MECHANICAL ENGINEERING
B. Sc. Program

Status Report: Volume II
December 2009
B. SC. PROGRAM STATUS REPORT

Mechanical Engineering

Prepared by Departmental Committee and Coordinated by

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Head of Department
Department of Mechanical Engineering

DECEMBER 2009
DEPARTMENT VISION/MISSION STATEMENTS

Vision
Mechanical engineering is a challenging, rewarding, and highly respected profession, a profession that our department of mechanical engineering at AASTMT supports through our commitment to excellence in our teaching, research and service missions.

Mission
Many Mechanical Engineering graduates pursue positions in management, while others prefer a career along technical and professional lines.

Because a mechanical engineer might work in any one of these fields, The Mechanical Engineering Program has been designed in a way that offers a challenging education. It is designed to provide knowledge of the basic physical sciences, and to encourage the development of ingenuity for the purpose of creating well-engineered solutions to technological problems that contribute positively to their communities and countries.

The Mechanical Engineering Department educates the engineers of tomorrow by integrating classroom theory and practical hands-on projects, by emphasizing the process of learning and critical thinking, by conducting original research, and by promoting professional relationships among the university, the business community, and engineering colleagues.

DEPARTMENT OBJECTIVES

Undergraduate study stresses the development of the individuals in their chosen specialty. Students proceed through the program guided by a series of rules and regulations. The objective of the department is to present to our Students the minimum university wide standards for the operation of our graduate program and help them make the most of their time during the graduate program and to support the colleges efforts to achieve high standards of delivery thus drawing attention to mutual rights and responsibilities. Each Student should become thoroughly familiar with the rules and regulations of the Graduate Degree program stated in this document.
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**MECHANICAL ENGINEERING**
Introduction

Program overview, activities and job opportunities, and program objectives

Mechanical Engineering: An Overview

Mechanical engineers design and develop everything you think of as a machine - from supersonic fighter jets to bicycles to toasters. And they influence the design of other products as well - shoes, light bulbs and even doors. Many mechanical engineers specialize in areas such as manufacturing, robotics, automotive/transportation and air conditioning. Others cross over into other disciplines, working on everything from artificial organs to the expanding field of nanotechnology. And some use their mechanical engineering degree as preparation for the practice of medicine and law. The mechanical engineer may design a component, a machine, a system or a process. Mechanical engineers will analyze their design using the principles of motion, energy, and force to insure the product functions safely, efficiently, reliably, and can be manufactured at a competitive cost.

The Role of Mechanical Engineers

Mechanical engineers are directly and broadly concerned with the engineering systems used to control and transform energy to meet the needs of humanity. They design, develop, and produce devices and systems from space probes to washing machines, from turbojet engines to lawn mowers, from automatic machine tools and vending machines to computer-controlled systems. Because mechanical engineering is one of the broadest-based fields of technical study, it is also an excellent foundation for further education in business, law, medicine, and other professions that require a good working knowledge of science and technology.

Career Opportunities for Mechanical Engineers

The mechanical engineering degree program reflects the trend in industry generally toward recruiting a greater proportion of graduates into executive positions.

Mechanical Engineers play a major role in energy utilization and conservation, in solar energy, design and selection, management and maintenance of both conventional and non-conventional power plants. Heating, air conditioning and refrigeration, transportation and automotive fields, and in the field of mechatronics, automation, fluid machinery, production and processing machinery including the petroleum and chemical fields.
Program Aim and Objectives

Graduates of the program are expected to be able to apply knowledge of mathematics, science, and engineering; design and conduct experiments and engineering tests, as well as analyze and interpret data; design a system, component, or process to meet desired needs; function on multidisciplinary teams; identify, formulate, and solve engineering problems; understand professional and ethical responsibilities in the practice of engineering; communicate effectively using oral, written, and graphical expressions, including technical reports; appreciate the impact of engineering solutions in a global and societal context; recognize the need for and have the ability to engage in independent study and lifelong learning; understand contemporary issues and the ways they affect the practice of engineering; use the techniques, skills, and modern engineering tools, including computers, that are appropriate for good engineering practice.
Program Intended Learning Outcomes (ILOs)

Knowledge and Understanding

1. Students should have knowledge and understanding of:
   - Essential scientific principles of Hydraulics.
   - Fundamentals of Fluid mechanics engineering applications.
   - Concepts of Thermal power plants.

2. A basic understanding of the following:
   - Classification of engineering materials, metals and non-metals.
   - Crystalline structure, properties of engineering materials, mechanical properties, other properties.
   - Testing and inspection of materials, destructive tests, non destructive tests.
   - Solidification of metals and alloys, heat treatment of metals and alloys.
   - Corrosion.
   - Direct stresses, tension stress, compression stress, shear stress.
   - Design of bolts, thermal stresses.
   - Normal force, shearing force and bending moment diagrams.
   - Bending theory, bending stress, design of beams.
   - Torsion stress and deformation, design of transmission shafts.
   - Stress transformation, strain transformation.
   - Design of pressure vessels, design of beams, design of shafts.
   - Deflection of beams.
   - Buckling of columns, design of columns.
   - Introduction to finite element method.

3. A basic understanding of the principles of conservation of mass, momentum and energy. The essential elements of dynamic system design through modelling and simulation of various mechanical. The principles of machine element design through geometrical construction, assemblies, analysis, synthesis and optimal design. The principles involved in obtaining solutions to various engineering problems using appropriate numerical and experimental techniques.


5. Students should also have basic knowledge of electrical engineering as well as modern control system and microcontrollers for most mechanical systems.

6. Additionally, students should have the basic knowledge of management and operation research.
**Intellectual Skills**

1. Students should be able to apply basic scientific principles of Hydraulics and fluid mechanics to solve simple and complex engineering problems. Model and analyze most engineering systems with respect to fluid mechanics. Design hydraulic systems for most applications. Calculating the efficiency of any thermal power plants. Different Types of Turbines and compressors.

2. Students should be able to realize the relationship between the structure and properties of engineering materials, and how to modify the structure to achieve specific properties. Calculate and sketch normal force, shear force and bending moment diagrams, and determine stresses and strains in beams and simple structural members subjected to various types of loading. Determine stresses in different orientations in beams and other structural components, calculate deflection of beams and shafts, analyze statically indeterminate beams, and design slender columns subjected to axial loading. Use the theory to develop engineering solutions to the strength problems in the design of mechanical components and structural elements.

3. Students should have a basic understanding of mathematical and physical concepts of dynamic system analysis and control. Understand the statistical approach to various physical problems. Put forward the design requirements and considerations and manage the different design steps. Capable of selecting the suitable solution techniques to various design problems.

4. Students should be able to apply basic scientific principles of thermodynamics and fluid mechanics to solve simple and complex engineering problems. Model and analyze most engineering systems with respect to thermodynamics and fluid mechanics. Estimating the cooling load for any application. Design refrigeration and air conditioning systems for most applications. Using lots of related software packages.

**Practical and Professional Skills**

1. Student should be able to use Pneumatics, hydraulic devises and flow measurements, conduct simple hydraulic and fluid mechanics experiments. Diagnose and trouble-shoot the problems of any simple thermal power plant cycle.

2. Students should be able to use load and strain measurement instruments to collect data on the state of stress/strain within loaded components and structures. Determine the main mechanical properties of materials using destructive testing techniques. Apply non-destructive methods for checking materials and determining surface and internal defects.

3. Students should be familiar with free-hand sketching along computer aided drafting and design graphics. Draw components and assemblies of machine parts using 3D computer aided graphics. Practice computer aided analysis and design using various software for 2D and 3D analysis. Produce 2D and 3D graphics for presentation of various theoretical and experimental results, carry out engineering data processing and system control. Visualize the impact of technology development on the environment.
Program Planning Sheet

New program structure including the suggested new course titles and codes and comparison between this program and the previous one

Curriculum

The mechanical engineering curriculum is designed to provide a strong foundation in analysis, problem-solving, engineering design, and communication that graduates can use to further their professional goals through practice or graduate study in engineering or the pursuit of further professional education in another field. Because engineering is a constantly evolving profession, the curriculum seeks to give students the study and organizational skills that support lifelong learning.

Course Coding

Numbering System

The course code consists of five or six alphanumeric digits, ME XYZ (E) depending on the nature of the course; whether it is core or elective.
The **ME** digits : Represent the abbreviations of the subject field.

The **X** digit : Represents the course level or the year at which the course is offered in the plan of study.

The **Y** digit : Represents the course group.

The **Z** digit : Represents the course sequence number within the group.

The **E** Letter : Indicates if a course is core or elective, (E) indicates an elective course.

**Abbreviations of Subject Fields**
The following abbreviations of subject fields are used in the Degree offered and Graduation Requirements and Course Summary Description sections of this report; and are listed below in an alphabetical order:

- BA – Basic and Applied Science.
- CC – Computer Engineering.
- EC – Electronics and communication Engineering
- EE – Electrical Engineering.
- IM – Industrial and Management Engineering.
- LH – Language Courses.
- ME – Mechanical Engineering.
- NE – Non-Engineering Courses.

**Mechanical Engineering Subject Field Groups**
The Mechanical Engineering (ME) subject field offers courses in the following five groups:

- Elective Courses - (ME XXXE)
- Projects - (ME X0X)
- Power Plant Engineering Courses – (ME X2X)
- Heat, Thermodynamics, Refrigeration & Air conditioning Courses – (ME X3X)
- General Mechanical Courses – (ME X4X)
- Applied Mechanics Courses – (ME X5X)
- Hydraulics & Fluid Mechanics Courses – (ME X6X)
- Materials Science Courses – (ME X7X)
- Automotive & Internal Combustion Engines Courses – (ME X8X)
- Mechatronics Engineering Courses – (ME X9X)

**Degree Offered**
The program offers the degree of Bachelor of Science (B. Sc.) in Mechanical Engineering. The candidate for the (B. Sc.) degree is required to pursue scholastic quality and complete a plan of study prepared with his academic advisor and approved by the Mechanical Engineering Department Council. The number of credit hours required for graduation is 180 (cr. hr.) spreading over 10 academic semesters. The program contains a sequence of courses that are designed according to the National Academic Reference Standards (NARS) for mechanical engineering.
Graduation Requirements

Energy and Power Engineering – Refrigeration and Air Conditioning Engineering

College Requirements

A total of 81 credit hours are required by the college as per the following table:

<table>
<thead>
<tr>
<th>Subject Field</th>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Cr. Hr.</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA</td>
<td>1</td>
<td>BA 113</td>
<td>Physics (1)</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>BA 114</td>
<td>Physics (2)</td>
<td>3</td>
<td>BA 113</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>BA 118</td>
<td>Chemistry</td>
<td>2</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>BA 123</td>
<td>Mathematics (1)</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>BA 124</td>
<td>Mathematics (2)</td>
<td>3</td>
<td>BA 123</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>BA 141</td>
<td>Engineering mechanics (1)</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>BA 142</td>
<td>Engineering mechanics (2)</td>
<td>3</td>
<td>BA 141</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>BA 223</td>
<td>Mathematics (3)</td>
<td>3</td>
<td>BA 124</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>BA 224</td>
<td>Mathematics (4)</td>
<td>3</td>
<td>BA 223</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>BA 323</td>
<td>Mathematics (5)</td>
<td>3</td>
<td>BA 224</td>
</tr>
<tr>
<td>CC</td>
<td>1</td>
<td>CC111</td>
<td>Introduction to Computer</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>CC112</td>
<td>Structured Programming</td>
<td>3</td>
<td>CC 111</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>CC 413</td>
<td>Numerical Analysis</td>
<td>3</td>
<td>CC 112</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>CC 442</td>
<td>Digital Design and Intro. to Microprocessors</td>
<td>3</td>
<td>EE 218 &amp; CC 112</td>
</tr>
<tr>
<td>IM</td>
<td>1</td>
<td>IM 111</td>
<td>Industrial Relations</td>
<td>2</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>IM 112</td>
<td>Manufacturing Technology</td>
<td>2</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>IM 423</td>
<td>Operation Research</td>
<td>3</td>
<td>90 Credit Hours</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>IM 535</td>
<td>International Operation Management</td>
<td>3</td>
<td>126 Credit Hours</td>
</tr>
<tr>
<td>ME</td>
<td>2</td>
<td>ME 151</td>
<td>Eng. Drawing and Projection</td>
<td>2</td>
<td>None</td>
</tr>
<tr>
<td>LH</td>
<td>1</td>
<td>LH 131</td>
<td>ESP (1)</td>
<td>2</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>LH 132</td>
<td>ESP (2)</td>
<td>2</td>
<td>LH 131</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>LH 231</td>
<td>Technical Report Writing</td>
<td>3</td>
<td>LH 132</td>
</tr>
<tr>
<td>EE</td>
<td>4</td>
<td>EE 218</td>
<td>Instrumentation and Measurements</td>
<td>3</td>
<td>EE 238</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>EE 238</td>
<td>Electrical Eng. Fundamentals</td>
<td>3</td>
<td>BA 124</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>EE 329</td>
<td>Electrical Machines</td>
<td>3</td>
<td>EE 238</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>EE 418</td>
<td>Automatic Control System</td>
<td>3</td>
<td>EE 328 or EE 218</td>
</tr>
<tr>
<td>NE</td>
<td>6</td>
<td>NE 264</td>
<td>Scientific thinking</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>NE 364</td>
<td>Engineering Economy</td>
<td>3</td>
<td>54 Credit Hours</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>NE 466</td>
<td>Environmental science and technology</td>
<td>3</td>
<td>None</td>
</tr>
</tbody>
</table>

Department Requirements

A total of 99 credit hours are required by the department, which are distributed as follows:
- 84 credit hours of compulsory courses.
- A minimum of 15 Cr. Hrs. of department electives selected from these two main groups.

