaluation.
Experiments of Comparison.
Randomized Blocks, Latin Squares and Related Designs.
Factorial and Fractional Factorial Experiments.
True Correlation and Regression Analysis.
Non Parametric Experiments.
Taguchi's Contribution to the Design of Experiments.

LEARNING OUTCOMES

C- Knowledge

After completing this module, students will be able to:

3. Review the basic concepts and principles of Design of Experiments.
4. Develop an in-depth understanding of the Design of Experiments techniques.

D- Skills

After completing this module, students will be able to:

1. Carry Full and Fractional Factorial Designs.
2. Make Hypothesis Testing.
3. Condact ANOVA analysis
4. Make advanced experimental Design of Experiments methods including Taguchi method.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Individual Project.
- Class Presentation.

Learning Materials

Software Requirements:

- Minitab.

Useful Websites:

- www.sas.com/training/us/css.

- www.statstanford.edu

Reference Text:

- Douglas C. Montgomery, Design and Analysis of Experiments, John Wiley and Sons, latest edition.

Supplementary Readings:

- Lipson, C. and Sheth, N.J., Statistical Design and Analysis of Engineering Experiments, Macgraw Hill Book Company, New York, Latest edition.
- Peter, G. and Bradley, J., Optimal Design of Experiments: A Case Study Approach, John Wiley and Sons, Latest Edition.

Assessment Scheme

- Weekly written Assignments (12 Home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Individual Projects.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

• Assignments	10%
• Tests and Quizzes	10%
• Term Project and Reports	20%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3	hrs / week
• Tutorials	1.5	hrs / week
• Total class contact hours	63	hrs/semester
• Total self study hours	45	hrs/semester
Total study hours	**108**	**hrs/semester**

Module Leader

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	: **GSE 552**
Title	: **Legislations & Contracts**
Level	: **5**
Credit Hours	: **3**
Prerequisites	: **ISE 466**

AIMS

This module is designed to provide students with an overview of their liabilities and rights according to the valid laws and regulations governing the engineering works in all its specializations. It reviews and explains theoretically and practically such laws and makes references known to them.

SYLLABUS

Topics
Law and regulations concerning engineering syndicate, Contractors union and environment protection.
Relationship between the parties of local and international contracts in civil and administrative laws.
Claims and disputes resulting during execution of works and the engineer's decision in this respect.
Settlement of disputes in local and international contracts, institutional arbitration.

LEARNING OUTCOMES

E- Knowledge

After completing this module, students will be able to:

5. Understand their legal rights and responsibilities..
6. Develop knowledge, skills, and positive attitudes about the law.
7. Develop problem-solving and decision-making skills with regard to legal issues and problems.

F- Skills

After completing this module, students will be able to:

4. Practice negotiation, meditation, arbritration, and dispute resolution.
5. Make good contract administration.
6. Interact with workers, employees, and employers in a common employment law environment.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Individual Project.
- Class Presentation.

Learning Materials

Software Requirements:

- none

Useful Websites:

- www.slu.edu/x11296.xml
- www.iaccm.com/development
- www.workcover.nsw.gov.au

Reference Text:

- Professors notes in the lectures.

Supplementary Readings:

- Ewan, M., Contract Law: Cases and Materials, Oxford University Press, 2005.
- Norman, S., Law of Employment, Oxford University Press. 2008.

Assessment Scheme

- Weekly written assignment (10 Home Assignments).
- Short Written Quizzes.
- Individual/group term projects.
- Unseen Written Mid-Term Exam.
- Unseen Written Final-Exam.

Assessment Pattern

• Class participation	5%
• Assignments	10%
• Quizzes	15%
• Term Paper	10%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3 hrs / week
• Tutorials	1.5 hrs / week
• Total class contact hours	63 hrs/semester
• Total self study hours	45 hrs/semester
• Total study hours	108 hrs/semester

Module Leader

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	: **MFG 5531**
Title	: **Non Conventional Manufacturing Processes**
Level	: **5**
Credit Hours	: **3**
Prerequisites	: **MFG 4631**

AIMS

This module is designed to provide students with the fundamentals of some non-conventional processes such as Chemical Machining (CM), Electrochemical Machining (ECM), Electric Discharge Machining (EDM), Laser Beam Machining (LBM), Electron Beam Machining (EBM), Ultrasonic Machining (USM), Abrasive Jet Machining (AJM), Hydrodynamic Machining (HDM) and Abrasive Flow Machining (AFM). Focus on the use of new tools, concepts, terminology, function and industrial applications of each process of non-conventional processes.

