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
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’hôpital rule, Analysis of functions, Functions of several variables, and partial derivative.

**SYLLABUS**

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functions-Properties of Functions – Composite Functions.</td>
</tr>
<tr>
<td>Limits – Computational Techniques of Limits.</td>
</tr>
<tr>
<td>Continuity – Limits and Continuity of Trigonometric Functions.</td>
</tr>
<tr>
<td>Inverse Functions – Logarithmic and Exponential Functions – Inverse Trigonometric Functions – Hyperbolic Functions – Inverse Hyperbolic Functions.</td>
</tr>
<tr>
<td>L’Hopital Rule – Indeterminate Forms.</td>
</tr>
<tr>
<td>Taylor and Maclurin series.</td>
</tr>
<tr>
<td>Functions of Two or More Variables – Partial Derivatives – Chain Rules.</td>
</tr>
</tbody>
</table>

**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.ucdavis.edu)
- [http://www.math.nmc.edu](http://www.math.nmc.edu)
Reference Text:
- Thomas, Calculus-Early Transcendentals, 11th ed., Pearson/Addison Wesley, 2006, Ch. 1-4, 7, 14

Supplementary Readings:

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
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

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

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:**

**Supplementary Readings:**

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

**Assessment Pattern**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>10 %</td>
</tr>
<tr>
<td>Tests and Quizzes</td>
<td>10 %</td>
</tr>
<tr>
<td>Laboratory Test</td>
<td>10 %</td>
</tr>
<tr>
<td>Term Projects and Reports</td>
<td>10 %</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20 %</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40 %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>

**Learning Unit Contact Hours**

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3 hrs/wk</td>
</tr>
<tr>
<td>Tutorials</td>
<td>1.5 hrs/wk</td>
</tr>
<tr>
<td>Laboratories</td>
<td>1.5 hrs/wk</td>
</tr>
<tr>
<td>Total class contact hours</td>
<td>84 hrs/wk</td>
</tr>
<tr>
<td>Total self study hours</td>
<td>60 hrs/sem</td>
</tr>
<tr>
<td>Total study hours</td>
<td>144 hrs/sem</td>
</tr>
</tbody>
</table>

**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. Scalar 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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units and Forces.</td>
</tr>
<tr>
<td>Statics of Particles: Plane.</td>
</tr>
<tr>
<td>Statics of Particles: Space.</td>
</tr>
<tr>
<td>Statics of Rigid Bodies: Vector Product.</td>
</tr>
<tr>
<td>Statics of Rigid Bodies: Moments.</td>
</tr>
<tr>
<td>Moment – Couple and Wrench.</td>
</tr>
<tr>
<td>2-D Equilibrium Structure.</td>
</tr>
<tr>
<td>3-D Equilibrium Structure.</td>
</tr>
<tr>
<td>2-D Centroids and Center of Gravity.</td>
</tr>
<tr>
<td>3-D Centroids and Center of Gravity.</td>
</tr>
<tr>
<td>2-D Moment of Inertia.</td>
</tr>
<tr>
<td>3-D Moment of Inertia.</td>
</tr>
<tr>
<td>Real Case Studies.</td>
</tr>
</tbody>
</table>

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

Learning Materials
Useful Websites:
- [http://www.statics.com](http://www.statics.com)
- [http://www.ent.ohiou.edu](http://www.ent.ohiou.edu)
- [http://www.amazon.com](http://www.amazon.com)

Reference Text:

Supplementary Readings:

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
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

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

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.ces.clemson.edu)
- [http://www.osu.okmulgee.edu](http://www.osu.okmulgee.edu)
- [http://www.ces.celemson.edu](http://www.ces.celemson.edu)
- [http://www.mhhe.com](http://www.mhhe.com)
- [http://www.osu-okumulgee.edu](http://www.osu-okumulgee.edu)
- [http://www.ces.clemson.edu](http://www.ces.clemson.edu)

**Reference Text:**

**Supplementary Readings:**

**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**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studio Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Lab participation</td>
<td>10%</td>
</tr>
<tr>
<td>Assignments ( Studio and Lab)</td>
<td>10%</td>
</tr>
<tr>
<td>Tests and Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

**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
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

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

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:

Supplementary Readings:

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
## 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

<table>
<thead>
<tr>
<th>Topics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Writing: the Essay</strong></td>
<td></td>
</tr>
<tr>
<td>- Introduction of writing correction code</td>
<td></td>
</tr>
<tr>
<td>- From Grammar to Writing: The Sentence</td>
<td></td>
</tr>
<tr>
<td><strong>Reading: “Unit I”</strong></td>
<td></td>
</tr>
<tr>
<td>- Writing: Describing a Person</td>
<td></td>
</tr>
<tr>
<td>- From Grammar to Writing: Subject/Verb agreement</td>
<td></td>
</tr>
<tr>
<td><strong>Reading: “Unit II”</strong></td>
<td></td>
</tr>
<tr>
<td>- Writing: Describing a Place</td>
<td></td>
</tr>
<tr>
<td>- From Grammar to Writing: Editing exercises</td>
<td></td>
</tr>
<tr>
<td><strong>Reading: “Unit III”</strong></td>
<td></td>
</tr>
<tr>
<td>- Writing: Describing an Event</td>
<td></td>
</tr>
<tr>
<td>- From Grammar to Writing: Parallelism</td>
<td></td>
</tr>
<tr>
<td><strong>Reading: “Unit IV”</strong></td>
<td></td>
</tr>
<tr>
<td>- Writing: Describing a Process</td>
<td></td>
</tr>
<tr>
<td>- From Grammar to Writing: Editing exercises</td>
<td></td>
</tr>
<tr>
<td><strong>Reading: “Unit V”</strong></td>
<td></td>
</tr>
<tr>
<td>- Writing: Distinguishing facts from opinions</td>
<td></td>
</tr>
<tr>
<td>- Specialized Vocabulary</td>
<td></td>
</tr>
<tr>
<td><strong>Writing: Directed Free Writing/Editing</strong></td>
<td></td>
</tr>
<tr>
<td>- From: Grammar to Writing: Parallelism of Gerunds and Infinitives</td>
<td></td>
</tr>
<tr>
<td>- Specialized Vocabulary</td>
<td></td>
</tr>
<tr>
<td><strong>Reading “Unit VI”</strong></td>
<td></td>
</tr>
<tr>
<td>- Writing: Process Writing</td>
<td></td>
</tr>
<tr>
<td>- From Grammar to Writing: Sentences and Fragments</td>
<td></td>
</tr>
<tr>
<td><strong>Reading: “Unit VII”</strong></td>
<td></td>
</tr>
<tr>
<td>- Writing: Process Writing</td>
<td></td>
</tr>
<tr>
<td>- From Grammar to Writing: Editing exercises</td>
<td></td>
</tr>
<tr>
<td><strong>Reading: “Unit VIII”</strong></td>
<td></td>
</tr>
<tr>
<td>- Writing: Expository Writing (Comparison and Contrast)</td>
<td></td>
</tr>
<tr>
<td>- From Grammar to Writing: Punctuation of Adjective Clauses</td>
<td></td>
</tr>
<tr>
<td><strong>Reading: “Unit IX”</strong></td>
<td></td>
</tr>
<tr>
<td>- Writing: Expository Writing (Definition and Partition)</td>
<td></td>
</tr>
<tr>
<td>- From Grammar to Writing: Editing exercises</td>
<td></td>
</tr>
<tr>
<td><strong>Reading: “Unit X”</strong></td>
<td></td>
</tr>
<tr>
<td>- Writing: Expository Writing (Classification)</td>
<td></td>
</tr>
<tr>
<td>- From Grammar to Writing: Avoiding run-on sentences and comma splices</td>
<td></td>
</tr>
<tr>
<td><strong>Reading: “Unit XI”</strong></td>
<td></td>
</tr>
<tr>
<td>- Writing: Practice – Summary Writing</td>
<td></td>
</tr>
<tr>
<td>- From Grammar to Writing: Editing exercises</td>
<td></td>
</tr>
</tbody>
</table>
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.better.english.com
- http://www.eslcafe.com