- Students of *Energy and Power Engineering Major* should register 3 subjects from group A + 2 subject from group B.
- Students of *Refrigeration and Air Conditioning Engineering Major* should register 3 subjects from group B + 1 subject from group A.

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

<table>
<thead>
<tr>
<th>Subject Field</th>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Cr. Hr.</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME</td>
<td>3</td>
<td>ME 232</td>
<td>Thermodynamics (1)</td>
<td>3</td>
<td>BA 114</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>ME 241</td>
<td>Experimental Methods</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>ME 252</td>
<td>Mechanical Engineering Drawing</td>
<td>3</td>
<td>ME 151</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>ME 274</td>
<td>Materials Science</td>
<td>3</td>
<td>BA 114 &amp; BA 142</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>ME 276</td>
<td>Stress Analysis</td>
<td>3</td>
<td>ME 274</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>ME 333</td>
<td>Thermodynamics (2)</td>
<td>3</td>
<td>ME 232</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>ME 355</td>
<td>Theory of Machines</td>
<td>3</td>
<td>BA 142</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>ME 356</td>
<td>Machine Design (1)</td>
<td>3</td>
<td>ME 276 &amp; ME 252</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>ME 357</td>
<td>Machine Design (2)</td>
<td>3</td>
<td>ME 356</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>ME 362</td>
<td>Hydraulics</td>
<td>3</td>
<td>BA 114</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>ME 381</td>
<td>Internal Combustion Engine (1)</td>
<td>3</td>
<td>ME 232</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>ME 382</td>
<td>Internal Combustion Engine (2)</td>
<td>3</td>
<td>ME 381 &amp; ME 333</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>ME 423</td>
<td>Steam Plant Engineering</td>
<td>3</td>
<td>ME 431</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>ME 431</td>
<td>Heat Transfer</td>
<td>3</td>
<td>ME 333</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>ME 434</td>
<td>Refrigeration &amp; Air Conditioning</td>
<td>3</td>
<td>ME 431</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>ME 455</td>
<td>Computer Aided Design</td>
<td>3</td>
<td>ME 356 or ME 454</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>ME 458</td>
<td>Mechanical Vibration</td>
<td>3</td>
<td>ME 355</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>ME 461</td>
<td>Fluid Mechanics</td>
<td>3</td>
<td>ME 362</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>ME 464</td>
<td>Hydraulic Systems</td>
<td>3</td>
<td>ME 362</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>ME 465</td>
<td>Computational Fluid Dynamics</td>
<td>3</td>
<td>ME 461 &amp; ME 431</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>ME 501</td>
<td>Senior Project (1)</td>
<td>3</td>
<td>S.S.*</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>ME 502</td>
<td>Senior Project (2)</td>
<td>6</td>
<td>ME 501</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>ME 520</td>
<td>Thermal Plant Engineering</td>
<td>3</td>
<td>ME 423</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>ME 565</td>
<td>Turbo machinery</td>
<td>3</td>
<td>ME 461</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>ME 542</td>
<td>Maintenance Planning</td>
<td>3</td>
<td>126 Credit Hours</td>
</tr>
<tr>
<td>IM</td>
<td>4</td>
<td>IM 212</td>
<td>Manufacturing Process 1</td>
<td>3</td>
<td>IM 112</td>
</tr>
<tr>
<td>EE</td>
<td>8</td>
<td>EE 448</td>
<td>Electrical power</td>
<td>3</td>
<td>EE 329</td>
</tr>
</tbody>
</table>

* Senior Standing (Semesters 9 and 10 only).
## Department Restricted Electives

At least 5 courses (15 Cr. Hr.) from the following list

<table>
<thead>
<tr>
<th>Group A</th>
<th>Subject Field</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Cr. Hr.</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 – 10</td>
<td>IM 542</td>
<td>Reverse Engineering</td>
<td>3</td>
<td>126 Credit Hours</td>
<td></td>
</tr>
<tr>
<td>9 – 10</td>
<td>ME 481</td>
<td>Automotive Technology</td>
<td>3</td>
<td>ME 381</td>
<td></td>
</tr>
<tr>
<td>9 – 10</td>
<td>ME 522</td>
<td>Power plant analysis and design</td>
<td>3</td>
<td>ME 520</td>
<td></td>
</tr>
<tr>
<td>9 – 10</td>
<td>ME 523</td>
<td>Power plant operation &amp; Management</td>
<td>3</td>
<td>ME 423</td>
<td></td>
</tr>
<tr>
<td>9 – 10</td>
<td>ME 524</td>
<td>Renewable Energy Resources</td>
<td>3</td>
<td>126 Credit Hours</td>
<td></td>
</tr>
<tr>
<td>9 – 10</td>
<td>ME 526</td>
<td>Power plant measurements &amp; control</td>
<td>3</td>
<td>EE 418</td>
<td></td>
</tr>
<tr>
<td>9 – 10</td>
<td>ME 555</td>
<td>Material Handling Equipment</td>
<td>3</td>
<td>126 Credit Hours</td>
<td></td>
</tr>
<tr>
<td>9 – 10</td>
<td>ME 591</td>
<td>Mechatronics</td>
<td>3</td>
<td>CC 442</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Group B</th>
<th>Subject Field</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Cr. Hr.</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 – 10</td>
<td>ME 532</td>
<td>Refrigerating Applications</td>
<td>3</td>
<td>ME 434</td>
<td></td>
</tr>
<tr>
<td>9 – 10</td>
<td>ME 533</td>
<td>Air Conditioning Applications</td>
<td>3</td>
<td>ME 434</td>
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<tr>
<td>9 – 10</td>
<td>ME 534</td>
<td>Energy Management</td>
<td>3</td>
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<tr>
<td>9 – 10</td>
<td>ME 535</td>
<td>Refrigeration equipment &amp; control</td>
<td>3</td>
<td>ME 434</td>
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<tr>
<td>9 – 10</td>
<td>ME 536</td>
<td>Air Conditioning Units and Control</td>
<td>3</td>
<td>ME 434</td>
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<tr>
<td>9 – 10</td>
<td>ME 537</td>
<td>Refrigerating plant design and selection</td>
<td>3</td>
<td>ME 434</td>
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<tr>
<td>9 – 10</td>
<td>ME 538</td>
<td>Air conditioning systems design &amp; selection</td>
<td>3</td>
<td>ME 434</td>
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<td>9 – 10</td>
<td>ME 539</td>
<td>Cryogenic Systems</td>
<td>3</td>
<td>ME 434</td>
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</table>
# Mechatronics Engineering

## College Requirements

A total of 90 credit hours are required by the college as per the following table:

<table>
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<tr>
<th>Subject Field</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Cr. Hr.</th>
<th>Prerequisite</th>
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<td>Mathematics (2)</td>
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<td>BA 141</td>
<td>Engineering mechanics (1)</td>
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<td>Structured Programming</td>
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<td>CC 213</td>
<td>Programming Applications</td>
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<td>CC 413</td>
<td>Numerical Analysis</td>
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<td>CC 442</td>
<td>Digital Design and Intro. to Microprocessors</td>
<td>3</td>
<td>EE 218 &amp; CC 112</td>
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<td>Manufacturing Technology</td>
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<td>IM 423</td>
<td>Operation Research</td>
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<td>IM 535</td>
<td>International Operation Management</td>
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<td>Analogue and Digital Signal Processing</td>
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<td>3</td>
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<td>EE 238</td>
<td>Electrical Eng. Fundamentals</td>
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<td>Electrical Machines</td>
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<td>EE 418</td>
<td>Automatic Control System</td>
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<td>Scientific thinking</td>
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<td>NE 364</td>
<td>Engineering Economy</td>
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<td>NE 466</td>
<td>Environmental science and technology</td>
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Department Requirements
A total of 90 credit hours are required by the department, which are distributed as follows:

- 84 credit hours of compulsory courses.
- 6 credit hours of department restricted electives that are selected from the two main groups.

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

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<tr>
<th>Subject Field</th>
<th>Course Code</th>
<th>Course Title</th>
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<th>Prerequisite</th>
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<td>Thermodynamics (1)</td>
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<td>3</td>
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<td>Experimental Methods</td>
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<td>Mechanical Engineering Drawing</td>
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<td>Materials Science</td>
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<td>BA 114 &amp; BA 142</td>
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<td>4</td>
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<td>Stress Analysis</td>
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<td>ME 274</td>
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<td>4</td>
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<td>Thermodynamics (2)</td>
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<td>Theory of Machines</td>
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<td>Hydraulics</td>
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<td>Mechanical Vibration</td>
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<td>Fluid Mechanics</td>
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<td>ME 464</td>
<td>Hydraulic Systems</td>
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<td>ME 465</td>
<td>Computational Fluid Dynamics</td>
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<td>Maintenance Planning</td>
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<td>Mechatronics</td>
<td>3</td>
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<td>9</td>
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<td>Electromechanical Systems</td>
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<td>Mechatronic Systems</td>
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<td>ME 594</td>
<td>Robotics applications</td>
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<td>Automation of Mechanical Systems</td>
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<td>IM 212</td>
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<td>EE</td>
<td>EE 416</td>
<td>Microcontroller Applications</td>
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* Senior Standing (Semesters 9 and 10 only).
### Department Restricted Electives
Select 1 course from each group (total of 6 Cr. Hrs.) from the following list.

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<thead>
<tr>
<th>Subject Field</th>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
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<th>Prerequisite</th>
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<td>ME 464</td>
<td>Hydraulic Systems</td>
<td>3</td>
<td>ME 362</td>
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<td>8</td>
<td>IM 542</td>
<td>Reverse Engineering</td>
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<td>8</td>
<td>ME 555</td>
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<td><strong>Group B</strong></td>
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<td>9</td>
<td>ME 425</td>
<td>Power Plant Technology</td>
<td>3</td>
<td>ME 424 or ME 333</td>
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<td>Automotive Technology</td>
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### Automotive Engineering

#### College Requirements

A total of 81 credit hours are required by the college as per the following table:

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<th>Prerequisite</th>
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<td>EE 418</td>
<td>Automatic Control System</td>
<td>3</td>
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<td>Engineering Economy</td>
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### Department Requirements

A total of 99 credit hours are required by the department, which are listed in the following table.