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SYLLABUS

Topics
Fundamentals of Chemical Machining(CM).
Steps of CM and Applications.
Chemical Milling and Chemical Blanking.
Electrochemical Machining (ECM), Terminology and Rate of Metal Removal.
Some Industrial Applications of ECM.
How EDM occurs, its Machine Parts and Types of Flashing.
Electric Discharge Wire Cut (EDWC), Rate of Metal Removal.
US Transducer and US Drilling Machine.
LBM, EBM, and AJM.
Hydrodynamic Machining (HDM).
Abrasive Flow Machining (AFM).

Learning Outcomes

A- Knowledge

After completing this module, students will be able to:

1. Review the different techniques of non-conventional processes.
2. Know the different industrial applications of non-conventional processes.
3. Evaluate the technique of metal cutting by non-conventional machines.

B- Skills

After completing this module, students will be able to:

1. Understand the effect of different process variables of non-conventional processes.
2. Transfer methods of developing CNC programming for new applications.

3. Enhance capabilities on which non-conventional machine should be used for each complicated work piece shape.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Video Tapes.
- Field Visits and Project.

Learning Materials

Hardware Requirements

- Field Trips.
- Video Tapes.

Reference Text

- Serope Kalpakjian, Schmid, S., "Manufacturing process for engineering materials", Prentice Hall, 5th ed., 2007.

Supplementary Readings

- Krar S.F., Oswold ,J.W. and Amand, J.E., "Technology of machine Tools", Mc Graw- Hill Book Company, 3rd. ed., 1984.
- McGeough, "Advanced methods of machining", Chapman and Hall, London, 1st ed., 1988.
- Kumar, B, "Manufacturing Processes and Technology", Khanna publishers , Delhi, 2002.
- De Barr and Oliver, " Electrochemical machining", Macdonald and Co (publishers) Ltd., London, 1968

Assessment Scheme

- Weekly Written Assignments (12 Home Assignments).
- Short Written Quizzes (4-10 min. Quizzes)
- Class Written Tests (2-1.5 hr. tests).
- Individual Practical Project.
- Unseen Written Mid- Term Exam (1.5-hr Exam).
- Unseen Written Final-Exam (3-hr Exam).

Assessment Pattern

• Assignments	10 %
• Tests and Quizzes	10%
• Term Projects	20%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3 hrs / week
• Tutorials	1.5 hrs / week
• Total class contact hours	63 hrs/semester
• Total self study hours	45 hrs/semester
Total study hours	108 hrs/semester

Module Leader

Staff

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FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: ISE 5532**
Title	**: Design For X**
Level	**: 5**
Credit Hours	**: 3**
Prerequisites	**: ISE 4632**

AIMS

This module introduces students to the design of systems from the design for X perspective. Design for X teaches how to deal with conflicting and ever increasing number of constraints in the design process. It teaches the students to adopt a systematic design approach that address issues related to manufacture, assembly, environment, reliability and other factors from concept design stage to product manufacture.

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SYLLABUS

Topics
Design for Manufacture
Design for Assembly
Design for Disassembly
Design for Recyclability
Design for Environment
Design for aesthetics
Design for Performance
Design for Ergonomics
Other criteria and case studies

Learning Outcomes

A- Knowledge

After completing this module, students will be able to:

4. Understand the criteria when developing new products.
5. Know and evaluate methodologies in product development.

B- Skills

After completing this module, students will be able to:

4. Employ a structured process realization process necessary for successful product development.
5. Identify customer needs and create quality products.
6. Apply consistent methodologies till producing quality products at low cost.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Video Tapes.
- Field Visits and Project.

Learning Materials

Reference Text

- Karl, T. and Steven D.E., Product Design and Development, McGraw Hill, Latest edition.

Supplementary Readings

- Bryan, J.L., Protecting Your Ideas: The Inventor's Guide to Patents, Academic Press, 1999.
- Billatos, B., Green Technology and Design for the Environment, Taylor and Francis, 1997.
- Kawasaki, G., The Art of the Start, Portfolio, 2004
- Kelley, T., The Art of Innovation, Doubleday, 2001.

Assessment Scheme

- Weekly Written Assignments (12 Home Assignments).
- Short Written Quizzes (4-10 min. Quizzes)
- Class Written Tests (2-1.5 hr. tests).
- Individual Practical Project.
- Unseen Written Mid- Term Exam (1.5-hr Exam).
- Unseen Written Final-Exam (3-hr Exam).