Reference Text


Supplementary Readings


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

ENG 156
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antiderivatives- The Indefinite Integrals – Integration by Substitution.</td>
</tr>
<tr>
<td>Techniques of integration- Basic Integration formulas- Integration by parts- Reduction formulas- Integration using partial fractions- Trigonometric Integrals- Trigonometric Substitution.</td>
</tr>
<tr>
<td>Double Integrals – Double Integrals in Polar Coordinates – Areas.</td>
</tr>
<tr>
<td>Triple Integrals – Triple Integrals in Cylindrical and Spherical Coordinates – Volumes.</td>
</tr>
<tr>
<td>Infinite Series – Convergence Tests.</td>
</tr>
</tbody>
</table>

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 different coordinate systems.

Teaching/Learning Strategies

- Lectures.
- Tutorials.

Learning Materials

Software Requirements:
- MAPLE, DRIVE, MATHEMATICA, MATLAB.

Useful Websites:
- [http://www.omega.albany.edu](http://www.omega.albany.edu)
- [http://www.math.nmc.edu](http://www.math.nmc.edu)
Reference Text:
- Thomas, Calculus- Early Transcendentals, 11th ed., Pearson- Addition wesly, 2006, Ch. 4-6,8,16

Supplementary Readings:

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
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

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

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:

Supplementary Readings:

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

Assessment Pattern

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>10 %</td>
</tr>
<tr>
<td>Tests and Quizzes</td>
<td>10 %</td>
</tr>
<tr>
<td>Laboratory Test</td>
<td>10 %</td>
</tr>
<tr>
<td>Term Projects and Reports</td>
<td>10 %</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20 %</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40 %</td>
</tr>
</tbody>
</table>

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

BSC 162
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinematics: Rectilinear Motion of Particle.</td>
</tr>
<tr>
<td>Erratic Motion.</td>
</tr>
<tr>
<td>Curvilinear Motion of Particle: Cartesian Coordinates.</td>
</tr>
<tr>
<td>Motion of Projectiles.</td>
</tr>
<tr>
<td>Curvilinear Motion of Particle: Normal and Tangential Coordinates.</td>
</tr>
<tr>
<td>Curvilinear Motion of Particle Polar Coordinates.</td>
</tr>
<tr>
<td>Kinetics of Particle: Force and Acceleration.</td>
</tr>
<tr>
<td>Mechanical Vibration.</td>
</tr>
<tr>
<td>Circular Motion.</td>
</tr>
<tr>
<td>Impulse and Momentum.</td>
</tr>
<tr>
<td>Real Case Studies.</td>
</tr>
</tbody>
</table>

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
Reference Text:


Supplementary Readings:


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

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class participation</td>
<td>10%</td>
</tr>
<tr>
<td>Assignments</td>
<td>10%</td>
</tr>
<tr>
<td>Tests and Quizzes</td>
<td>15%</td>
</tr>
<tr>
<td>Term Paper</td>
<td>5%</td>
</tr>
<tr>
<td>Unseen Mid-term Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Learning Unit Contact Hours

<table>
<thead>
<tr>
<th>Component</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3 hrs/week</td>
</tr>
<tr>
<td>Tutorials</td>
<td>1.5 hrs/week</td>
</tr>
<tr>
<td>Total class contact hours</td>
<td>63 hrs/semester</td>
</tr>
<tr>
<td>Total self study hours</td>
<td>45 hrs/semester</td>
</tr>
<tr>
<td>Total study hours</td>
<td>108 hrs/semester</td>
</tr>
</tbody>
</table>

Module Leader

Staff
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Pollution</td>
</tr>
<tr>
<td>Water Pollution</td>
</tr>
<tr>
<td>Water Treatment</td>
</tr>
<tr>
<td>Electrochemistry</td>
</tr>
<tr>
<td>Chemical Processes in Petroleum Industry</td>
</tr>
<tr>
<td>Chemical Processes in Cement Industry</td>
</tr>
<tr>
<td>Chemical Processes in Polymers Industry</td>
</tr>
<tr>
<td>Chemical Processes in Glass Industry</td>
</tr>
<tr>
<td>Chemical Processes in Ceramics Industry</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this module, students will be able to:
1. Analyze 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

Reference Texts:
Supplementary Readings:


Assessment Scheme

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

Assessment Pattern

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>10 %</td>
</tr>
<tr>
<td>Tests and Quizzes</td>
<td>10 %</td>
</tr>
<tr>
<td>Laboratory Test</td>
<td>10 %</td>
</tr>
<tr>
<td>Term Projects and Reports</td>
<td>10 %</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20 %</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40 %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>

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
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health and Safety at work, Workshop Accidents. Electrical Hazards. Fire Protections</td>
</tr>
<tr>
<td>Workshop Measuring Equipment.</td>
</tr>
<tr>
<td>Turning machines and their elements, and cutting tools.</td>
</tr>
<tr>
<td>Milling machines and their elements, and cutters.</td>
</tr>
<tr>
<td>Grinding machines and their elements, and grinding wheels.</td>
</tr>
<tr>
<td>Drilling and Boring machines and their elements, and cutting tools.</td>
</tr>
<tr>
<td>Shaping and Planning machines and their elements, and cutting tools.</td>
</tr>
<tr>
<td>Shearing, Bending and Rolling machines.</td>
</tr>
<tr>
<td>Welding Equipment and related tools, and Electrical Connections.</td>
</tr>
<tr>
<td>Foundary Furnaces and Casting Equipment.</td>
</tr>
<tr>
<td>Wood working machines and related tools.</td>
</tr>
<tr>
<td>Pressing, Blowing, and Extrusion of polymeric machines.</td>
</tr>
</tbody>
</table>

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.
- Manufacturing Processes Video Tapes.