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<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Cr. Hr.</th>
<th>Prerequisite</th>
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<td>Experimental Methods</td>
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* Senior Standing (Semesters 9 and 10 only).
# Academic Program Sheets

## Energy and Power Engineering – Refrigeration and Air Conditioning Engineering

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### Course Prerequisites

The course prerequisites are listed in the table below by each semester and for the four majors offered by the departments as follows:
## Energy and Power Engineering – Refrigeration and Air Conditioning Engineering

### Prerequisites List – Core Courses

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| MEXXX | Department Restricted Elective | MEXXX | As Designated Below |
| MEXXX | Department Restricted Elective | MEXXX | As Designated Below |
| ME 542 | Maintenance planning | 126 Credit Hours |
| IM 535 | International operations management | 126 Credit Hours |
| ME 502 | Senior Project (2) | ME 501 | Senior Project 1 |

**Prerequisites List – Elective Courses**

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| **Group 2: Refrigeration and Air Conditioning Engineering** | |
| ME 532 | Refrigerating Applications | ME 434 | Refrigeration & Air Conditioning |
| ME 533 | Air Conditioning Applications | ME 434 | Refrigeration & Air Conditioning |
| ME 534 | Energy Management | 126 Credit Hours |
| ME 535 | Refrigerating Equipment & Control | ME 434 | Refrigeration & Air Conditioning |
| ME 536 | Air Conditioning Units and Control | ME 434 | Refrigeration & Air Conditioning |
| ME 537 | Refrigerating Plant & Design | ME 434 | Refrigeration & Air Conditioning |
| ME 538 | Air conditioning System Design & Selection | ME 434 | Refrigeration & Air Conditioning |
| ME 539 | Cryogenic Systems | ME 434 | Refrigeration & Air Conditioning |
# Mechatronics Engineering

## Prerequisites List - Core Courses

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### Prerequisites List

#### Course | Prerequisite
---|---
**SEMESTER 9**
EC 534 | Analog & Digital Signal Processing
MEXXX | Elective course from group A
ME 501 | Senior Project 1
ME 592 | Mechatronics Systems
ME 593 | Electromechanical Systems
NE 466 | Environmental science and technology

- **EC 331** Electronics
- **As Designated Below**
- **138 Credit Hours and a GPA of at least 2.00**
- **ME 591** Mechatronics
- **ME 591** Mechatronics
- **None**

#### SEMESTER 10

IM 535 | International operations management
ME 502 | Senior Project 1
ME 542 | Maintenance planning
ME 595 | Automation of Mechanical Systems
ME 594 | Robotics and Applications

- **ME 501** Senior Project 1
- **ME 593** Electromechanical Systems
- **ME 355** Theory of Machines

**Prerequisites List – Elective Courses**

#### Group A

- **IM 542** Reverse Engineering
- **ME 464** Hydraulic systems
- **ME 555** Material Handling Equipment

- **ME 362** Hydraulics
- **126 Credit Hours**

#### Group B

- **ME 425** Power plant technology
- **ME 481** Automotive Technology
- **ME 524** Renewable Energy Resources

- **ME 424** Thermofluids or Thermodynamics (2)
- **ME 333**
- **ME 381** Internal combustion engine (1)

- **ME 381** Internal combustion engine (1)
- **126 Credit Hours**
## Automotive Engineering
### Prerequisites List – Core Courses

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## Academic Program Analysis

### Energy and Power Engineering – Refrigeration and Air Conditioning Engineering

#### YEAR ONE

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## B. Sc. Program Status Report 2009

### Year Two

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# B. Sc. Program Status Report 2009

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**Total** | 12 | 9 | 5 | 18 | 4.5 | 3 | 1.75 | 4.25 | 1.75 | 2 | 0.75 | 18 |

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### Year Four

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## YEAR FIVE

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# Mechatronics Engineering

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### SEMESTER THREE

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## YEAR THREE

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### YEAR FOUR
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# B. Sc. Program Status Report 2009

## Year Five

### Semester Nine

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### Automotive Engineering

#### YEAR ONE

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## B. SC. PROGRAM STATUS REPORT 2009

### YEAR TWO

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* A: Humanities and Social Sciences; B: Mathematics and Basic Sciences; C: Basic Engineering Sciences; D: Applied Engineering and Design; E: Computer Applications and ICT; F: Projects and Practice; G: Discretionary
### YEAR THREE

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*A: Humanities and Social Sciences; B: Mathematics and Basic Sciences; C: Basic Engineering Sciences; D: Applied Engineering and Design; E: Computer Applications and ICT; F: Projects and Practice; G: Discretionary*
# B. Sc. Program Status Report 2009

## Year Five

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* A: Humanities and Social Sciences; B: Mathematics and Basic Sciences; C: Basic Engineering Sciences; D: Applied Engineering and Design; E: Computer Applications and ICT; F: Projects and Practice; G: Discretionary
Program Analysis by Semester Offering

Energy and Power Engineering – Refrigeration and Air Conditioning Engineering

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Figure 1: Distribution of contact hours by semester (absolute).

* A: Humanities and Social Sciences; B: Mathematics and Basic Sciences; C: Basic Engineering Sciences; D: Applied Engineering and Design; E: Computer Applications and ICT; F: Projects and Practice; G: Discretionary
Figure 2: Distribution of contact hours by semester (percentage).

Figure 3: Distribution of total contact hours.
Figure 4: Distribution of credit hours per semester (absolute).

Figure 5: Distribution of credit hours percentages per semester.
Figure 6: Distribution of total credit hours.

### Mechatronics Engineering

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* A: Humanities and Social Sciences; B: Mathematics and Basic Sciences; C: Basic Engineering Sciences; D: Applied Engineering and Design; E: Computer Applications and ICT; F: Projects and Practice; G: Discretionary
Figure 7: Distribution of contact hours by semester (absolute).

Figure 8: Distribution of contact hours by semester (percentage).
Figure 9: Distribution of total contact hours

Figure 10: Distribution of credit hours per semester (absolute).
Figure 11: Distribution of credit hours percentages per semester (percentage).

Figure 12: Distribution of total credit hours.
### Automotive Engineering

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*a: Humanities and Social Sciences; B: Mathematics and Basic Sciences; C: Basic Engineering Sciences; D: Applied Engineering and Design; E: Computer Applications and ICT; F: Projects and Practice; G: Discretionary*

![Distribution of contact hours by semester](image-url)
Figure 14: Distribution of contact hours by semester (percentage).

Figure 15: Distribution of total contact hours
Figure 16: Distribution of credit hours per semester (absolute).

Figure 17: Distribution of credit hours percentages per semester.
Program Analysis by Subject Area

Energy and Power Engineering – Refrigeration and Air Conditioning Engineering

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* A: Humanities and Social Sciences; B: Mathematics and Basic Sciences; C: Basic Engineering Sciences; D: Applied Engineering and Design; E: Computer Applications and ICT; F: Projects and Practice; G: Discretionary
Figure 19: Contact hours by subject area (absolute).

Figure 20: Contact hour percentage by subject Areas (percentage).
Figure 21: Contact Hours per Week.

Figure 22: Percentage of total contact hours by ME course group.
Figure 23: Percentage of ME courses total contact hours per week.

Figure 24: Credit hours by subject Area (absolute).
Figure 25: Credit hours percentages by subject Area.

Figure 26: Distribution of total credit hours by subject Area.
Figure 27: Distribution of total ME courses credit hours.

Figure 28: Distribution of total credit hours by subject Area.
# Mechatronics Engineering

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* A: Humanities and Social Sciences; B: Mathematics and Basic Sciences; C: Basic Engineering Sciences; D: Applied Engineering and Design; E: Computer Applications and ICT; F: Projects and Practice; G: Discretionary

Figure 29: Contact hour by subject areas (absolute).
Figure 30: Contact hour percentage by subject areas.

Figure 31: Contact Hours per Week by subject area.
Figure 32: Percentage of total contact hours by ME course group.

Figure 33: Percentage of ME courses total contact hours per week
Figure 34: Credit hours by subject Area (absolute).

Figure 35: Credit hours percentages by subject Area.
Figure 36: Distribution of total credit hours by subject Area.

Figure 37: Distribution of total ME courses credit hours
Automotive Engineering

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* A: Humanities and Social Sciences; B: Mathematics and Basic Sciences; C: Basic Engineering Sciences; D: Applied Engineering and Design; E: Computer Applications and ICT; F: Projects and Practice; G: Discretionary
Figure 39: Contact hour by subject Areas.

Figure 40: Contact hour percentage by subject Areas.
Figure 41: Contact hours per week by subject area.

Figure 42: Percentage of total contact hours by ME course group.
Figure 43: Percentage of ME courses total contact hours per week.

Figure 44: Credit hours by subject Area.
Figure 45: Credit hours percentages by subject area.

Figure 46: Distribution of total credit hours by subject area.
Figure 47: Distribution of total ME courses credit hours.

Figure 48: Distribution of total credit hours by subject Area.
### Analysis of Courses Offered to Other Departments

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* A: Humanities and Social Sciences; B: Mathematics and Basic Sciences; C: Basic Engineering Sciences; D: Applied Engineering and Design; E: Computer Applications and ICT; F: Projects and Practice; G: Discretionary
Comparison with Previous Program

The previous Mechanical Engineering program has been modified to meet the requirements of the IMech professional institute (part of the British Professional Institutes) and more importantly to satisfy the requirements of the Supreme Council of Egyptian Universities.

The changes in the program include changes in the three majors offered by department and these changes are discussed in this section.

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Addition of a new course:

Addition of new elective courses:

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Courses Summary Description

Brief description of all courses including the number of credit hours and prerequisites.

Basic Applied Science Courses (BA)

**BA 113 – Physics (1)**
Cr.3. Prerequisite: None

Introduction to static electricity and Coulomb’s law - Introduction to static electricity and coulomb’s law - Electric field - Electric potential - Capacitors - Electric current, ohm’s law - Resistors in series and parallel - Kirchhoff’s rule - Introduction to theory of magnetism and different applications - Electromagnetic induction - Optics and waves (nature of light, properties of light waves) - Young’s double slit polarization of light waves.

**BA 114 – Physics (2)**
Cr.3. Prerequisite: BA113

Introduction to thermodynamics - Reversibility and reversible work - First law of thermodynamics’ Non-flow equation - Steady flow equation - Working Fluid (steam, perfect gas) - Reversible processes (constant volume, constant pressure, constant temperature, adiabatic) - Reversible process (polytropic) - Second law of thermodynamics - Heat transfer.

**BA 118 - Chemistry**
Cr.2. Prerequisite: None

Electrochemical reactions and cells, volumetric analysis (practical) - Principles of corrosion, titrate technique, determine of acidity (practical) - Metals and corrosive environments, determine of alkalinity and chloride (practical) - Forms of corrosion uniform, galvanic and differential aeration cell, determination of hardness (practical) - Pitting, stress corrosion cracking and intergranular corrosion forms, determination of dissolved oxygen (practical) - Atmospheric and erosion corrosion, spectrophotometer analysis (practical) - Coating and inhibitors as protection methods, determination of nitrite and nitrate (practical) - Cathodic protection, determination of phosphate and silica (practical) - Classification of fuel, properties of liquid fuel, determination of some heavy metals (practical) - Combustion of fuel, determination of fluorine and chlorine (practical) - air supply and exhaust gases, determination of turbidity (practical) - Classification of lubricants advantages and disadvantages of different types, oil analysis determination of viscosity and T.B.N (practical) - Properties of lubricants and additives, determination of insoluble and saltwater
(practical) - Nature of impurities in water, soft and hard water effect of using impure water on boilers performance, determination of acidity and water content (practical) - Water treatment, determination of ph (practical) - Air and water pollution, determination of TDS and salinity (practical).

**BA 123 – Mathematics (1)**
*Cr.3. Prerequisite: None*

Basic techniques and rules of differentiation - Trigonometric function: properties, basic identities and their derivatives - Inverse of trigonometric and their derivatives - Logarithmic functions: their properties, basic identities and derivatives - Exponential functions: their properties, basic identities and derivatives - Derivative of hyperbolic functions and their inverse - Parametric differentiation and implicit differentiation - The Nth derivative - L’ Hopital rule - Partial differentiation - Maclaurin’s expansion. - Physical application - Curve sketching - Conic sections - General revision.

**BA 124 – Mathematics (2)**
*Cr.3. Prerequisite: BA123*

Definition of indefinite integrals and table of famous integrals - Simple rules of integration and the fundamental theorem of calculus - Fundamental theorem of calculus and integration by parts - Integration by parts and integration of rational functions - Integration of rational functions - Integration of trigonometric powers - Trigonometric substitution and 7th week exam - Integration of quadratic forms and the reduction formulas - Definite integration - Area and volume - Area, volume and length of curve - Average of a function, numerical integration - Matrix Algebra - Solution of systems of linear equations.

**BA 141 – Engineering Mechanics (1)**
*Cr.3. Prerequisite: None*


**BA 142 – Engineering Mechanics (2)**
*Cr.3. Prerequisite: BA141*

Kinematics of a particle – Rectilinear Kinematics - Curvilinear Motion – Projectile Motion - Force & Acceleration (Kinetics) - Work & Energy of a particle (Kinetics) - Rotation of a Rigid Body about a fixed Axis - General Plan Motion - Relative Motion (Velocity) - Relative Motion (Acceleration) - Planar Kinetics of Rigid Body – Equation of Translation Motion - Equation of Rotational Motion - Equation of General Plane Motion - Work and Energy.