Assessment Pattern

• Assignments	10 %
• Tests and Quizzes	10%
• Term Projects	20%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3 hrs / week
• Tutorials	1.5 hrs / week
• Total class contact hours	63 hrs/semester
• Total self study hours	45 hrs/semester
Total study hours	**108 hrs/semester**

Module Leader

Staff

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MODULE OUTLINE

Module Code	**: ISE 554**
Title	**: Graduation Project (Part I)**
Level	**: 5**
Credit Hours	**: 3**
Prerequisites	**: Min. credits 138 & Min. Cum. GPA 2**

AIMS

This module is designed to enable senior students to perform appropriate research, and apply relevant engineering standards to develop a solution of a problem, or a design of a system. Students may suggest their own projects, or receiving proposals from supervisors or company sponsor.

SYLLABUS

Topics
Define the Problem.
Identify Research Plan.
Formulate a Student Team.
Select the Designated Supervisor .
Carry - out Field Trips .
Conduct Background Research.
Perform Problem Analysis.
Submit a Pre- and Mid – Written Reports.
Prepare Oral Presentations.

Learning Outcomes

A- Knowledge

After completing this module, engineering students will be able to:

1. Apply research methods and techniques to contribute to a solution of an engineering problem.
2. Gain knowledge and understanding of how to deal with real life industrial or service system.

B- Skills

After completing this module, engineering students will be able to:

15. Contact a company sponsor, if any, to recognize its needs.
16. Perform appropriate scientific research, and apply relevant engineering standards to develop formal requirements for the solution of a problem or the design of a system.
17. Employ alternative approaches and designs, on the basis of engineering principles to meet those requirements.
18. Implement or operate the designated model, prototype, or method to satisfy those requirements.
19. Evaluate the results against the requirements, using performance measures.
20. Recognize the possible potential adverse environmental, safety, health, and social impacts of the project.

21. Compose a variety of research documents including professional communications, letters and sketches in a student portfolio.
22. Produce collaboratively appropriate written reports, taking in consideration the format and citation.
23. Prepare oral presentations for supervisors and senior students during several seminars.

Teaching/Learning Strategies

- Orientation Sessions.
- Review and discussion Sessions.
- Team projects.
- Presentations.
- Field trips.

Learning Materials

Software Requirements

- Suitable software packages and/or.
- Building own computer programs.

Reference Text:

- Suitable textbooks and scientific journals in the field of the project.

Supplementary Reading:

- Scientific Papers.
- Research Reports
- Engineering Manuals.
- Technical Catalogues.

Assessment Scheme

- Weekly contacts with supervisor.
- Pre - and Mid- Written Reports.
- Several Oral Presentations.

Assessment Pattern

• Supervisor's Evaluation	40 %
• Examiners' Staff Evaluation	60 %
Total	**100 %**

Leaning Unit Contact Hours

• Sessions	3 hrs / week
• Total class contact hours	42 hrs / semester
• Total other study hours	66 hrs / semester
• Total other study hours	108 hrs / semester

Module Leader

Staff

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MODULE OUTLINE

Module Code	**: ISE 561**
Title	**: Simulation Modeling and Analysis**
Level	**: 5**
Credit Hours	**: 3**
Prerequisites	**: ISE 355**

AIMS

This module is designed to provide senior students with an in-depth understanding of the simulation modeling process. Topics covered include the fundamental concepts of simulation modeling. The time advance mechanisms, input data analysis techniques, model validation and verification concepts, designing simulation experiments, and simulation output analysis approaches. Hands-on exercises to be conducted to develop discrete–event simulation models using the simulation package ARENA with applications from the manufacturing and service sectors.

SYLLABUS

Topics
Queuing Theory
Monte Carlo Simulation.
Types of simulation and Time Advance Mechanisms.
Basics of Discrete Event Simulation.
Random Number Generation.
Input Data Analysis and Probabilistic Didtributions.
Model Building Process with SIMAN Language (ARENA Package).
Model Validation and Verfication.
Simulation Output Analysis.
Stopping Rules.
Case Studies.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Critically review the decision processes in planning and operation of manufacturing systems.
2. Demonstrate how simulation can be used as a decision support system in planning and operation of manufacturing systems.
3. Review models for analyzing real-world production planning and operations decisions.
4. Utilize Principles of discrete event simulation and a simulation language (ARENA).
5. Utilize Principles of Monte Carlo Simulation.