#### Useful Websites
- [http://www.xtend.co.nz](http://www.xtend.co.nz)
- [http://www.infopeople.org](http://www.infopeople.org)

#### Reference Text:

#### Supplementary Readings:

### 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

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class &amp; Workshop Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Assignments (Team Reports)</td>
<td>10%</td>
</tr>
<tr>
<td>Tests and Quizzes</td>
<td>15%</td>
</tr>
<tr>
<td>Individual Oral Practical Test</td>
<td>5%</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40%</td>
</tr>
</tbody>
</table>

**Total** 100%

### Learning Unit Contact Hours

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3 hrs / week</td>
</tr>
<tr>
<td>Workshops</td>
<td>1.5 hrs / week</td>
</tr>
<tr>
<td>Total class contact hours</td>
<td>63 hrs/semester</td>
</tr>
<tr>
<td>Total self study hours</td>
<td>45 hrs/semester</td>
</tr>
<tr>
<td>Total study hours</td>
<td>108 hrs/semester</td>
</tr>
</tbody>
</table>

### Module Leader

Staff
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

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

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

#### Useful Websites
- [http://www.io.com](http://www.io.com)
- [http://www.better.english.com](http://www.better.english.com)
- [http://www.eslcafe.com](http://www.eslcafe.com)

#### Reference Text

### 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%

<table>
<thead>
<tr>
<th>Total</th>
<th>100%</th>
</tr>
</thead>
</table>

### 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
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

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

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:

Supplementary Readings:

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
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crystal Structure of Metals.</td>
</tr>
<tr>
<td>Classification of Engineering Materials.</td>
</tr>
<tr>
<td>Engineering Alloys and their properties, Solidification and Grain Formation.</td>
</tr>
<tr>
<td>Binary phase diagrams, Iron Carbon Diagram.</td>
</tr>
<tr>
<td>Strengthening mechanisms and Heat treatment.</td>
</tr>
<tr>
<td>Mechanical Testing: Tension and Compression, Bending, Shear, Hardness, Impact, Creep and Fatigue.</td>
</tr>
<tr>
<td>Non Destructive Testing.</td>
</tr>
<tr>
<td>Retention of Structure and Properties (Micro / Macro)</td>
</tr>
<tr>
<td>Laboratory Experiments: Tension and Compression, Bending, Hardness, Impact Tests.</td>
</tr>
</tbody>
</table>

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.
Learning Materials

Useful Websites

- [http://www.fpl.fs.fed.us](http://www.fpl.fs.fed.us)
- [http://www.matweb.com](http://www.matweb.com)

Reference Text:


Supplementary Readings:


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%

<table>
<thead>
<tr>
<th>Total</th>
<th>100%</th>
</tr>
</thead>
</table>

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
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. Characteristics of casting, characteristics of forming, characteristics of joining, characteristics of ceramic and Polymer Processing.

SYLLABUS

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

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:

Supplementary Readings:

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

**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.amazon.com)
- [http://www.wileyeurope.com](http://www.wileyeurope.com)
- [http://www.josseybass.com](http://www.josseybass.com)

#### Reference Text:

#### Supplementary Readings:

### 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

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Assignments &amp; Reports</td>
<td>10%</td>
</tr>
<tr>
<td>Tests and Quizzes</td>
<td>15%</td>
</tr>
<tr>
<td>Term Paper</td>
<td>5%</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40%</td>
</tr>
</tbody>
</table>

### Total

100%

### Leaning Unit Contact Hours

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3 hrs / week</td>
</tr>
<tr>
<td>Tutorials</td>
<td>1.5 hrs / week</td>
</tr>
<tr>
<td>Total class contact hours</td>
<td>63 hrs/semester</td>
</tr>
<tr>
<td>Total self study hours</td>
<td>45 hrs/semester</td>
</tr>
<tr>
<td>Total study hours</td>
<td>108 hrs/semester</td>
</tr>
</tbody>
</table>

### Module Leader

Staff
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Program Construction (identification, statement, function, comment, and process).</td>
</tr>
<tr>
<td>C++ Simple Data Types.</td>
</tr>
<tr>
<td>Constants and Variables Declaration.</td>
</tr>
<tr>
<td>Input and Output Statements (Cin and Cout).</td>
</tr>
<tr>
<td>Output Manipulators.</td>
</tr>
<tr>
<td>Assignment Statement Mathematical Expressions.</td>
</tr>
<tr>
<td>Automatic Type Conversions and Casting.</td>
</tr>
<tr>
<td>Decision Statements (if and which).</td>
</tr>
<tr>
<td>Logical Expressions.</td>
</tr>
<tr>
<td>Repetition Statements (for, while and do).</td>
</tr>
<tr>
<td>One and Multidimensional Arrays.</td>
</tr>
<tr>
<td>String Manipulations.</td>
</tr>
<tr>
<td>Built-In Functions and User-Defined Functions.</td>
</tr>
<tr>
<td>Passing Value and Reference Arguments.</td>
</tr>
<tr>
<td>Local and Global Identifiers.</td>
</tr>
</tbody>
</table>

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:**

**Reference Text:**

**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**

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Participation</td>
<td>5 %</td>
</tr>
<tr>
<td>Assignments</td>
<td>10 %</td>
</tr>
<tr>
<td>Tests and Quizzes</td>
<td>15 %</td>
</tr>
<tr>
<td>Term Project</td>
<td>10 %</td>
</tr>
<tr>
<td>Unseen Mid-term Exam</td>
<td>20 %</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40 %</td>
</tr>
</tbody>
</table>

**Total 100%**

**Learning Unit Contact Hours**

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3 hrs/week</td>
</tr>
<tr>
<td>Laboratories</td>
<td>1.5 hrs/week</td>
</tr>
<tr>
<td>Total class contact hours</td>
<td>63 hrs/semester</td>
</tr>
<tr>
<td>Total self study hours</td>
<td>45 hrs/semester</td>
</tr>
<tr>
<td>Total study hours</td>
<td>108 hrs/semester</td>
</tr>
</tbody>
</table>

**Module Leader**

Staff
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

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

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

Reference Text


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
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification of Differential Equations – Initial and Boundary Value Problems.</td>
</tr>
<tr>
<td>Modeling with First Order Differential Equations.</td>
</tr>
<tr>
<td>Higher Order Ordinary Differential Equations.</td>
</tr>
<tr>
<td>Homogeneous Linear Differential Equations with constant coefficients.</td>
</tr>
<tr>
<td>Nonhomogenous Linear Differential Equations - Undetermined Coefficients Method.</td>
</tr>
<tr>
<td>Variation of Parameters Method - Reduction of order.</td>
</tr>
<tr>
<td>Cauchy – Euler Differential Equations.</td>
</tr>
<tr>
<td>Modeling with Second Order Differential Equations.</td>
</tr>
<tr>
<td>Numerical Solution Of Ordinary Differential Equations.</td>
</tr>
<tr>
<td>Special Functions: Gamma, Beta, and Bessel Functions.</td>
</tr>
</tbody>
</table>

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:

Supplementary Readings:

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
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strain and Stress Measurements: Load Cells, and Gauges.</td>
</tr>
</tbody>
</table>

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:

Supplementary Readings:
- Sawhney, A. K., A Course in Mechanical Measurements and Instrumentation, Dhanpat and Sons, Delhi, 1989.