**BA 223 – Mathematics (3)**
*Cr.3. Prerequisite: BA124*

Solving first order differential equations: Separable of variables and Homogeneous equation - Solving first order differential equations: Exact and Linear equations - Solving first order differential equations: Bernoulli’s equation and revision on first order differential equations - Solving second order homogeneous differential equations with constant coefficients, method of undetermined coefficients - Solving second order non-homogeneous differential equations with constant
coefficients, method of variation of parameters - Continue method of variation of parameters, solving second order differential equations with variable coefficients (Euler's equation), Laplace transform: Basic definition, First shifting theorem, Laplace transform: Transform differentiation and integration, Unit step function, second shifting theorem, and convolution theorem - Inverse Laplace transforms - Solving differential equations by using Laplace transform - Fourier series: Fourier series for functions of period 2P - Fourier series for even and odd functions - Fourier series for harmonic functions.

**BA 224 – Mathematics (4)**

*Cr.3. Prerequisite: B.A 223*


**BA 323 – Mathematics (5)**

*Cr.3. Prerequisite: B.A 224*


**Computer Engineering (CC)**

**CC 111 – Introduction to Computers**

*Cr.3. Prerequisite: None*

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

**CC 112 – Structured Programming**

*Cr.3. Prerequisite: CC 111*
An introduction to C-language Programming is provided in this course, Variable/Constant definitions, Basic Programmes, Sequential Programming, Conditional Programming, Looping and repetitions, Functions, Arrays as well as searching and sorting techniques.

**CC 213 – Programming Applications**  
*Cr.3. Prerequisite: CC 112*

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

**CC 413 – Numerical Analysis**  
*Cr.3. Prerequisite: CC 112 and BA224*

Introduction to numerical methods and their applications - solve science and engineering problems - convergence - error analysis of numerical methods.

**CC 442 – Digital Design and Introduction to Microprocessors**  
*Cr.3. Prerequisite: CC 112*

Number systems - binary arithmetic and codes - logic gates - Boolean algebra and logic simplifications - Design and realization of combinational circuits - Flip-Flops – Design of sequential circuits - Analysis and realization of counters – Computer aided engineering - Introduction to microprocessor.

**Electronics & Communication Engineering Courses (EC)**

**EC 331 – Electronics (Mechatronics Engineering Program)**  
*Cr.3. Prerequisite: EE 328*


**EC 534 – Analog and Digital Signal Processing (Mechtronics Engineering Program)**  
*Cr.3. Prerequisite: EC 331*

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

**Electrical Engineering Courses (EE)**

**EE 218 – Instrumentation Measurements**  
*Cr.3. Prerequisite: EE238*

Introduction to feedback control (1) - Introduction to feedback control (2)- Physical Measurements - Introduction to feedback systems - Liquid level instruments - Liquid flow instruments – PH + Viscosity - Displacement + velocity measurements - Force and torque measurements - Data analysis - Error detectors/comparators - Electric/pneumatic transducers - Amplifier – Actuation.
EE 238 – Electrical Engineering Fundamentals  
Cr.3. Prerequisite: BA 124  


EE 329 – Electrical Machines  
Cr.3. Prerequisite: EE 238  


EE 416 – Microcontroller Applications  
Cr.3. Prerequisite: CC 442  


EE 418 – Automatic Control Systems  
Cr.3. Prerequisite: EE 218 OR EE328  


EE 419 – Modern control Engineering  
Cr.3. Prerequisite: EE 418  


EE 448 – Electrical Power  
Cr.3. Prerequisite: EE 329

**Industrial Engineering & Management Courses (IM)**

**IM 111 – Industrial Relations**  
Cr.2. Prerequisite: None

Types of industries and production techniques — Management and organization structure — Production planning and control — Industrial cost estimation techniques — Industrial economy and breakeven analysis — Accidents at work — rules and regulations — Hazards classification, prevention, and personal safety — Fire hazards identification and prevention — Chemical hazards and prevention — accident reporting — Quality control and labour relations — Science, engineering, and technology — Industrial revolutions.

**IM 112 – Manufacturing Technology**  
Cr.2. Prerequisite: None

Production of steel and cast iron — Forming operations — Heat treatment operations — Cutting tools — Mechanics of metal cutting and turning operations — Cutting fluids — Sand casting — Centrifugal casting, die casting and aspects of the casting process — Gas and Electric arc welding — Electric resistance and pressure welding and aspects of the welding process — Standards of measurements — Measuring Instruments — Measuring methods.

**IM 212 – Manufacturing Processes**  
Cr.3. Prerequisite: IM 112


**IM 400 – Practical Training**  
Cr.0. Prerequisite: None.

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

**IM 423 – Operations Research**  
Cr.3. Prerequisite: 90 Credit Hours.

Introduction to linear programming — Development of linear programming models — The graphical and simplex method — Transportation and assignment methods — Network models and analysis (minimal spanning tree, shortest route, and maximal flow) — Critical path method — Probabilistic approach, project evaluation and review technique (PERT) — Project crashing.
**IM 535 – International Operations Management**  
*Cr.3. Prerequisite: 126 Credit Hours.*


**IM 542E – Reverse Engineering**  
*Cr.3. Prerequisite: 126 Credit Hours.*


**Language, Humanities and Social Science (LH)**

**LH 131 - ESP I**  
*Cr.2. Prerequisite: None*


**LH 132 - ESP II**  
*Cr.2. Prerequisite: LH 131*


**LH 231 - ESP III**  
*Cr.3. Prerequisite: LH 131, LH 132*

Mechanical Engineering Courses (ME)

Projects – (ME X0X)

ME 501 – Senior Project I
Cr.3. Prerequisite: Senior Standing – Completion of 138 Credit Hours and a GPA of at least 2.00.

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

ME 502 – Senior Project II
Cr.6. Prerequisite: IM 501

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

Power Plant Engineering Courses – (ME X2X)

ME 423 – Steam Plant Engineering
CR: 3. Prerequisite: ME 431


ME 425 – Power Plant Technology
CR: 3. Prerequisite: ME 333 or ME 234


ME 520- Thermal Plant Engineering
CR: 3. Prerequisite: ME 423

ME 522- Power Plant analysis and design  
CR: 3. Prerequisite: ME 520


ME 523- Power Plant Operation and Management  
CR: 3. Prerequisite: ME 423


ME 524- Renewable Energy Resources  
CR: 3. Prerequisite: 126 Credit Hours


ME 526- Power Plant Measurements and Control  
CR: 3. Prerequisite: EE 418


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

ME 231- Thermodynamics (Industrial and Marine)  
CR: 3. Prerequisite: BA 114

Classical thermodynamics-Heat transfer by conduction, convection and radiation-Air standard cycles- Steam cycles- Gas turbine cycle-Introduction to refrigeration and air conditioning- psychrometry.

ME 232- Thermodynamics (1)  
CR: 3. Prerequisite: BA 114

**ME 234 Thermo-fluids (Electrical)**  
CR: 3. Prerequisite: BA 114/ CR: 3


**ME 333 Thermodynamics (2)**  
CR: 3. Prerequisite: ME 231


**ME 431 Heat Transfer**  
CR: 3. Prerequisite: ME 231 or ME 333


**ME 434 Refrigeration & Air conditioning**  
CR: 3. Prerequisite: ME 431/ CR: 3

Introduction - Basic Vapor compression System - Load Estimation - Air Conditioning Fundamentals - Air conditioning design - Summer & Winter Cycles - Special systems - Air Conditioning Equipment - Air Conditioning Units.

**ME 532 Refrigeration Applications**  
CR: 3. Prerequisite: ME 434

Domestic systems - Commercial - Industrial - Ice manufacturing - Food refrigeration - Freezing units - Freezing cycles - Low temperature refrigeration - Gas liquefaction - Industrial refrigeration plants.

**ME 533 Air conditioning Applications**  
CR: 3. Prerequisite: ME 434

Domestic air conditioning and ventilation- Industrial air conditioning and ventilation- Transportation units' air conditioning and ventilation- Laboratories-Clean spaces- Printing factories- Textile Processing- Hospitals and clinics- Photo graphic industries- Environmental control of animals and plants- Dry and storing farm corps- Air conditioning of wood and paper products- Electronic industry.

**ME 534 Energy Management**  
CR: 3. Prerequisite: 126 Credit Hours

Energy classification- Sources and utilization - Principal fuels for energy conversion - Petroleum fuels characteristics - World natural gas production and reserves - Gas pipe lines and underground storage - Liquefied natural gas and absorption of acidic gases from natural gas - Energy storage - Environmental impact of combustion of fuel - Source monitoring of NOx and SOx - Monitoring of
carbon monoxide emissions - NO\textsubscript{x} control by furnace and burner design - Energy management systems - Total energy schemes - Energy recovery - Process integration - Pinch technology - Computer simulation using (MESSAGE).

**ME 535- Refrigeration Equipment and Control**

CR: 3. Prerequisite: ME 434

Basic air cycle - Modification of air cycles - Thermoelectric refrigeration - Absorption systems - Vapor compression cycle - Safety and automatic control devices - Defrost systems - Dual purpose refrigeration cycle - Simple and integrated Control systems.

**ME 536- Air Conditioning units and Control**

CR: 3. Prerequisite: ME 434

Direct Contact Exchanger (Washers) - Air washer and cooling tower design and performance - Heating and cooling coils - Fans - Filters - Pumps - Piping - Air ducts - Air distribution components - AHU and FCU modules - Temperature, humidity, and air flow sensors - Control systems and DDC - Integrated control systems and DDC.

**ME 537- Refrigeration plant design & selection**

CR: 3. Prerequisite: ME 434

Cold stores capacities and layout - Constructional requirements and materials – Refrigerated stores classifications - Refrigerated stores - Loading and unloading - Refrigeration load estimation - Selection of components - Direct and brine systems - Store temperatures - M/C room requirements - Freezing tunnels - Refrigeration capacity control system - Trouble shooting.

**ME 538- A/C Systems, design & selection**

CR: 3. Prerequisite: ME 434

Air Conditioning Load Estimation - Units Capacity Requirements - Small (Separate) units applications - All air central system - All water and water air central system - Central system - Case study - Variable parameters - Trouble shooting - Technical repair and commissioning.

**ME 539- Cryogenic System**

CR: 3. Prerequisite: ME 434


**General Mechanical Courses – (ME X4X)**

**ME 241- Experimental Methods**

CR: 3. Prerequisite: None

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

**ME 542- Maintenance Planning**  
**CR: 3. Prerequisite: 126 Credit Hours**


**Applied Mechanics Courses – (ME X5X)**

**ME 151- Engineering Drawing & Projection**  
**CR: 2. Prerequisite: None**

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

**ME 252- Mechanical Engineering Drawing**  
**CR: 3. Prerequisite: ME 151**


**ME 255 – Computer Aided Drafting (Construction)**  
**CR: 3. Prerequisite: CB 221**


**ME 355- Theory of Machines**  
**CR: 3. Prerequisite: BA 142**

**ME 356 - Machine Design (1)**

*CR: 3. Prerequisite: ME 276 and ME 252*

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

**ME 357 - Machine Design (2)**

*CR: 3. Prerequisite: ME 356*

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

**ME 454 - Machine Design (Marine and Industrial)**

*CR: 3. Prerequisite: ME 252*


**ME 455 - Computer Aided Design**

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

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

**ME 458 - Mechanical Vibrations**

*CR: 3. Prerequisite: ME 355*


**ME 555 - Material Handling Equipment**

*CR: 3. Prerequisite: 126 Credit Hours*

Introduction to hoisting machinery. Cranes (types, drives, and design considerations). Elevators and miscellaneous types of hoisting machinery. Introduction to conveying machinery. Belt conveyors,

**Hydraulics & Fluid Mechanics Courses – (ME X6X)**

**ME 361 – Fluid Mechanics (Industrial)**
**CR:** 3. **Prerequisite:** 54 Credit Hour


**ME 362 – Hydraulics**
**CR:** 3. **Prerequisite:** BA 114

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

**ME 461 – Fluid Mechanics**
**CR:** 3. **Prerequisite:** ME 362


**ME 464- Hydraulic systems**
**CR:** 3. **Prerequisite:** ME 362


**ME 465- Computational fluid dynamics (CFD)**
**CR:** 3. **Prerequisite:** ME 461 and ME 431


**ME 565 – TurboMachinery**
**CR:** 3. **Prerequisite:** ME 461

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

**Materials Science Courses – (ME X7X)**

**ME 274 - Materials Science**  
CR: 3. Prerequisite: BA 114 and BA 142


**ME 276 – Stress Analysis**  
CR: 3. Prerequisite: ME 274

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

**ME 277 - Strength of Materials (Industrial)**  
CR: 3. Prerequisite: ME 274

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

**Automotive & Internal Combustion Engines Courses – (ME X8X)**

**ME 381 – Internal Combustion Engines (1)**  
CR: 3. Prerequisite: ME 232


**ME 382 – Internal Combustion Engines (2)**  
CR: 3. Prerequisite: ME 381


**ME 481 – Automotive Technology**  
CR: 3. Prerequisite: ME 381

**ME 482 – Automotive Engines**  
CR: 3. Prerequisite: ME 382

Gasoline engine operation - Diesel engine operation - Cooling system operation and diagnosis - Lubrication system operation and diagnosis - Starting and charging system diagnosis - Ignition system operation and diagnosis - Gasoline fuel and emission control systems - Diesel fuel and emission control systems - Engine condition diagnosis - Engine removal and disassembly - Engine service and assembly - Engine installation and in-vehicle service.