B- Skills

After completing this module, students will be able to:

1. Demonstrate the "Best " ways to design and perform simulation experiments.
2. Evaluate the data obtained from simulation to help make sound decisions(statistical data analysis).

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Individual/Group Projects.
- Class Presentation.

Learning Materials

Software and Computer Usage:

- ARENA Software Package will be used.The student version(Full version with a limit on number of entities in the model)comes with the simulation with ARENA book.

Useful Websites:

- http://www.me.uic.edu
- http://www.ise.ufl.edu

Reference Text:

- Kelton W.D., R. Sadowski, Sturrock D., Simulation With Arena, McGraw–Hill, 4th ed., 2007.
- Law A., and W.D. Kelton, Simulation Modeling and Analysis, McGraw–Hill,4th ed. ,2007.

Supplementary Readings:

- Pidd M., Computer Simulation Management Sciences, John Wiley Inc, 4th ed.,1998.
- Karayanakis, and N. M., Advanced System Modelling and Simulation with Block Diagram Languages, CRC Press, 1995.
- Bernard, P., Herbert, P. , and Tag Jon Kim, Theory of Modeling and Simulation, Academic Press, 2000.
- Sheldon Ross, Simulation, Academic Press, 3rd ed., 2008.

Assessment Scheme

- Weekly written and Computer Assignments (6 home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Individual Computer Project
- Unseen written and Computer Mid-Term Exam (1.5-hr. Exam).
- Unseen written and Computer Final-Exam (3-hr. Exam).

Assessment Pattern

• Assignments	10%
• Tests and Quizzes	10%
• Individual Computer Project and Report	20%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	1.5 hrs / week
• Computer Laboratories	3 hrs / week
• Total class contact hours	63 hrs/semester
• Total self study hours	45 hrs/semester
Total study hours	**108 hrs/semester**

Module Leader

Staff

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MODULE OUTLINE

Lu Code	**: GSE 562**
Title	**: Ethics, Safety and Health**
Level	**: 5**
Credit Hours	**: 3**
Prerequisites	**: ISE 354**

AIMS

This module is designed to provide the principles of engineering ethics, as professional ethics, opposed to personal morality. It sets the standards for professional practice to help students deal with issues they would face in their professional practice. It provides students with how serious and frequent hazards arise, how to assess the risks involved, and how to eliminate or control these risks. Theories of self protective behavior and accident prevention are studied. Safety program effectiveness is analyzed. Methods of risk assessment and reduction is discussed. Advanced hazard communication is provided. Students will analyse variety of Case Studies.

SYLLABUS

Topics
• Lab Safety and Health Movement: an Overview.
• Ethical Guidelines in Engineering Work.
• Scope of Engineering Ethics.
• Case studies in Engineering Ethics.
• Ethical Guidelines in Research.
• Different codes of Ethics: an Overview.
• Managing Health and Safety.
• Industrial Hygiene.
• Five Steps to Risk Assessment.
• How Most Accidents and Cases of Work-related Ill Health Arise.
• Working in and Moving Around the Workshop.
• Ergonomic Hazards.
• Standards for the Best Certified Work Place Conditions.
• Instant Check Lists.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

1. Apply Engineering expertise as a part of Social Experimentation.
2. Learn more about their responsibility towards Employees and safety.
3. Apply moral Reasoning & Ethical Theories.
4. Enforce rights of Engineers.
5. Undersatnd all principles of accident causation .
6. Practice this knowledge in the work place setting, through interactive sessions and site visits.
7. Appreciate the importance of assurance, and understand approaches to auditing.

B- Skills

After completing this module, students will be able to:

24. Gain skills in the analysis of safety program effectiveness.
25. Develop the hazard communication.
26. Enhance capabilities in risk assessment.
27. Develop a better understanding of the rationale for all relavant ethical codes.
28. Act in such a manner as to enhance the honor, integrity and dignity of the profession.
29. Desgin their own instant check list for any facility assigned to them.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Field Trips

Learning Materials

Software and Computer Usage:

- None

Useful Websites:

- http://temp.onlinethics.org/cases/robot/article- 1.htm.
- chemlabs.uoregon.edu/Safety/GeneralInstructions.htm.
- www.batesville.k12.in.us/physics/phynet/**lab**%20**rules**/**lab_rules**.html.

Reference Text:

- Health and safety in engineering workshops (ISBN 978 0 7176 1717 3), Reprinted 2004 & 2010 (free download).