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
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
time 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

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

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:

Supplementary Readings:

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

MFG 263
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Concepts, Pressures and Forces, Fluid Statics.</td>
</tr>
<tr>
<td>Continuity and Momentum Equations and their Applications.</td>
</tr>
<tr>
<td>Energy Equations with Applications.</td>
</tr>
<tr>
<td>Major and Minor Losses in Flowing Systems.</td>
</tr>
<tr>
<td>Incompressible Flow in Pipes and Ducts.</td>
</tr>
<tr>
<td>Fluid Machinery including Pumps, Fans and Turbines.</td>
</tr>
</tbody>
</table>

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.uk

Reference Text:

Supplementary Readings:

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
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two Dimensional Arrays.</td>
</tr>
<tr>
<td>Structures and Arrays of Structures.</td>
</tr>
<tr>
<td>Pointers.</td>
</tr>
<tr>
<td>Classes Usage and Declaring.</td>
</tr>
<tr>
<td>Objects as Function Arguments.</td>
</tr>
<tr>
<td>Operator Overloading.</td>
</tr>
<tr>
<td>Inheritance.</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

A- Knowledge

After completing this module, students will be able to:

4. Develop and analyze a large problem in object-oriented methodologies (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 medium-size/large project.

Teaching/Learning Strategies

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

Learning Materials

Software Requirements:
- Borland C++, VC++ Tools.

Useful Websites:
Reference Text:

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
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction to marketing:</strong> Basic marketing definitions and concepts</td>
</tr>
<tr>
<td>Development of marketing thinking supported by concept of &quot;Customer&quot; and Customer relationship management</td>
</tr>
<tr>
<td>Different types of customer groups</td>
</tr>
<tr>
<td>Methods of customer satisfaction including quality issues.</td>
</tr>
<tr>
<td><strong>Elements of the marketing mix:</strong> 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</td>
</tr>
</tbody>
</table>

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.

Teaching/Learning Strategies
- Lectures.
- Tutorials.
- Team Projects.
- Class Presentations.
Learning Materials

Reference Text:

Supplementary Readings:
- *Journal of the Academy of Marketing Sciences*

Assessment Scheme
- Written tests are used to assess students understanding of core topics (15%) (to assess A.1, 2 and 3)
- A field work report and presentation (15%) (to assess B.1,2,3)
- Attendance, participation with ongoing pop questions (10%) (to assess 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 assess 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
MSA UNIVERSITY  
FACULTY OF ENGINEERING  
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply and Demand: An Initial Look.</td>
</tr>
<tr>
<td>Consumer Choice: Individual and Market Demand</td>
</tr>
<tr>
<td>Appendix.</td>
</tr>
<tr>
<td>Demand and Elasticity.</td>
</tr>
<tr>
<td>Production, Input, and Cost: Supply Analysis.</td>
</tr>
<tr>
<td>The Firm and Industry under Perfect Competition.</td>
</tr>
<tr>
<td>Monopoly.</td>
</tr>
<tr>
<td>Between Competition and Monopoly.</td>
</tr>
<tr>
<td>Pricing the Factors of Production.</td>
</tr>
</tbody>
</table>

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:**

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

**Reference Text:**

**Supplementary Readings:**

**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

SOC 2662
300's LEVEL MODULES
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vector Fields- Gradient Fields- Divergence and curl- Laplacian operator</td>
</tr>
<tr>
<td>Laplace Transform ( Definition – Laplace transform of elementary functions- Properties– Inverse Laplace Transform- Convolution Theorem) - Fourier Analysis -Fourier Transform</td>
</tr>
<tr>
<td>Introduction to Complex variables and Complex functions.</td>
</tr>
<tr>
<td>Interpolation – Newton's Divided–Difference Interpolating Polynomials – Lagrange Interpolating polynomials.</td>
</tr>
<tr>
<td>Numerical Differentiation – High-Accuracy Differentiation – Formulas.</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

A- Knowledge
After completing this module, students will be able to:

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
Reference Text:

Supplementary Readings:

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
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

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

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.
- Tutorials.
- Class Presentation.

Learning Materials

Useful Websites

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

Supplementary Readings:

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
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

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

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:

Supplementary Readings:

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

AIMS

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Productivity:</strong> Factors Affecting Productivity and Role of Management.</td>
</tr>
<tr>
<td><strong>Method Study:</strong> Documenting the Present Method, Analysis, Guidelines for Improvement.</td>
</tr>
<tr>
<td>Principles of Motion Economy, Fundamental Hand Motions, Micro-Motion Study and Equipment, Improving hand Motions, Mechanization, Automation, and Standardization.</td>
</tr>
<tr>
<td><strong>Working Conditions:</strong> Temperature, Ventilation, Illumination, Colour, Noise, Safety,… Ergonomics and Human Factors in the Workplace.</td>
</tr>
<tr>
<td>Wage Incentive Plans.</td>
</tr>
</tbody>
</table>

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. Exercise 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 predetermined time systems.
5. Generate and constructively address ethical, social and environmental issues that arise in a work systems engineering project.

**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.caubo.ca)
- [http://www.em.tsu.edu](http://www.em.tsu.edu)
- [http://www.virginie.edu](http://www.virginie.edu)
- [http://hfes.org](http://hfes.org)
- [http://www.osha.gov](http://www.osha.gov)

**Reference Text:**

**Supplementary Readings:**

**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
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

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

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:

Supplementary Readings:

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, Kirchhoff’s law, resistor combinations,
superposition, nodal analysis, mesh analysis, Thevenin’s and Norton theories, capacitors
and inductors. A.C. circuits sinusoidal functions, phasors, impedance and admittance, \( \Delta/y \)
transformation, nodal and mesh analysis, magnetic circuits. D.C. Machines and A.C
Machines.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current and Voltage, Reference Directions and Polarities, Power, Ideal Circuit Elements, Sources.</td>
</tr>
<tr>
<td>Ohm’s Law, Kirshoff’s Law, Resistor Combinations.</td>
</tr>
<tr>
<td>Nodal Analysis, Loop and Mesh Analysis, Superposition.</td>
</tr>
<tr>
<td>Thevenin’s and Norton’s Theorems.</td>
</tr>
<tr>
<td>Capacitors and Inductors, First Order Networks.</td>
</tr>
<tr>
<td>Second Order Circuits.</td>
</tr>
<tr>
<td>The Sinusoidal Functions, Complex Numbers.</td>
</tr>
<tr>
<td>Phasors, Impedance and Admittance, ( \Delta/y ) Transformation.</td>
</tr>
<tr>
<td>Nodal Analysis, Mesh and Loop Analysis, Source Transformation.</td>
</tr>
<tr>
<td>Magnetic Circuits, Mutual Inductance, Linear Transformer.</td>
</tr>
<tr>
<td>The Ideal Transformer, Transformer Applications.</td>
</tr>
<tr>
<td>D.C. Machines: Fundamental concepts, Basic D.C. Machine.</td>
</tr>
<tr>
<td>Equivalent Circuits and Analysis, D.C. Machine Applications.</td>
</tr>
</tbody>
</table>

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.
- Tutorials.
- Laboratories.