**ME 483 – Alternative Fuels and Power Systems**  
CR: 3. Prerequisite: ME 382


**ME 581 – Automotive fuel and Ignition Systems**  
CR: 3. Prerequisite: ME 481


**ME 582 – Automotive Chassis Systems**  
CR: 3. Prerequisite: ME 481

Engine clutches - Manual transmission - Automatic transmission - Propeller shaft and differential carrier - Types of drive and suspension - Front axle and front suspension - Rear axle and rear suspension - Brake systems - Wheels and tires - Steering systems.

**ME 583 – Vehicle Control and Safety Systems**  
CR: 3. Prerequisite: ME 481

Automotive control systems, Modelling of dynamic systems - Basic Control actions, Hydraulic and Pneumatic controllers - Engine management systems, Cruise control - Antilock brake systems - Crash avoidance systems - Smart air bags - Vehicle dynamic control, Anti slip control - Active and semi-active suspension - Automatic gear box control - Traction control system - Restraint system electronics - Parking aids, Vision enhancement systems - Intelligent vehicle diagnostics, On-board navigation systems - Safety requirements related to impact, Fire hazards - Regulations related to emission control.

**ME 584 – Automotive Electric & Electronic Systems**  
CR: 3. Prerequisite: ME 481

ME 585 – Automotive Power Trains
CR: 3. Prerequisite: ME 481


ME 586 – Vehicle Design and Engineering
CR: 3. Prerequisite: ME 481

Modern materials and vehicle design - Body design: The styling process - Body design: Aerodynamics- Chassis design and analysis- Crash worthiness- Noise, vibration and harshness- Occupant accommodation- Suspension systems and components - Control systems in vehicles- The design of engine characteristics for vehicle use - Transmissions and driveline-Braking systems.

ME 587 – Automotive Manufacturing
CR: 3. Prerequisite: ME 481


ME 588 – Vehicle Maintenance & Repair
CR: 3. Prerequisite: ME 481

Maintenance schedules, workshop layout and planning- Automotive tools, measuring instruments, testers and analyzers-Tests to evaluate engine performance-Engine reconditioning and tune-up-Fault diagnosis, maintenance and repair for: Fuel system components- Ignition system- Charging system, starting system- Barking system- Steering system- Tires and suspension system - Body repairing and refinishing- Management of out-service and repair centers

Mechatronics Engineering Courses – (ME X9X)

ME 591 – Mechatronics
CR: 3. Prerequisite: CC 442

Introduction to Mechatronics and Measurement Systems- Mechatronics Key Elements-Introduction to Sensors and Transducers-Position and Motion Sensors -Temperature Sensing Devices - Pressure, Flow, Stress, and Strain Sensors-Actuating Devices- Analog Signal Processing -
Digital Circuits and Systems - Analog to Digital and Digital to Analog Conversion - Data Acquisition Systems - Case Studies I - Case Studies II

**ME 592 - Mechatronics Systems**
*CR: 3. Prerequisite: ME 591*


**ME 593 - Electromechanical Systems and Microprocessor Applications**
*CR: 3. Prerequisite: ME 591*

Introduction to Power Electronics and Industrial Control Systems, Devices and characteristics (diodes, thyristors, triacs, power BJT, MOSFETS, IGBTs) - Power Diodes, single phase rectifiers, free-wheeling action - Power Thyristors, Delay Angles, single phase controlled rectifiers - Three phase circuits for diodes and thyristors - DC Motor Speed Control using thyristors and Diode Circuits - Triacs, AC Controllers and Dimmer Circuits, AC Motor Speed Control - IGBTs, Chopper Circuits, DC Motor Control - Inverters, AC control - PWM, AC Motor Control, UPS: - Introduction to Sensors and Transducers (Position, Motion, Pressure, Flow, Stress, and Strain Sensors, ...) - Relay Logic Control - PLCs - 1 - PLCs - 2

**ME 594 - Robotics Applications**
*CR: 3. Prerequisite: ME 355*

Introduction to Programmable Logic Controllers: - Relay Logic - PLC Basics - Hardware Architectures - Bit Logic - Ladder Diagram - Application - 1 - Application - 2 - Timers/Counters - Flow chart and state diagram conversion to Ladder Diagram - Application - 3 - Application - 4 - SCADA and HMI interfaces - DCS Systems

**ME 595 - Automation of Mechanical Systems**
*CR: 3. Prerequisite: ME 593*

Introduction to Programmable Logic Controllers - Relay Logic - PLC Basics - Hardware Architectures - Bit Logic - Ladder Diagram - Application - 1 - Application - 2 - Timers/Counters - Flow chart and state diagram conversion to Ladder Diagram - Application - 3 - Application - 4 - SCADA and HMI interfaces - DCS Systems

**Non Engineering Courses (NE)**

**NE 264 – Scientific Thinking**
*Cr. 3. Prerequisite: None*

Thinking Patterns Development - Nature and postulates of scientific thinking - Meaning and objective of Science - Scientific values and directions - Science, non-science and other-than science - Engineering and Technology - Properties of science - Mental operations used in science and Scientific Guessing - Types of deductions and Representation - Research methods in natural sciences: definitions, Experiments, Observations, Scientific postulates and their conditions -
Verification of scientific postulates - General methods of problems solving - Creative and critical Thinking - Fluency types – Flexibility - Originality and Basics of Brain Storming.

**NE 364 – Engineering Economy**  
*Cr.3. Prerequisite: 54 Credit Hours.*

Introduction and overview – Cost concepts and the economic environment – Principles of money, time relations – Concept of economic equivalence – Cash flow diagrams interest formulas and uniform series – Cash flow diagrams uniform gradient series and geometric sequence – Nominal and effective interest rates continuous compounding and continuous cash flows – Applications of engineering economy methods of investment assessment – Comparing alternatives useful life is equal to the study period – The imputed market value technique – Depreciation historical methods and cost recovery systems.

**NE 466 – Environmental Science & Technology**  
*Cr.3. Prerequisite: None*

Course File Summary

Further description of courses including course information, grading system, course description, textbook and reference book, course aim and objectives, and course outline.

This chapter provides further description of the courses of the Industrial and Systems Engineering program. The course files are organized as follows:

- Basic and Applied Science Courses – BA
- Computer Engineering Courses – CC
- Electronics Engineering Courses – EC
- Electrical Engineering Courses – EE
- Industrial and system Engineering Courses – IM
- Language Courses – LH
- Non Engineering Courses
- Mechanical Engineering Courses – ME

- Elective Courses – (ME XXXE)
- Power Plant Engineering Courses – (ME X2X)
- Heat, Thermodynamics, Refrigeration & Air conditioning Courses – (ME X3X)
- General Mechanical Courses – (ME X4X)
- Applied Mechanics Courses – (ME X5X)
- Hydraulics & Fluid Mechanics Courses – (ME X6X)
- Materials Science Courses – (ME X7X)
- Automotive & Internal Combustion Engines Courses – (ME X8X)
- Mechatronics Engineering Courses – (ME X9X)
Basic and Applied Science Courses (BA)

BA 113 – Physics (1)

COURSE INFORMATION

Course Title: Physics (1).
Code: BA113.
Hours: Lecture – 2 Hrs. Tutorial-2Hrs. Laboratory – 1 Hr. Credit – 3.
Prerequisite: None.

GRADING

Class. Experimental physics 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION

This course consists of four parts static electricity, electric current, magnetism and light.

TEXT BOOKS

Stephen luzader (Physics for engineers and scientists).

REFERENCE BOOKS

- Physics for scientists and engineers, Serway, 5rd edition.
- Advance level physics (Nelhan and Parker).

COURSE AIM

The aim of this course is to Supply the students with strong back ground in the field of electricity and magnetism which is really needed for the to complete their study in the field of engineering and technology.

COURSE OBJECTIVES

This course provides the students with good knowledge about the nature and the existence of static electricity, the interaction between different type of charges and the electric field types generated by these charges. The course also, allows the student to distinguish between the static electricity and the electric current through the application of ohm’s law and gives the student basic information about the structure of simple electric circuit. This course gives a good background about the theory of magnetism and electromagnetic Induction.
<table>
<thead>
<tr>
<th>Week Number 1:</th>
<th>Introduction to static electricity and coulomb’s law.</th>
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<tbody>
<tr>
<td>Week Number 2:</td>
<td>Introduction to static electricity and coulomb’s law.</td>
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<td>Week Number 3:</td>
<td>Electric field.</td>
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<td>Week Number 4:</td>
<td>Electric potential.</td>
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<tr>
<td>Week Number 5:</td>
<td>Capacitors.</td>
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<td>Week Number 6:</td>
<td>Capacitors.</td>
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<td>Week Number 7:</td>
<td>Exam # 1.</td>
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<tr>
<td>Week Number 8:</td>
<td>Electric current, ohm’s law resistors in series and parallel.</td>
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<tr>
<td>Week Number 9:</td>
<td>Electric current, ohm’s law resistors in series and parallel.</td>
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<tr>
<td>Week Number 10:</td>
<td>Kirchhoff’s rule.</td>
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<tr>
<td>Week Number 11:</td>
<td>Introduction to theory of magnetism and different applications.</td>
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<tr>
<td>Week Number 12:</td>
<td>Exam # 2.</td>
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<tr>
<td>Week Number 13:</td>
<td>Electromagnetic induction.</td>
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<td>Week Number 14:</td>
<td>Optics and waves (nature of light, properties of light waves).</td>
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<td>Week Number 15:</td>
<td>Young’s double slit polarization of light waves.</td>
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<td>Week Number 16:</td>
<td>Final Exam.</td>
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</tbody>
</table>
BA 114 – Physics (2)

Course Title: Physics (2).

Code: BA114.

Hours: Lecture – 2 Hrs. Laboratory – 2 Hrs. Credit – 3.

Prerequisite: BA113 - Physics (1)

GRADING

Class Performance/Attendance: 10%

Midterm1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

COURSE DESCRIPTION

This course is concerned with the investigation of the behavior of the fluid under different conditions to calculate the net work done on or by the system. It is also concerned with standing the first and second law of thermodynamics. Heat, work and internal energy of the fluids (liquid and gas) should be calculated for different processes under different condition. Heat transfer is also studied through this course.

TEXT BOOKS

Heat and thermodynamics ‘Eastop and Macckonhy’.

REFERENCE BOOKS

References available in AAST Library.

COURSE AIM

The aim of this course is to develop the skills of students to solve the problems of Heat and thermodynamics and understanding the different cases and condition under which thermodynamic system operates.

COURSE OBJECTIVES

The objectives of this course are: Understanding the relation between heat, work and the conservation of energy through thermodynamic cycle. Also, the student must know the relation between the different units used through this Course.
COURSE OUTLINE

Week Number 1:  Introduction to thermodynamics.
Week Number 2:  Reversibility and reversible work.
Week Number 3:  First law of thermodynamics’ Non-flow equation.
Week Number 4:  Steady flow equation.
Week Number 5:  Working Fluid (1) (steam).
Week Number 6:  Working Fluid (1) (steam).
Week Number 7:  Working Fluid (2) (perfect gas).
Week Number 8:  Working Fluid (2) (perfect gas).
Week Number 9:  Reversible processes.(constant volume, constant pressure).
Week Number 10: Reversible processes (constant temperature, adiabatic).
Week Number 11: Reversible process (polytropic).
Week Number 12: Second law of thermodynamics (1).
Week Number 13: Second law of thermodynamics (2).
Week Number 14: Heat transfer (1).
Week Number 15: Heat transfer (2).
Week Number 16: Final Exam.