Supplementary Readings:

- Spellman, F.R. and N.E. Whiting, Safety Engineering: Principles and Practices, Government Institutes, Division of ABS Group Inc., Rockwell,Maryland, 1999.
- Davis, Michael, "The Moral Authority of a Professional Code," NOMOS29 (1987), pp. 302-337.
- Pritchard, M.S., "Ethics in Engineering: Good Works." NSF Grant No. SBR-9320257.

Assessment Scheme

- Weekly Assignments (12 Home Assignments).
- Tests (1.5- hrs. each, 2 Tests).
- Quizzes (10-min. each, 6 Quizzes).
- Real Industrial Enterprise Case-Study (In-Class Mini Project).
- Unseen Mid-Term Exam (1.5-hr Exam).
- Unseen Final-Exam (3-hr Exam).

Assessment Pattern

• Homework Assignments	10%
• Tests & Quizzes	10%
• In-Class Mini Project	20%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3 hrs/week
• Tutorials	1.5 hrs/week
• Total Class contact hours	63 hrs/semester
• Total self study hours	45 hrs/semester
Total study hours	108 hrs/semester

Module Leader

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: MFG 5631**
Title	**: Reverse Engineering**
Level	**: 5**
Credit Hours	**: 3**
Prerequisites	**: MFG 5531**

AIMS

This module is designed to provide students with the fundamentals of reverse procedure, and how to implement the different stages in the laboratory.

SYLLABUS

Topics
Basic Concepts.
An Overview and History.
Prescreening and Preparation Through for stages.
Evaluation and Verification stage.
Technical Data Generation stage.
Design Verification stage.
Project Implantation stage.
Future application.
Individual Projects.

Learning Outcomes

A- Knowledge

After completing this module, students will be able to:

1. Apply how to evaluate and verify the parts.
2. Build knowledge to generate the technical data.
3. Review how to create a complete design.
4. Implement the project.

B- Skills

After completing this module, students will be able to:

1. Create a complete design for parts using reverse engineering.

Teaching/Learning Strategies

- Lectures.
- Class Presentation.
- Video Tapes.

Learning Materials

Software Requirements

- Video Tapes.
- Reverse engineering software.
- Power Point.

Hardware Requirements

- Reverse engineering Lab.

Useful Sites

- www.ugs.com

Reference Text

- Ingle Kathryn, A., "Reverse Engineering", McGraw-Hill, 1995.

Assessment Scheme

- Weekly Written Assignments (6 Home Assignments).
- Short Written Quizzes (4- 10 Min. Quizzes).
- Class Written Tests (2- 1.5 – hr Tests).
- Individual Practical Project.
- Unseen Written and Computer Mid- Term Exam (1.5-hr Exam).
- Unseen Written and Computer Final-Exam (3-hr Exam).

Assessment Pattern

• Assignments	10%
• Tests & Quizzes	10 %
• Project and Lab	20%
• Unseen Mid-Term Exam	20%
• Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

• Lectures	3 hrs / week
• Tutorials	1.5 hrs / week
• Total class contact hours	63 hrs/semester
• Total self study hours	45 hrs/semester
• Total study hours	108 hrs/semester

Module Leader

Staff

MSA UNIVERSITY

FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code	**: ISE 5632**
Title	**: Manufacturing Information Systems**
Level	**: 5**
Credit Hours	**: 3**
Prerequisites	**: ISE 5532**

AIMS

This module is designed to provide students with the basics of information systems concepts, design and analysis techniques with their application to manufacturing systems. Manufacturing information systems impact on operations management is explored through resource planning, manufacturing execution and advanced hierarchical production planning and scheduling systems. Challenges facing the manager of manufacturing systems are explored through case studies focusing on Lean and Agile manufacturing, and Supply chain management.

SYLLABUS

Topics
Introduction to Databases.
Relational Modes- The Basic Structure, Fuctional Dependency Project and Normal Forms.
Relational Design Criteria, and Relational Design Procedures.
Sytactic and Semantic Design issues in Data Analysis.
Semantic Modeling, I-Entities and Relationships.
Semantic Modelinng, II-Roles and Types.
Relational Database management systems-SQL interface, Updating the Database Basic Scheduling Computation for information .
Database Design Projects: Design a Supply System Project.
Design a Job-shop system Project.
Evaluating Designs.
Monitoring the Database Performance.
Real Case Study.