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:

Supplementary Readings:

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
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**

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation of Data.</td>
</tr>
<tr>
<td>Measures of Central Tendency.</td>
</tr>
<tr>
<td>Measures of Dispersion.</td>
</tr>
<tr>
<td>Fundamentals of Probability.</td>
</tr>
<tr>
<td>Discrete Probability Distributions: Binomial &amp; Poisson</td>
</tr>
<tr>
<td>Continuous Probability Distributions: Uniform, Exponential &amp; Normal.</td>
</tr>
<tr>
<td>Sampling Distribution.</td>
</tr>
<tr>
<td>Random processes and cross correlation</td>
</tr>
<tr>
<td>Confidence Limits &amp; Confidence Interval.</td>
</tr>
<tr>
<td>Significance Testing Hypotheses: X²-test &amp; Goodness of Fit Test.</td>
</tr>
<tr>
<td>Correlation: Measurement, &amp; Coefficients.</td>
</tr>
<tr>
<td>Regression Analysis and Least Squares Method.</td>
</tr>
</tbody>
</table>

**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 decisions.
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.
- Projects.
- Tutorials.

### Learning Materials

#### Software Requirements:
- MINITAB, SPSS, MICROSTAT, SAS.

#### Useful Websites:
- [http://www.mathforum.org/library/topics](http://www.mathforum.org/library/topics)
- [http://www.math.uah.edu](http://www.math.uah.edu)
- [http://www.stat.stanford.edu](http://www.stat.stanford.edu)

#### Reference Text:

#### Supplementary Readings:

### Assessment Scheme

#### Assessment Pattern
- Class Participation/Assignments: 20%
- Tests and Quizzes: 20%
- Unseen Mid-Term Exam: 20%
- Unseen Final Exam: 40%

### Learning Unit Contact Hours Per Week

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3 hrs/week</td>
</tr>
<tr>
<td>Tutorials</td>
<td>1.5 hrs/week</td>
</tr>
<tr>
<td>Total class contact hours</td>
<td>63 hrs/semester</td>
</tr>
<tr>
<td>Total self study hours</td>
<td>45 hrs/semester</td>
</tr>
<tr>
<td>Total study hours</td>
<td>108 hrs/semester</td>
</tr>
</tbody>
</table>

### Module Leader

Staff
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Selection and Factor of Safety.</td>
</tr>
<tr>
<td>Load and Stress analysis, Theories of Failure for Ductile and Brittle Materials, Fatigue Failure.</td>
</tr>
<tr>
<td>Design of Power Transmission Shafts and gears.</td>
</tr>
<tr>
<td>Design of Fasteners.</td>
</tr>
<tr>
<td>Design of journal Bearings. Selection of Rolling Element Bearings</td>
</tr>
</tbody>
</table>

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.

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:

Supplementary Readings:

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Participation</td>
<td>5%</td>
</tr>
<tr>
<td>Assignments</td>
<td>10%</td>
</tr>
<tr>
<td>Tests &amp; Quizzes</td>
<td>15%</td>
</tr>
<tr>
<td>Term Project</td>
<td>10%</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

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

DES 362
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Concepts of Tool Design.</td>
</tr>
<tr>
<td>Design of Jigs and Fixtures: Supporting and locating principles, Clamping and Work holding principles, Construction principles.</td>
</tr>
<tr>
<td>Die design: Shearing, Bending, Deep Drawing, Progressive dies.</td>
</tr>
<tr>
<td>Single point tool design: design of Turning tools.</td>
</tr>
<tr>
<td>Multiple points’ tool design: Design of Milling and broaching cutters.</td>
</tr>
<tr>
<td>Design Economics.</td>
</tr>
<tr>
<td>Computer – Aided tool Design.</td>
</tr>
<tr>
<td>Individual Projects.</td>
</tr>
</tbody>
</table>

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.

Teaching/Learning Strategies

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

Learning Materials

Useful Websites

- [http://www.carlan.com](http://www.carlan.com)
- [http://www.mech.ust.hk](http://www.mech.ust.hk)
Reference Text:

Supplementary Readings:

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
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

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

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 manufacturing 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.
- Class Presentation.
- Tutorials.

Learning Materials

Software Requirements

- EXCEL SpreadSheets

Useful Websites

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

Reference Text:


Supplementary Readings:

- 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

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Participation</td>
<td>5%</td>
</tr>
<tr>
<td>Assignments</td>
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</tr>
<tr>
<td>Quizzes</td>
<td>15%</td>
</tr>
<tr>
<td>Term Project</td>
<td>10%</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40%</td>
</tr>
</tbody>
</table>

Total 100%

Learning Unit Contact Hours

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3 hrs/week</td>
</tr>
<tr>
<td>Tutorials</td>
<td>1.5 hrs/week</td>
</tr>
<tr>
<td>Total class contact hours</td>
<td>63 hrs/semester</td>
</tr>
<tr>
<td>Total self study hours</td>
<td>45 hrs/semester</td>
</tr>
<tr>
<td>Total study hours</td>
<td>108 hrs/semester</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite Materials and Natural Fibers.</td>
</tr>
<tr>
<td>Introduction to Nanotechnology 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.</td>
</tr>
</tbody>
</table>

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.fpl.fs.fed.us](http://www.fpl.fs.fed.us)
- [http://www.matweb.com](http://www.matweb.com)

#### Reference Text:

#### Supplementary Readings:

### 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%

<table>
<thead>
<tr>
<th>Total</th>
<th>100%</th>
</tr>
</thead>
</table>

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

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.
- Tutorials.
- Laboratories.

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:

Supplementary Readings:
- Jacob Millman and Arvin, Microelectronics, McGraw Hill Co.

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
**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**

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations and Productivity.</td>
</tr>
<tr>
<td>Forecasting Techniques.</td>
</tr>
<tr>
<td>Inventory Management.</td>
</tr>
<tr>
<td>Materials Requirements Planning.</td>
</tr>
<tr>
<td>Aggregate Production Planning.</td>
</tr>
<tr>
<td>Loading, Scheduling and Sequencing.</td>
</tr>
<tr>
<td>Just In Time Systems.</td>
</tr>
<tr>
<td>Supply Chain Management.</td>
</tr>
</tbody>
</table>

**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.wspc.com)  
- [http://www.tmac.org](http://www.tmac.org)  
- [http://www.prospects.ac.uk](http://www.prospects.ac.uk)  
- [http://www.slac.standford.edu](http://www.slac.standford.edu)  
- [http://www.nationjob.com](http://www.nationjob.com)
Reference Text:

Supplementary Readings:

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
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

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

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.
### Learning Materials

**Useful Websites:**
- http://www.statsoftinc.com
- http://www.spssscience.com
- http://www.statsoft.net
- http://www.ncss.com
- http://www.asq.org/learn-about-quality/basic-concepts.html

**Reference Text:**

**Supplementary Readings:**

### 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

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Participation</td>
<td>5%</td>
</tr>
<tr>
<td>Assignments</td>
<td>10%</td>
</tr>
<tr>
<td>Tests and Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Term Project and Reports.</td>
<td>15%</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

### Learning Unit Contact Hours

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours/Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3 hrs / week</td>
</tr>
<tr>
<td>Tutorials</td>
<td>1.5 hrs / week</td>
</tr>
<tr>
<td>Total class contact hours</td>
<td>63 hrs/semester</td>
</tr>
<tr>
<td>Total self study hours</td>
<td>45 hrs/semester</td>
</tr>
<tr>
<td>Total study hours</td>
<td>108 hrs/semester</td>
</tr>
</tbody>
</table>