TOOLS REQUIRED:

Use of the steam tab
BA 118 – Chemistry

Course Title: Chemistry.
Code: BA118.
Hours: Lecture – 2 Hrs. Laboratory – 2 Hrs. Credit – 2.
Prerequisite: None.

Grading
Lab., Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

Course Description
The Science of Chemistry characterized its close relate with the other branches of sciences and with the technological applicants of these sciences and with technological applicants of these sciences, which emerge in the mineral oil, medicate, petroleum, petrochemicals, chemical textile and other industries. This course includes topics of specialized chemical engineering technology without going through details.

Text Books & References
- Drew principles of industrial water treatment. Third edit. Drew chemical corporat.

Course Aim
The aim of course develops for the student, bases of scientific engineering chemistry, and creative student’s scale to identify the technical problems which are related to engineering chemistry.

Course Objectives
Establishing a base for students. Providing the student with knowledge about the effects of the environment on the material whatever its form is indifferent purposes. Accruing Scientific bases
which equality the student to control dominate and protect the used materials. Enabling the student
to solve industrial problems in a scientific method.

COURSE OUTLINE

Week Number 1: Electrochemical Reactions and cells. Volumetric Analysis (Practical).

Week Number 2: Principles of corrosion. Titrate Technique, Determine of acidity (practical).

Week Number 3: Metals and corrosive Environments. Determine of Alkalinity and chloride (practical).

Week Number 4: Forms of corrosion uniform, Galvanic and Differential aeration cell. Determination of Hardness (Practical).

Week Number 5: Pitting, stress corrosion cracking and intergranular corrosion forms. Determination of Dissolved oxygen (Practical).

Week Number 6: Atmospheric and Erosion Corrosion. Spectrophotometer Analysis (Practical).

Week Number 7: Coating and inhibitors as protection methods. Determination of nitrite and nitrate (Practical).

Week Number 8: Cathodic protection. Determination of phosphate and silica (Practical).

Week Number 9: Classification of fuel, properties of liquid fuel. Determination of some heavy Metals (Practical).

Week Number 10: Combustion of fuel. Determination of fluorine and chlorine (Practical).

Week Number 11: Air supply and Exhaust Gases. Determination of turbidity (Practical).

Week Number 12: Classification of lubricants Advantages and disadvantages of different types. Oil Analysis Determination of Viscosity and T.B.N (Practical).


Week Number 15: Water Treatment. Determination of PH (Practical).

Week Number 16: Air and water pollution. Determination of TDS and salinity(Practical).
BA 123 – Mathematics (1)

Course Information

Course Title: Mathematics (1).
Code: BA123.
Prerequisite: None.

Grading

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

Course Description

The aim of this course is the differentiation and some of its applications, basic differentiable functions of one variable. It includes definitions and intuitive meanings of derivatives; Higher derivatives; Basic techniques of differentiation; Chain Rule; Parametric equations; Partial differentiation; Implicit differentiation; Inverse function theorem; Logarithmic differentiation; differentiation; Logarithmic functions; Exponential functions; Trigonometric functions; Inverse trigonometric functions; Hyperbolic functions; Differentiation of those; Physical and geometric applications of differentiation; Limits; Nth derivative; L'Hôpital rule; Maclaurin’s expansion as approximations of functions; Analytic geometry; Translation of Axes; Conic sections.

Text Books

- Printed Notes.
- Class Notes.

Reference Books


Course Aim

This course teaches students main transcendental functions and their basic properties, differentiation and some of its applications; as well as analytic geometry and quadratic curves.
COURSE OBJECTIVES

The course teaches basic transcendental functions and their properties. It develops students’ skills in the techniques of differentiation, and enables them to grasp its intuitive meaning. It also provides them with essential knowledge and skills in analytic geometry.

COURSE OUTLINE

Week Number 1: Basic techniques and rules of differentiation.

Week Number 2: Trigonometric function: properties, basic identities and their derivatives.

Week Number 3: Inverse of trigonometric and their derivatives.

Week Number 4: Logarithmic functions: their properties, basic identities and derivatives.

Week Number 5: Exponential functions: their properties, basic identities and derivatives.

Week Number 6: Derivative of hyperbolic functions and their inverse.

Week Number 7: Parametric differentiation and implicit differentiation.

Week Number 8: The Nth derivative.

Week Number 9: L’ Hopital rule.

Week Number 10: Partial differentiation.

Week Number 11: Maclaurin’s expansion.

Week Number 12: Physical application.

Week Number 13: Curve sketching.

Week Number 14: Conic sections.

Week Number 15: General revision.

Week Number 16: Final Exam.
BA 124 – Mathematics (2)
COURSE INFORMATION

Course Title: Mathematics (2).
Code: BA124.
Prerequisite: BA123 - Mathematics (1)

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION

This course addresses integration and some of its geometric applications, as well as elementary matrix algebra. It includes definitions and intuitive meanings of indefinite and definite integrals; Fundamental Theorem of Calculus; Basic techniques of integration; Integration by parts; Geometric applications; Integration of powers of trigonometric functions; Substitution; Miscellaneous and Trigonometric substitutions; Integration of rational functions in x through partial fractions; Numerical Integration. Gauss’ method for the solution of linear equations; Matrix inversion and its use in the solution of linear equations.

TEXT BOOKS

- Printed Notes.

REFERENCE BOOKS


COURSE AIM

To learn integration using different methods. To use these techniques in solving some application like to find the area, the volume, the length of a curve, and the average of a curve. To solve problems using numerical integration. To learn elementary linear algebra, solution of linear equations using matrices and determinants.
COURSE OBJECTIVES

The course develops students’ skills in the techniques of integration, and enables them to grasp its intuitive meaning. It also provides them with essential knowledge and skills in matrix algebra.

COURSE OUTLINE

Week Number 1: Definition of indefinite integrals and table of famous integrals.

Week Number 2: Simple rules of integration and the fundamental theorem of calculus.

Week Number 3: Fundamental theorem of calculus and integration by parts.

Week Number 4: Integration by parts and integration of rational functions.

Week Number 5: Integration of rational functions.

Week Number 6: Integration of trigonometric powers.

Week Number 7: Trigonometric substitution and 7th week exam.

Week Number 8: Integration of quadratic forms and the reduction formulas.

Week Number 9: Definite integration.

Week Number 10: Area and volume.

Week Number 11: Area, volume and length of curve.

Week Number 12: Average of a function, numerical integration and 12th week exam.

Week Number 13: Matrix Algebra.

Week Number 14: Solution of systems of linear equations.

Week Number 15: General revision.

Week Number 16: Final Exam.
BA 141 – Engineering Mechanics (1)
C O U R S E  I N F O R M A T I O N

Course Title: Engineering Mechanics (1).
Code: BA141.
Prerequisite: None.

G R A D I N G

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

C O U R S E  D E S C R I P T I O N


T E X T  B O O K S


R E F E R E N C E  B O O K S

Books available in the AAST Library

C O U R S E  A I M

The aim of the course is to provide the student with an introduction to many of the fundamental concepts in Mechanics

C O U R S E  O B J E C T I V E S

The course treats only rigid-body mechanics, science it forms a suitable basis for the design and analysis of many types of structural, mechanical or electrical devices encountered in engineering

C O U R S E  O U T L I N E

Week Number 1: Rectangular components of a force.
Week Number 2: Parallelogram low.
Week Number 3: Equilibrium of particle – springs and cables.
Week Number 4: Moment of force.
Week Number 5: Free body diagram.
Week Number 6: Equilibrium of rigid body.
Week Number 7: Exam # 1.
Week Number 8: Trusses “joint method – zero – force members”.
Week Number 9: Trusses “method of section”.
Week Number 10: Frames.
Week Number 11: Frames (cont.).
Week Number 12: Exam # 2.
Week Number 13: Friction
Week Number 14: Mass Moment of Inertia
Week Number 15: Virtual work
Week Number 16: Final Exam.
BA 142 – Engineering Mechanics (2)

Course Title: Engineering Mechanics (2).

Code: BA142.

Hours:
- Lecture – 2 Hrs.
- Tutorial – 2 Hrs.
- Credit – 3.

Prerequisite: BA141.

Grading

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

Course Description

Introduction of the kinematics of the particle, rectilinear and projectile motions, force and acceleration. Moreover, work and energy of a particle, rotation of a body about a fixed axis, general plan motion, relative velocity and acceleration, equations of translation – rotational.

Text Books

HIBBELER R.C., Engineering Mechanics “Dynamics”.

Reference Books

Books available in the AAST Library.

Course Aim

The aim of the course is to provide a clear and thorough presentation of the theory and applications of engineering mechanics.

Course Objectives

The course objectives are to study the geometry of motion (Kinematics) as well as the relationship between the motion of a body and the forces and the moments acting on it (Kinetics).

Course Outline

Week Number 1: Kinematics of a particle – Rectilinear Kinematics.

Week Number 2: Curvilinear Motion – Rectangular Components, Projectile Motion.
Week Number 3:  Force & Acceleration (Kinetics).

Week Number 4:  Work & Energy of a particle (Kinetics).

Week Number 5:  Rotation of a Rigid Body about a fixed Axis.

Week Number 6:  General Plan Motion.

Week Number 7:  Exam # 1.

Week Number 8:  Relative Motion (Velocity).

Week Number 9:  Relative Motion (Acceleration).

Week Number 10:  Planar Kinetics of Rigid Body – Equation of Translation Motion.

Week Number 11:  Equation of Rotational Motion.

Week Number 12:  Exam # 2.

Week Number 13:  Equation of General Plane Motion.

Week Number 14:  Work and Energy.

Week Number 15:  Revision.

Week Number 1:  Final Exam.
### BA 223 – Mathematics (3)

**Course Information**

- **Course Title:** Mathematics (3).
- **Code:** BA223.
- **Hours:** Lecture – 2 Hrs.  Tutorial – 2 Hrs.  Credit – 3.
- **Prerequisite:** BA124 – Mathematics (2).

### Grading

- Class Performance/Attendance: 10%
- Midterm # 1/Assignments – (7th Week): 30%
- Midterm # 2/Assignments – (12th Week): 20%
- Final Exam: 40%

### Course Description

Solving first order differential equations: Separable of variables, Homogeneous equation, Exact equation, Linear equation and Bernoulli’s equation. Solving second order homogeneous and non-homogeneous differential equations with constant and variable coefficients. Undetermined coefficients and variation of parameters methods. Laplace transformations, basic properties, first shifting theorem, unit step function, second shifting theorem, transform of derivatives and integrals, and inverse Laplace transforms. Solving differential equations by using Laplace transform. Fourier series: Fourier series for even, odd, and harmonic functions.

### Text Books


### Reference Books


### Course Aim

To study varies methods of solving differential equations, which arise as mathematical modeling in many topics of engineering.

### Course Objectives

To study differential equations, Laplace transform and Fourier analysis, that is of fundamental importance in modern engineering and science.
COURSE OUTLINE

Week Number 1: Solving first order differential equations: Separable of variables and Homogeneous equation.

Week Number 2: Solving first order differential equations: Exact and Linear equations.

Week Number 3: Solving first order differential equations: Bernoulli's equation and revision on first order differential equations.

Week Number 4: Solving second order homogeneous differential equations with constant coefficients. Method of undetermined coefficients.

Week Number 5: Solving second order non-homogeneous differential equations with constant coefficients. Method of variation of parameters.

Week Number 6: Continue method of variation of parameters. Solving second order differential equations with variable coefficients (Euler's equation).

Week Number 7: Laplace transform: Basic definition, First shifting theorem.

Week Number 8: Laplace transform: Transform differentiation and integration.

Week Number 9: Unit step function, second shifting theorem, and convolution theorem.

Week Number 10: Inverse Laplace transforms.

Week Number 11: Solving differential equations by using Laplace transform.

Week Number 12: Fourier series: Fourier series for functions of period 2P.

Week Number 13: Fourier series for even and odd functions.

Week Number 14: Fourier series for harmonic functions.

Week Number 15: Revision.

Week Number 16: Final Exam.
Course Title: Mathematics (4)

Code: BA 224


Prerequisite: BA 223 – Mathematics (3)

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION

This course gives a comprehensive study on the 2D and 3D vectors: algebra, differential and integral calculus, and the physical interpretation of the integral theorems. The course also gives a study on the complex functions, its differentiation and integration, the residue theorems and its application to real integrals.

TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

This course aims at enhancing the students knowledge in the subject of “Vector Differential and Integral calculus” as well as Complex Analysis and Integration needed to solve engineering problems at higher level of the undergraduate engineering studies.

COURSE OBJECTIVES

Through this course the student gets to know:

- Vector Differential Calculus
- Vector Integral calculus
- Complex Analytic Functions and Complex Integration.
COURSE OUTLINE

Week Number 1: Vector Algebra / Dot and cross product and Applications.
Week Number 2: Partial Differentiation / and Derivatives of vector functions.
Week Number 3: Gradient / Divergence/ curl/ Laplacian.
Week Number 4: Line Integrals / line Integrals Independent of the path / Exactness.
Week Number 5: Conservative vector fields.
Week Number 6: Double Integrals in Cartesian and polar coordinates / Green’s Theorem,
Week Number 7: Surface Integrals / Stokes’ Theorem /7th week Exam.
Week Number 8: Triple Integrals / Divergence (Gauss’ Theorem).
Week Number 9: Review on Integrals Theorems.
Week Number 10: Complex numbers and functions / forms of representation.
Week Number 11: Analytic functions/ Harmonic functions.
Week Number 12: Line complex integrals / Cauchy’s Integrals Theorem /12th week Exam.
Week Number 13: Zeros and poles of Analytic functions/ Residues and their evaluation.
Week Number 14: Residue Theorem / Application to Real Integral.
Week Number 15: Introduction to Fourier Integrals and Transforms.
Week Number 16: Final Exam.
BA 323 – Mathematics (5)

Course Title: Mathematics (5).

Code: BA 323.


Prerequisite: BA 224 – Mathematics (4).

Grading

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

Course Description

In the first of this course we discuss the solution of ordinary differential equations with variable coefficients using Taylor’s, power series and Frobenius methods, then we go into some special differential equations, as Legendre and Bessel differential equations which lead us to some special functions, as Legendre, Bessel, Gamma and Beta functions. After that we study the method of separation of variables to solve partial differential equations that help us to study some applications like heat transfer in a bar, vibrating of a string and potential fields. In the last of this course we discuss some special complex transformations, conformal mappings, such as bilinear and Schwarz Christoffel transformations.

Text Book


Reference Books


Course Aim

When dealing with some physical problems, an ordinary or partial differential equation arises. Our course aims to give the student the ability to extract exact solutions of these problems.
COURSE OBJECTIVES

Upon completion of this course the student will be able to:

- Solve ordinary differential equations with variable coefficients.
- Solve partial differential equations with the method of separation of variables.
- Deal with some special functions.
- Construct some special complex functions.

COURSE OUTLINE

Week Number 1: Taylor's and Power series methods for solving ordinary differential equations.

Week Number 2: Differential equation with variable coefficients, ordinary and singular points, solution about ordinary points.

Week Number 3: Solution about singular points: Regular singular points, the method of Frobenius - Case I.

Week Number 4: The method of Frobenius - Case II and Case III.

Week Number 5: Gamma and Beta functions.

Week Number 6: Legendre differential equation and Legendre polynomials.

Week Number 7: Bessel differential equation.

Week Number 8: Bessel function of the 1st kind.

Week Number 9: Boundary value problems, partial differential equations and the method of separation of variables.

Week Number 10: Heat equation - heat transfer in a bar.

Week Number 11: Wave equation - vibration of a string.

Week Number 12: Laplace equation and potential fields.

Week Number 13: Conformal mappings - Complex functions as mappings.

Week Number 14: Bilinear transformations – linear fraction transformation.

Week Number 15: Schwarz Christoffel transformation.

Week Number 16: Final Exam
Computer Engineering Courses (CC)

CC 111 – Introduction to Computers

Course Title: Introduction to Computer Science.
Code: CC111.
Hours: Lecture – 1 Hrs. Laboratory – 2 Hrs. Credit – 2.
Prerequisite: none.

Grading

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

Course Description

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

Text Books


Reference Books


Course Aim

- The students must have a general understanding of what computers are and how they operate.
- The students must have good skills in using windows, MS PowerPoint, HTML and Visual Basic.
- The students must learn problem solving techniques and program development.
The student should know the available programming languages and their capabilities.

**COURSE OBJECTIVES**

At the end of the course the student should be able to:

- Identify computer hardware components and their specifications and types.
- Use Windows, MS PowerPoint, HTML, and Visual Basic.
- Understand and use numbering systems.

**COURSE OUTLINE**

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<th>Week Number</th>
<th>Module</th>
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<td>2</td>
<td>The System Unit: Processing and Memory.</td>
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<td>3</td>
<td>Storage and Input/output Devices</td>
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<td>4</td>
<td>System Software and Application Software</td>
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<td>5</td>
<td>Quiz 1+ Program Development, Programming Languages, and Flow charts</td>
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<td>6</td>
<td>Visual Basic 1</td>
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<td>7</td>
<td>7th Week Exam</td>
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<td>8</td>
<td>Visual Basic 2</td>
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<td>9</td>
<td>Visual Basic 3</td>
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<td>11</td>
<td>Web page design using HTML 2</td>
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<td>12</td>
<td>12th Week Exam</td>
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<tr>
<td>13</td>
<td>Communications and Networks 1</td>
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<td>14</td>
<td>Communications and Networks 2</td>
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<tr>
<td>15</td>
<td>Ethics, Computer Crime, Privacy, and other Social Issues</td>
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<td>16</td>
<td>Final Exam</td>
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</table>


**CC 112 – Structured Programming**

**COURSE INFORMATION**

Course Title: Structured Programming.

Code: CC112.

Hours: Lecture – 2 Hrs. Laboratory – 2 Hrs. Credit – 3.

Prerequisite: CC111.

**GRADING**

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

**COURSE DESCRIPTION**

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

**TEXT BOOKS**

J. Hanly and E. Koffman, "C Program Design for Engineers", Addison Wesley, latest edition

**REFERENCE BOOKS**


**COURSE AIM**

Introducing Structured programming techniques associated with the C-Language, used to program most nowadays systems. Studying their application to practical problems with special emphasis on some practical applications concerning different disciplines.

**COURSE OBJECTIVES**

Studying C-language programming techniques, sequence, selection and repetition control structures, functions, Arrays, sorting and searching techniques.

**COURSE OUTLINE**

*Week Number 1:* Overview of Programming and Problem Solving

*Week Number 2:* C Syntax and Semantics
Week Number 3: I/O Formatting and Arithmetic

Week Number 4: Conditions and Logical Expressions

Week Number 5: Selection Control Structures

Week Number 6: Repetitions (Part 1)

Week Number 7: 7th Week Exam

Week Number 8: Repetitions (Part 2)

Week Number 9: Functions (Part 1)

Week Number 10: Functions (Part 2)

Week Number 11: Arrays (Part 1)

Week Number 12: 12th Week Exam

Week Number 13: Arrays (Part 2)

Week Number 14: Programming applications – problem solving Tech (Part 1)

Week Number 15: Programming applications – problem solving Tech (Part 2)

Week Number 16: Final Exam.
CC 213 – Programming Applications

COURSE INFORMATION

Course Title: Programming Applications
Code: CC 213
Prerequisite: CC 112.

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION

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

TEXT BOOK


REFERENCE BOOKS


COURSE AIM

Introducing different programming techniques associated with the C-Language, used to program most nowadays systems. Studying their application to practical problems with special emphasis on some practical applications concerning different disciplines.

COURSE OBJECTIVES

Upon completion of this course the student will be able to study C-language programming techniques, files, pointers, structure, string, and array.

COURSE OUTLINE

Week Number 1: Revision of structured programming constructs: selection, repetition, and Functions.
Week Number 2: Revision of one dimensional array.

Week Number 3: Searching and sorting.

Week Number 4: Two dimensional arrays.

Week Number 5: Pointers.

Week Number 6: Strings.

Week Number 7: 7th week exam.

Week Number 8: Structures.

Week Number 9: Structures/Unions.

Week Number 10: Recursion.

Week Number 11: Text Files.

Week Number 12: 12th week exam.

Week Number 13: Binary Files.

Week Number 14: Bitwise Operators/ I/O Interfacing.

Week Number 15: Advanced Applications.

Week Number 16: Final Exam.
CC 413 – Numerical Analysis
COURSE INFORMATION

Course Title: Numerical Analysis
Code: CC 413
Prerequisite: CC 112 - BA224.

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION

Introduction to numerical methods and their applications - solve science and engineering problems - convergence - error analysis of numerical methods.

TEXT BOOK


REFERENCE BOOKS


COURSE AIM

Allow students to master the approximation techniques used in numerical solutions that arise in science and engineering problems. Teach students why numerical methods work, what type of errors to expect and when an application might lead to difficulties.

COURSE OBJECTIVES

Upon completion of this course the student will be able to:

- Introduction to numerical methods and errors of computers, errors analysis, error propagation, roots of equations of one variable linear equations, Eigen values and Eigen vectors.
Numerical differentiation, integration, interpolation, least square error, and regression.

**Course Outline**

**Week Number 1:** Solution of equations of one variable: Bisection method, False Position method, and secant method.

**Week Number 2:** Solution of equations of one variable: Successive Approximation method, and modified Successive Approximation method.

**Week Number 3:** Solution of equations of one variable: Newton Raphson method and nearly equal roots.

**Week Number 4:** Solution of equations of one variable: Berge Vieta method (of roots of polynomials).

**Week Number 5:** Error Analysis and Propagation: Types and sources of errors and ill-conditioning and instability.

**Week Number 6:** Error Analysis and Propagation: Process graphs, error propagation with examples.

**Week Number 7:** Solutions of linear equations: (Direct Methods) Gauss elimination and Gauss Jordan methods.

**Week Number 8:** Solutions of linear equations: (Direct Methods) Gauss Jordan method for Integral matrices.

**Week Number 9:** Solutions of linear equations: (Indirect Methods) Jacobi, Gauss Siedel, and conditions of convergence.

**Week Number 10:** Matrix Inversion using direct methods for solution of linear equations. Eigenvalues.

**Week Number 11:** Numerical Interpolation (Linear, Quadratic, and Lagrange polynomials).

**Week Number 12:** Numerical Differentiation and Integration (Mid-point integration).

**Week Number 13:** Numerical Integration (Trapezoidal, Simpson, and Gaussian integration).

**Week Number 14:** Linear and Quadratic regression.

**Week Number 15:** Lagrange regression and revision.

**Week Number 16:** Final Exam.
CC 442 – Digital Design and Introduction to Microprocessor

COURSE INFORMATION

Course Title: Digital Design and Introduction to Microprocessor
Code: CC 442
Prerequisite: CC 112.

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION

Number systems - binary arithmetic and codes - logic gates - Boolean algebra and logic simplifications - Design and realization of combinational circuits - Flip-Flops – Design of sequential circuits - Analysis and realization of counters – Computer aided engineering - Introduction to microprocessor.

TEXT BOOK


REFERENCE BOOKS


COURSE AIM

To develop engineering skills in the design and analysis of digital logic circuits with applications to digital computer and microprocessors.

COURSE OBJECTIVES

Upon completion of this course the student will be able to:

- Know the basic differences between analogue and digital systems.
- Use binary numbers and codes.
- Describe the operation of logic gates.
Applying Boolean algebra and K-map to simplify function.
Design combinational and sequential logic circuit.

**Course Outline**

*Week Number 1:* Introduction to digital concepts.
*Week Number 2:* Number system, operation, and codes.
*Week Number 3:* Logic gates.
*Week Number 4:* Boolean algebra and logic simplification – part 1.
*Week Number 5:* Boolean algebra and logic simplification – part 2.
*Week Number 6:* Function of combinational logic.
*Week Number 7:* 7th week exam.
*Week Number 8:* Decoders, Encoders, MUX, and DMUX – part 1.
*Week Number 9:* Decoders, Encoders, MUX, and DMUX – part 2.
*Week Number 10:* Flip-flops and related devices – part 1.
*Week Number 12:* 12th Week Exam.
*Week Number 13:* Shift register.
*Week Number 14:* Introduction to microprocessor – part 1.
*Week Number 15:* Introduction to microprocessor – part 2.
*Week Number 16:* Final Exam.
Electronics and Communication Courses (EC)

EC331 - Electronics

**Course Title:** Electronics  
**Code:** EC 331  
**Hours:** Lecture – 2 Hrs.  Tutorial – 2 Hrs.  Credit – 3.  
**Prerequisites:** EE (238) Refrigeration & Air Conditioning

**Grading**

- Class Performance / Attendance: 10%  
- Midterm # 1/ Assignments: (7th week) 30%  
- Midterm # 2/ Assignments: (12th week) 20%  
- Final Exam: 40%

**Course Description**

P-N junction diode, Special P-N junctions, bipolar junction and field effect transistors, Transistor amplifiers. Casacded amplifiers, Voltage and power amplifiers. Silicon controlled rectifiers.