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

8. Identify the basics of information systems concepts, design and analysis techniques with their application to manufacturing systems.
9. Identify Manufacturing information systems impact on operations management.
10. Explore the study of the basic concepts and principles of project management.
11. Develop an in-depth understanding of the Manufacturing information systems impact on operations management.

B- Skills

After completing this module, students will be able to:

7. Critically review the capabilities utilized in the analysis, design , and evaluation of the impact of MIS on resource planning.

8. Conduct an analysis of the current manual system and the outputs of an automated system through real case studies.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Individual Project.
- Class Presentation.

Learning Materials

Software Requirements:

- Microsoft Access.

Useful Websites:

- http://www.csiwin.com
- http://www.jsaproj.com
- http://www.arch.uiuc.edu
- http://www.criticaltools.com
- http://www.cher.eda.doc.gov

Reference Text:

- Hawryszkiewycz, J. T., Database Analysis and Design, SRA (Science Research Association, Inc., 1984.

Supplementary Readings:

- Hutt, A.T.F., A Relatiponal Database Design, Wiley, New York, !979.
- Inm,on, W.H., Effective Database Design, Prentice Hall, 1981.

Assessment Scheme

- Weekly written Assignments (12 Home Assignments).
- Short written Quizzes (4 10-min. Quizzes).
- Class written Tests (2 1.5-hr. Tests).
- Individual Projects.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

Assessment Pattern

Class Participation	5%
Assignments	10%
Tests and Quizzes	10%
Term Projects and Reports	15%
Unseen Mid-Term Exam	20%
Unseen Final Exam	40%
Total	**100%**

Learning Unit Contact Hours

Lectures	3 hrs / week
Tutorials	1.5 hrs / week
Total class contact hours	63 hrs/semester
Total self study hours	45 hrs/semester
Total study hours	108 hrs/semester

Module Leader

Staff

MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code	**: ISE 564**
Title	**: Graduation Project (Part II)**
Level	**: 5**
Credit Hours	**: 3**
Prerequisites	**: ISE 554**

AIMS

This module is designed to enable senior students, who successfully completed ISE 554, to analyze, design, implement, test and operate the designated model, prototype, or method to satisfy the company sponsor's requirements. Students should utilize the fundamental principles and skills gained through academic studies.

SYLLABUS

Topics
Carry - out Field Trips to company sponsor.
Utilize Computer Software and develop own computer programs.
Choose an Appropriate Design Satisfying the Sponsor's Requirements.
Implement/operate the designated model or prototype.
Analyze and Interpret the results.
Present recommendations and forward suggestion for further research.
Submit a Draft and Final Written Report.
Prepare Oral Presentations for Rehearsal.
Defend the work done infront of External Examiners.

Learning Outcomes

A- Knowledge

After completing this module, engineering students will be able to:

3. Apply research methods and techniques to contribute to a solution of an engineering problem.
4. Gain knowledge and understanding of how to deal with real life industrial or service system.

B- Skills

After completing this module, engineering students will be able to:

30. Critically review alternative approaches and designs, on the basis of engineering principles to meet those requirements.
31. Implement or operate the designated model, prototype, or method to satisfy those requirements.
32. Evaluate the results against the requirements, using performance measures.

33. Recognize the possible potential adverse environmental, safety, health, and social impacts of the project.

34. Compose a variety of research documents including professional communications, letters and sketches in a student portfolio.
35. Produce collaboratively appropriate written reports, taking in consideration the format and citation.
36. Prepare oral presentations for supervisors and senior students during several seminars.

Teaching/Learning Strategies

- Orientation Sessions.
- Review and discussion Sessions.
- Team projects.
- Presentations.
- Field trips.

Learning Materials

Software Requirements

- Suitable software packages and/or.
- Building own computer programs.

Reference Text:

- Suitable textbooks and scientific journals in the field of the project.

Supplementary Reading:

- Scientific Papers.
- Research Reports
- Engineering Manuals.
- Technical Catalogues.

Assessment Scheme

- Weekly contacts with supervisor.
- Draft - and Final - Written Reports.
- Several Oral Presentations.

Assessment Pattern

• Supervisor's Evaluation	40 %
• External Examiner's Evaluation	60 %
Total	**100 %**

Leaning Unit Contact Hours

• Sessions	3 hrs / week
• Total class contact hours	42 hrs / semester
• Total other study hours	66 hrs / semester
• Total study hours	108 hrs / semester

Module Leader

Staff