### Module Leader

Staff
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part I: Theory of Metal Forming</strong></td>
</tr>
<tr>
<td>Stress strain curves, models of mechanical behaviour, and effect of temperature and strain rates on stress strain curves.</td>
</tr>
<tr>
<td>Deformation and recrystallization, Cold and Hot working, strain hardening, elastic and plastic deformation of metals, yield criteria.</td>
</tr>
<tr>
<td><strong>Part II: Theory of Metal Cutting</strong></td>
</tr>
<tr>
<td>Tool geometry, Tool materials, and Chip formation.</td>
</tr>
<tr>
<td>Cutting forces (measurement and empirical relationships).</td>
</tr>
<tr>
<td>Heat in metal cutting, tool life, tool wear, and their measurements.</td>
</tr>
<tr>
<td>Chatter in machining.</td>
</tr>
<tr>
<td>Cutting fluids and Surface roughness.</td>
</tr>
<tr>
<td>Machining economy: optimum tool life and optimum cutting conditions.</td>
</tr>
<tr>
<td>Machinability.</td>
</tr>
</tbody>
</table>

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

Supplementary Readings

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
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using DMAIC to improve Speed, Quality and Cost.</td>
</tr>
<tr>
<td>Working with ideas: Brainstorming, ......</td>
</tr>
<tr>
<td>Voice of the Customer and Data Collection.</td>
</tr>
<tr>
<td>Descriptive Statistics, Data Displays and Variation Analysis.</td>
</tr>
<tr>
<td>Identifying and Verifying Causes.</td>
</tr>
<tr>
<td>Reducing Load Time and Non-Value-Add Cost.</td>
</tr>
<tr>
<td>Complexity Value Stream Mapping and Complexity Analysis.</td>
</tr>
<tr>
<td>Selecting and Testing Solutions.</td>
</tr>
</tbody>
</table>

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.
- Projects.
- Tutorials.

Learning Materials

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

Reference Text
- Class notes to be compiled 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

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

<table>
<thead>
<tr>
<th>Module Code</th>
<th>ISE 454</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Automatic Control</td>
</tr>
<tr>
<td>Level</td>
<td>4</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>3</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>MAT 361</td>
</tr>
</tbody>
</table>

## 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 root locus technique and Routh-Hurwitz stability criterion; time domain and frequency domain analysis, state space analysis and control system performance.

## SYLLABUS

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

## 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.
- Individual Project.
- Tutorials.
- Class Presentation.

Learning Materials

Software Requirements:
- MATLAB control tool box.
- SIMULINK tool box.

Useful Websites:
- [http://www.shef.ac.uk](http://www.shef.ac.uk)
- [http://www.aut.ee.ethz.ch](http://www.aut.ee.ethz.ch)
- [http://www.isa.org](http://www.isa.org)
- [http://www.ieee.org](http://www.ieee.org)

Reference Text:

Supplementary Readings:

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Participation</td>
<td>5%</td>
</tr>
<tr>
<td>Assignments</td>
<td>10%</td>
</tr>
<tr>
<td>Tests and Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Term Project and Reports</td>
<td>15%</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Learning Unit Contact Hours

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3 hrs/week</td>
</tr>
<tr>
<td>Tutorials</td>
<td>1.5 hrs/week</td>
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<tr>
<td>Total class contact hours</td>
<td>63 hrs/semester</td>
</tr>
<tr>
<td>Total self study hours</td>
<td>45 hrs/semester</td>
</tr>
<tr>
<td>Total study hours</td>
<td>108 hrs/semester</td>
</tr>
</tbody>
</table>

Module Leader

Staff
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

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

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

Hardware Requirements:
- Computer Laboratory.

Software Requirements:
- CAD/CAM/CAE Software.

Useful Websites:
- www.ugs.com

Reference Text:

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
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<tbody>
<tr>
<td>Class Participation</td>
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<tr>
<td>Quizzes &amp; Tests</td>
<td>10 %</td>
</tr>
<tr>
<td>Laboratory Tests</td>
<td>10 %</td>
</tr>
<tr>
<td>Term Project</td>
<td>15 %</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20 %</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40 %</td>
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</table>

Total 100%

Learning Unit Contact Hours

<table>
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<tr>
<th>Component</th>
<th>Hours</th>
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<tbody>
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<td>Lectures</td>
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<td>Total self study hours</td>
<td>45 hrs/semester</td>
</tr>
<tr>
<td>Total study hours</td>
<td>108 hrs/semester</td>
</tr>
</tbody>
</table>

Module Leader:
Staff
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defining Requirements, Space Requirements.</td>
</tr>
<tr>
<td>Flow Patterns, Quantitative and Qualitative Flow Measurements.</td>
</tr>
<tr>
<td>Personal Requirements: Parking, Locker Rooms, Restrooms, Road Services,</td>
</tr>
<tr>
<td>Health Services, Measures for Disabled Persons.</td>
</tr>
<tr>
<td>Layout Design Methods, Methods for Improving Layout Design, Computer-Aided Layout.</td>
</tr>
<tr>
<td>Storage and Warehousing Departments Designs, Receiving and Shipping Departments Design.</td>
</tr>
<tr>
<td>Site Location.</td>
</tr>
</tbody>
</table>

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-state.edu

Reference Text

Supplementary Readings

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

AIMS

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance Systems.</td>
</tr>
<tr>
<td>Maintenance Operations and Control.</td>
</tr>
<tr>
<td>Preventive Maintenances, Concepts Modeling, and Analysis.</td>
</tr>
<tr>
<td>Maintenance Work Measurement.</td>
</tr>
<tr>
<td>Maintenance Forecasting and Capacity Planning.</td>
</tr>
<tr>
<td>Maintenance Planning and Scheduling.</td>
</tr>
<tr>
<td>Maintenance Material Control.</td>
</tr>
<tr>
<td>Maintenance Quality Control.</td>
</tr>
<tr>
<td>Computerized Maintenance Management Systems.</td>
</tr>
</tbody>
</table>

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.
### Learning Materials

**Useful Websites:**
- [http://www.ttp.co.za](http://www.ttp.co.za)
- [http://www.bus-perf.co.uk](http://www.bus-perf.co.uk)
- [http://www.asu.edu](http://www.asu.edu)
- [http://www.enre.umd.edu](http://www.enre.umd.edu)
- [http://www.wisdom.arl.psu.edu](http://www.wisdom.arl.psu.edu)
- [http://www.smrp.org](http://www.smrp.org)
- [http://www.sre.org](http://www.sre.org)

**Reference Text:**

**Supplementary Readings:**

### 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

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Participation</td>
<td>5%</td>
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<tr>
<td>Assignments</td>
<td>10%</td>
</tr>
<tr>
<td>Tests and Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Term Project and Reports</td>
<td>15%</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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</tbody>
</table>

### Learning Unit Contact Hours

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3 hrs/week</td>
</tr>
<tr>
<td>Tutorials</td>
<td>1.5 hrs/week</td>
</tr>
<tr>
<td>Total class contact hours</td>
<td>63 hrs/semester</td>
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<tr>
<td>Total self study hours</td>
<td>45 hrs/semester</td>
</tr>
<tr>
<td>Total study hours</td>
<td>108 hrs/semester</td>
</tr>
</tbody>
</table>

### Module Leader

Staff

ISE 461
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Development Processes and Organization.</td>
</tr>
<tr>
<td>Product Planning and Environmental Impact.</td>
</tr>
<tr>
<td>Product Development Economics.</td>
</tr>
<tr>
<td>Managing Projects.</td>
</tr>
<tr>
<td>Identifying Customer Needs.</td>
</tr>
<tr>
<td>Product Specifications and Concept Generation.</td>
</tr>
<tr>
<td>Concept Selection and Concept Testing.</td>
</tr>
<tr>
<td>Product Architecture and supply chain</td>
</tr>
<tr>
<td>Industrial Design and Ergonomics.</td>
</tr>
<tr>
<td>Design for Manufacturing Optimization.</td>
</tr>
<tr>
<td>Prototyping and Simulation.</td>
</tr>
<tr>
<td>Robust Design and Taguchi Loss.</td>
</tr>
</tbody>
</table>

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.
- Tutorials.
- Projects.

Learning Materials

Useful Websites:
- [http://www.manufacturing.net](http://www.manufacturing.net)
- [http://www.ulrich-eppinger.net](http://www.ulrich-eppinger.net)
- [http://www.sdsmagazine.com](http://www.sdsmagazine.com)
- [http://www.ideo.com](http://www.ideo.com)
- [http://www.logicpd.com](http://www.logicpd.com)
- [http://www.hbs.edu](http://www.hbs.edu)

Reference Text:

Supplementary Readings:
- Booker, J. D., Design capable and Reliable Products, Heinmann, 2001.

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%

<table>
<thead>
<tr>
<th>Total</th>
<th>100%</th>
</tr>
</thead>
</table>

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
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

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

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.

Learning Materials

Software Requirements
• Lap. at MAS.
• Video Tapes.

Reference Text

Hardware Requirements
• Standard devices for Lab. Experiments.

Supplementary Readings
• Elsabbagh, “Introduction to Production Engineering”, Ein Shams University, Cairo.

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
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass and Energy Transfer</td>
</tr>
<tr>
<td>Environmental Chemistry</td>
</tr>
<tr>
<td>Mathematics for Growth</td>
</tr>
<tr>
<td>Risk Assessment</td>
</tr>
<tr>
<td>Water Pollution</td>
</tr>
<tr>
<td>Water Quality Control</td>
</tr>
<tr>
<td>Air Pollution</td>
</tr>
<tr>
<td>Global Atmosphere Change</td>
</tr>
<tr>
<td>Solid Waste Management</td>
</tr>
<tr>
<td>Recourse Recovery and Recycling</td>
</tr>
</tbody>
</table>

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.
Learning Materials

Software Requirements
- Microsoft Office 2007, Microsoft Project 2007

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

Reference Text

Supplementary Readings
- 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

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

ISE 4632
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
<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction, Robot Components, Degrees-of-Freedom, and Joints.</td>
</tr>
<tr>
<td>Robot Coordinates Workspace, Reference and Applications.</td>
</tr>
<tr>
<td>Robot kinematics and Position Analysis, Matrix Representation.</td>
</tr>
<tr>
<td>Homogeneous Transformation Matrices.</td>
</tr>
<tr>
<td>Robot Kinematic-Modeling (Forward and Inverse Kinematics).</td>
</tr>
<tr>
<td>Denavit-Hartenberg Representation in Kinematic Analysis of Robot</td>
</tr>
<tr>
<td>Differential Motions and Velocities, Differential Relationships, Jacobian.</td>
</tr>
<tr>
<td>Trajectory Planning: joint space and Cartesian space trajectory planning.</td>
</tr>
<tr>
<td>Robot Economics: Analysis and Justifications.</td>
</tr>
<tr>
<td>Robot Safety and Maintenance.</td>
</tr>
</tbody>
</table>

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.
- Individual Project.
- Tutorials.
- 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:

Supplementary Readings:

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
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**

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definitions of Quality, Quality Control, Quality Assurance, and Total Quality Management (TQM).</td>
</tr>
<tr>
<td>Philosophies and Views of the Quality Gurus.</td>
</tr>
<tr>
<td>Basic Concepts of TQM: Customer Focus, Management Commitment, Employees Involvement, Supplier Partnership, Continuous Improvement, Process Measurement.</td>
</tr>
<tr>
<td>Ethics and Quality Statements.</td>
</tr>
<tr>
<td>Customer Satisfaction and Customer Retention.</td>
</tr>
<tr>
<td>Performance Measures.</td>
</tr>
<tr>
<td>Quality Costs and Quality Awards.</td>
</tr>
<tr>
<td>Benchmarking, Quality Function Deployment.</td>
</tr>
</tbody>
</table>

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

Learning Materials

Useful Websites:
- [http://www.quality.de](http://www.quality.de)
- [http://www.americanquality.com](http://www.americanquality.com)
- [http://www.iso.ch](http://www.iso.ch)
- [http://www.airquality.org](http://www.airquality.org)

Reference Text:

Supplementary Readings:

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

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

Teaching/Learning Strategies
- Lectures.
- Individual Project.
- Tutorials.
- 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

Reference Text:

Supplementary Readings:

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 Learning Unit Contact Hours

<table>
<thead>
<tr>
<th>Learning Unit Contact Hours</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3 hrs/week</td>
</tr>
<tr>
<td>Tutorials</td>
<td>1.5 hrs/week</td>
</tr>
<tr>
<td>Total class contact hours</td>
<td>63 hrs/semester</td>
</tr>
<tr>
<td>Total self study hours</td>
<td>45 hrs/semester</td>
</tr>
<tr>
<td>Total study hours</td>
<td>108 hrs/semester</td>
</tr>
</tbody>
</table>

## Module Leader

Staff

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500's LEVEL MODULES
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistical Concepts.</td>
</tr>
<tr>
<td>Experiments of Evaluation.</td>
</tr>
<tr>
<td>Experiments of Comparison.</td>
</tr>
<tr>
<td>Randomized Blocks, Latin Squares and Related Designs.</td>
</tr>
<tr>
<td>Factorial and Fractional Factorial Experiments.</td>
</tr>
<tr>
<td>True Correlation and Regression Analysis.</td>
</tr>
<tr>
<td>Non Parametric Experiments.</td>
</tr>
<tr>
<td>Taguchi’s Contribution to the Design of Experiments.</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

C- Knowledge

After completing this module, students will be able to:

3. Review the basic concepts and principles of Design of Experiments.

D- Skills

After completing this module, students will be able to:

1. Carry Full and Fractional Factorial Designs.
3. Conduct ANOVA analysis

Teaching/Learning Strategies

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

Learning Materials

Software Requirements:

- Minitab.

Useful Websites:

- [www.sas.com/training/us/css](http://www.sas.com/training/us/css)
Reference Text:

Supplementary Readings:

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
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
<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Law and regulations concerning engineering syndicate, Contractors union and environment protection.</td>
</tr>
<tr>
<td>Relationship between the parties of local and international contracts in civil and administrative laws.</td>
</tr>
<tr>
<td>Claims and disputes resulting during execution of works and the engineer’s decision in this respect.</td>
</tr>
<tr>
<td>Settlement of disputes in local and international contracts, institutional arbitration.</td>
</tr>
</tbody>
</table>

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, mediation, arbitration, 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.
- Individual Project.
- Tutorials.
- 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:**

**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%

<table>
<thead>
<tr>
<th>Total</th>
<th>100%</th>
</tr>
</thead>
</table>

**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
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.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamentals of Chemical Machining (CM).</td>
</tr>
<tr>
<td>Steps of CM and Applications.</td>
</tr>
<tr>
<td>Chemical Milling and Chemical Blanking.</td>
</tr>
<tr>
<td>Electrochemical Machining (ECM). Terminology and Rate of Metal Removal.</td>
</tr>
<tr>
<td>Some Industrial Applications of ECM.</td>
</tr>
<tr>
<td>How EDM occurs, its Machine Parts and Types of Flashing.</td>
</tr>
<tr>
<td>Electric Discharge Wire Cut (EDWC), Rate of Metal Removal.</td>
</tr>
<tr>
<td>LBM, EBM, and AJM.</td>
</tr>
<tr>
<td>Hydrodynamic Machining (HDM).</td>
</tr>
<tr>
<td>Abrasive Flow Machining (AFM).</td>
</tr>
</tbody>
</table>

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

#### Supplementary Readings
- Kumar, B, “Manufacturing Processes and Technology”, Khanna publishers, Delhi, 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 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
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.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design for Manufacture</td>
</tr>
<tr>
<td>Design for Assembly</td>
</tr>
<tr>
<td>Design for Disassembly</td>
</tr>
<tr>
<td>Design for Recyclability</td>
</tr>
<tr>
<td>Design for Environment</td>
</tr>
<tr>
<td>Design for aesthetics</td>
</tr>
<tr>
<td>Design for Performance</td>
</tr>
<tr>
<td>Design for Ergonomics</td>
</tr>
<tr>
<td>Other criteria and case studies</td>
</tr>
</tbody>
</table>

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

Supplementary Readings
- Kawasaki, G., The Art of the Start, Portfolio, 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 Practical Project.
- Unseen Written Mid-Term Exam (1.5-hr Exam).
- Unseen Written Final-Exam (3-hr Exam).

Assessment Pattern

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>10%</td>
</tr>
<tr>
<td>Tests and Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Term Projects</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Learning Unit Contact Hours

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3 hrs / week</td>
</tr>
<tr>
<td>Tutorials</td>
<td>1.5 hrs / week</td>
</tr>
<tr>
<td><strong>Total class contact hours</strong></td>
<td>63 hrs/semester</td>
</tr>
<tr>
<td><strong>Total self study hours</strong></td>
<td>45 hrs/semester</td>
</tr>
<tr>
<td><strong>Total study hours</strong></td>
<td>108 hrs/semester</td>
</tr>
</tbody>
</table>

Module Leader

Staff
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
<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define the Problem.</td>
</tr>
<tr>
<td>Identify Research Plan.</td>
</tr>
<tr>
<td>Formulate a Student Team.</td>
</tr>
<tr>
<td>Select the Designated Supervisor.</td>
</tr>
<tr>
<td>Carry out Field Trips.</td>
</tr>
<tr>
<td>Conduct Background Research.</td>
</tr>
<tr>
<td>Perform Problem Analysis.</td>
</tr>
<tr>
<td>Submit a Pre- and Mid – Written Reports.</td>
</tr>
<tr>
<td>Prepare Oral Presentations.</td>
</tr>
</tbody>
</table>

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 %

<table>
<thead>
<tr>
<th>Total</th>
<th>100 %</th>
</tr>
</thead>
</table>

**Learning 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
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

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queuing Theory</td>
</tr>
<tr>
<td>Monte Carlo Simulation.</td>
</tr>
<tr>
<td>Types of simulation and Time Advance Mechanisms.</td>
</tr>
<tr>
<td>Basics of Discrete Event Simulation.</td>
</tr>
<tr>
<td>Random Number Generation.</td>
</tr>
<tr>
<td>Input Data Analysis and Probabilistic Distributions.</td>
</tr>
<tr>
<td>Model Building Process with SIMAN Language (ARENA Package).</td>
</tr>
<tr>
<td>Model Validation and Verification.</td>
</tr>
<tr>
<td>Simulation Output Analysis.</td>
</tr>
<tr>
<td>Stopping Rules.</td>
</tr>
<tr>
<td>Case Studies.</td>
</tr>
</tbody>
</table>

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.
- Individual/Group Projects.
- Tutorials.
- 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.me.uic.edu)
- [http://www.ise.ufl.edu](http://www.ise.ufl.edu)

#### Reference Text:

#### Supplementary Readings:

#### 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

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>10%</td>
</tr>
<tr>
<td>Tests and Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Individual Computer Project</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>Total study hours</th>
<th>108 hrs/semester</th>
</tr>
</thead>
</table>

### Module Leader
Staff
MSA UNIVERSITY
FACULTY OF ENGINEERING
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

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

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. Understand 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.
27. Develop a better understanding of the rationale for all relevant ethical codes.
28. Act in such a manner as to enhance the honor, integrity and dignity of the profession.
29. Design 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:
- chemlabs.uoregon.edu/Safety/GeneralInstructions.htm.
- www.batesville.k12.in.us/physics/phynet/lab%20rules/lab_rules.html.

Reference Text:

Supplementary Readings:

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
**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**

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Concepts.</td>
</tr>
<tr>
<td>An Overview and History.</td>
</tr>
<tr>
<td>Prescreening and Preparation Through for stages.</td>
</tr>
<tr>
<td>Evaluation and Verification stage.</td>
</tr>
<tr>
<td>Technical Data Generation stage.</td>
</tr>
<tr>
<td>Design Verification stage.</td>
</tr>
<tr>
<td>Project Implantation stage.</td>
</tr>
<tr>
<td>Future application.</td>
</tr>
<tr>
<td>Individual Projects.</td>
</tr>
</tbody>
</table>

**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.
- Video Tapes.
- Class Presentation.
## Learning Materials

### Software Requirements
- Video Tapes.
- Reverse engineering software.
- Power Point.

### Hardware Requirements
- Reverse engineering Lab.

### Useful Sites
- www.ugs.com

### Reference Text

## 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

MFG 5631

131
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

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

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.
- Individual Project.
- Tutorials.
- 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

Reference Text:

Supplementary Readings:

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

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

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.

<table>
<thead>
<tr>
<th><strong>Teaching/Learning Strategies</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Orientation Sessions.</td>
</tr>
<tr>
<td>• Review and discussion Sessions.</td>
</tr>
<tr>
<td>• Team projects.</td>
</tr>
<tr>
<td>• Presentations.</td>
</tr>
<tr>
<td>• Field trips.</td>
</tr>
</tbody>
</table>

**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**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor's Evaluation</td>
<td>40 %</td>
</tr>
<tr>
<td>External Examiner's Evaluation</td>
<td>60 %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>

**Learning Unit Contact Hours**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sessions</td>
<td>3 hrs / week</td>
</tr>
<tr>
<td>Total class contact hours</td>
<td>42 hrs / semester</td>
</tr>
<tr>
<td>Total other study hours</td>
<td>66 hrs / semester</td>
</tr>
<tr>
<td>Total study hours</td>
<td>108 hrs / semester</td>
</tr>
</tbody>
</table>

**Module Leader**

Staff