**Text Books**

- Boylested, Nashelsky, Electronic Devices & circuit theory

**Reference Books**

- A. Sedra & Smith, "Microelectronics Circuits" Oxford  

**Course Aim**

Introducing different electronic devices used in constructing modern electronic circuits, analysis, and study of their performance with special emphasis of some practical applications

**Course Objectives**

Studying semiconductors materials, P-N junction diodes, diode as a circuit element, special diodes, Bipolar Junction Transistor (BJT) and Field Effect Transistor (FET). Electronic amplifiers and switches.
## COURSE OUTLINE

| Week Number 1: | Semiconductor materials |
| Week Number 2: | Extrinsic Semiconductors |
| Week Number 3: | PN junctions |
| Week Number 4: | Special PN junction and its applications |
| Week Number 5: | Photo diodes, solar cells, LED's, Zener diodes |
| Week Number 6: | Bipolar Transistors |
| Week Number 7: | Field Effect Transistors |
| Week Number 8: | Transistor amplifiers |
| Week Number 9: | Cascaded amplifiers, Feedback amplifiers |
| Week Number 10: | Power amplifiers |
| Week Number 11: | Silicon Controlled Rectifiers & applications |
| Week Number 12: | Power supplies |
| Week Number 13: | Oscillators |
| Week Number 14: | Electronic filters |
| Week Number 15: | Revision |
| Week Number 16: | Final exam |
EC 534 - Analog and Digital Signal Processing

COURSE INFORMATION

Course Title: Analog and Digital Signal Processing
Code: EC 534
Prerequisites: EC (331) Electronics

GRADING

Class Performance / Attendance 10%
Midterm # 1/ Assignments: (7th week) 30%
Midterm # 2/ Assignments: (12th week) 20%
Final Exam 40%

COURSE DESCRIPTION

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

TEXT BOOKS

- Savant, Roden, and Carpenter. "Electronic Design" Benjamin cummings publ.
- Ifeachor & Gervis. "Digital Signal Processing".

REFERENCE BOOKS

H. Baher. "Analog and Digital Signal Processing"

COURSE AIM

Understanding the basic concepts of analog signal generation and shaping. Data converters, discrete time transforms. Digital filter design.

COURSE OBJECTIVES

Getting familiar with basic operations on analog and digital signals.

COURSE OUTLINE

Week Number 1: Sinusoidal oscillators
Week Number 2: Multivibrators
Week Number 3: Clipping And clamping circuits
Week Number 4: Differentiating and integrating circuits

Week Number 5: Design of analog filters

Week Number 6: Sampling of analog signals, S/H circuits

Week Number 7: DAC's

Week Number 8: Quantization techniques

Week Number 9: Analog to digital converters

Week Number 10: ADC's cont.

Week Number 11: Introduction to discrete time transform. The DFT and DCT, the FFT

Week Number 12: The Z transform, Time and frequency analysis of digital filters

Week Number 13: Design of IIR filters using BZT

Week Number 14: Design of FIR filters using windowing

Week Number 15: Revision

Week Number 16: Final exam
Electrical Engineering Courses (EE)

EE 218 – Instrumentation Measurements

COURSE INFORMATION

Course Title: Instrumentation & Measurement
Code: EE 218
Hours: Lecture – 2 Hrs.  Tutorial/Lab – 2/2 Hrs.  Credit – 3.
Prerequisite: EE238

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION


TEXT BOOK


REFERENCE BOOKS

• Chesmond, C.J. “Basic control system technology” ELBS,1989
• Bartelt, Terry, “Instrumentation and process control”, Thompson Delmar,2007

COURSE OBJECTIVES

To investigate different methods for remote measuring.

• To study how transducers operate and their characteristic
• To study how to analyze data obtained from measurements.
COURSE OUTLINE

Week Number 1: Introduction to feedback control (1).
Week Number 2: Introduction to feedback control (2).
Week Number 3: Physical Measurements.
Week Number 4: Introduction to feedback systems.
Week Number 5: Liquid level instruments.
Week Number 6: Liquid flow instruments.
Week Number 7: 7th week + PH+Viscosity.
Week Number 8: Displacement + velocity measurements.
Week Number 9: Force and torque measurements.
Week Number 10: Data analysis.
Week Number 11: Error detectors/comparators.
Week Number 12: 12th week + Electric/pneumatic transducers.
Week Number 13: Cont (Amplifier transducers).
Week Number 14: Actuation.
Week Number 15: Revision.
Week Number 16: Final Exam.
Course Title: Electrical engineering fundamentals

Code: EE 238

Hours: Lecture – 2 Hrs. Tutorial/Lab – 2/2 Hrs. Credit – 3.

Prerequisite: BA 124

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%


To study the basic circuit, the circuit theorems, and investigate the laws of magnetic force.
# Course Outline

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<th>Week Number</th>
<th>Topic</th>
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<td>Introduction</td>
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<td>2</td>
<td>Basic circuit</td>
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<tr>
<td>3</td>
<td>Resistance, voltage, current, and ohm’s law.</td>
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<tr>
<td>4</td>
<td>Kirchoff’s laws.</td>
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<td>5</td>
<td>Resistances in series or parallel.</td>
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<td>6</td>
<td>Mesh analysis</td>
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<tr>
<td>7</td>
<td>7th week + Node analysis</td>
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<tr>
<td>8</td>
<td>Source transformation</td>
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<tr>
<td>9</td>
<td>Superposition, voltage and current divider</td>
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<tr>
<td>10</td>
<td>Laws of magnetic force</td>
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<tr>
<td>11</td>
<td>Field strength, flux density.</td>
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<tr>
<td>12</td>
<td>12th week + Relation between B, H, I, K</td>
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<tr>
<td>13</td>
<td>Alternating current</td>
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<td>14</td>
<td>Waves, effective value</td>
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<td>15</td>
<td>Power</td>
</tr>
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<td>16</td>
<td>Final exam</td>
</tr>
</tbody>
</table>
EE 329 – Electrical Machines

COURSE INFORMATION

Course Title: Electrical machines
Code: EE 329
Hours: Lecture – 2 Hrs. Tutorial/Lab – 2/2 Hrs. Credit – 3.
Prerequisite: EE 238

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION


TEXT BOOK


REFERENCE BOOKS

C. Hubert, 'Electric Machines" Maxwell Macmillan, 1991

COURSE OBJECTIVES

- A study of theory and concept of Electric Machines (AC & DC).
- Deriving equivalent circuit of electrical machines.
- Studying performance and characteristics of machines (AC & DC).

COURSE OUTLINE

Week Number 1: Review on electric circuits.
Week Number 2: Magnetic circuits.
Week Number 4: DC Machines (2): DC machines: equivalent circuit-excitation-voltage control.
Week Number 5: DC Machines (3): DC motors: starting-characteristics.

Week Number 6: DC Machines (4): DC motors: performance and speed control.

Week Number 7: 7th week + Transformers (1): construction-applications.

Week Number 8: Transformers (2): theory- equivalent circuits-tests.

Week Number 9: Transformers (3): voltage regulation- efficiency.

Week Number 10: Three Phase Induction Motors (1): construction-applications.

Week Number 11: Three Phase Induction Motors (2): rotating magnetic field-theory of operation-equivalent circuit.

Week Number 12: 12th week + 3-phase induction motor (3): characteristics-performance-starting.


Week Number 16: Final Exam.
EE 416 – Microcontroller Applications

Course Information

Course Title: Microcontroller Applications
Code: EE 416
Prerequisites: CC442 Digital logics and microprocessors

Grading

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

Course Description

Introduction to Microcontrollers and Architectures with a review of various types available in the market - C-language programming overview - AVR Microcontroller basic structure - AVR Microcontroller basic programming principles - Timers and Counters, PWM - Analouge interfacing of AVR Microcontrollers - Serial interfacing standards using RS-232 principles of the PC - Serial Interfacing of the AVR Microcontroller

Text Books


Reference Books


Course Aim

To teach students the principles and techniques of Microcontroller Applications and control using the latest type of microcontroller circuits.

Course Objectives

- Understand the basic principles of Microcontrollers,
- Provide a review of C-language programming,
- Provide a description of microcontroller peripherals and applications
**COURSE OUTLINE**

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<td>1</td>
<td>Introduction to Microcontrollers and Architectures with a review of various types available in the market</td>
</tr>
<tr>
<td>2</td>
<td>C-language programming overview – 1</td>
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<td>3</td>
<td>C-language programming overview – 1</td>
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<td>AVR Microcontroller basic structure</td>
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<td>5</td>
<td>AVR Microcontroller basic programming principles – 1 (Basic IO design)</td>
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<tr>
<td>6</td>
<td>AVR Microcontroller basic programming principles – 2 (Basic IO design)</td>
</tr>
<tr>
<td>7</td>
<td>7th Week Exam</td>
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<tr>
<td>8</td>
<td>Timers and Counters, PWM</td>
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<tr>
<td>9</td>
<td>Analogue interfacing of AVR Microcontrollers</td>
</tr>
<tr>
<td>10</td>
<td>Serial interfacing standards using RS-232 principles of the PC</td>
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<tr>
<td>11</td>
<td>Serial Interfacing of the AVR Microcontroller</td>
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<td>12</td>
<td>12th Week Exam</td>
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<td>13</td>
<td>Applications – 1</td>
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<td>14</td>
<td>Applications – 2</td>
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<td>15</td>
<td>Applications – 3</td>
</tr>
<tr>
<td>16</td>
<td>Final exam</td>
</tr>
</tbody>
</table>
EE 418 – Automatic Control Systems

Course Information

Course Title: Automatic control systems
Code: EE 418
Hours: Lecture – 2 Hrs. Tutorial/Lab – 2/2 Hrs. Credit – 3.
Prerequisite: EE218 OR EE 328

Grading

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

Course Description


Text Book


Reference Books

- Y. El Gamal A.Amer, “Introduction to Control Engineering”, AAST 1988
- K.O.Gaw, “Modern Control Engineering”, Prentice Hall New Delhi, 1984

Course Objectives

- Stability concept and time domain analysis using time and frequency response
- Modeling and analysis of simple physical system are investigated
- To study controller units, their type analysis and tuning

Course Outline

Week Number 1: Introduction to control system.
Week Number 2:  Differential equation of physical systems.

Week Number 3:  Block diagram models using MATLAB.

Week Number 4:  Signal flow graph models using MATLAB.

Week Number 5:  Test input signals.

Week Number 6:  Performance of 1st and 2nd order system.

Week Number 7:  7th week + Effect of 3rd pole and a zero on the 2nd order system.

Week Number 8:  Stability concept Routh- Hurwitz stability criterion.

Week Number 9:  Root locus techniques.

Week Number 10:  Bode plots.

Week Number 11:  Nyquist plots.

Week Number 12:  12th week + Approaches to system design, advantage of feedback.

Week Number 13:  Approaches to system design, advantage of feedback.

Week Number 14:  Analog controllers.

Week Number 15:  Analog controllers (2).

Week Number 16:  Final Exam.
EE 419 – Modern Control Engineering

Course Title: Modern control engineering
Code: EE 419
Hours: Lecture – 2 Hrs. Tutorial/Lab – 2 Hrs. Credit – 3.
Prerequisite: EE 418

Grading

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

Course Description


Text Book


Reference Books


Course Objectives

To enable the students to get acquainted with the classical methods of design the state space method of design for both continuous and discrete time systems.

Course Outline

Week Number 1: Lead compensation design.
Week Number 2: Lag compensation design.
Week Number 3: Lag-Lead compensation design.

Week Number 4: Lead compensation by frequency response.

Week Number 5: Lag compensation by frequency response.

Week Number 6: Introduction to state-space.

Week Number 7: 7th week+ Methods of state space representation.

Week Number 8: Solution of state equation.

Week Number 9: Controllability – observability.

Week Number 10: State variable feedback.

Week Number 11: 12th week + Introduction to digital control systems.

Week Number 12: The z-transform.

Week Number 13: Block diagram of digital systems.

Week Number 14: Time response of digital systems.

Week Number 15: Stability analysis for digital systems.

Week Number 16: Final Exam.
EE448 – Electrical Power

Course Information

Course Title: Electrical Power
Code: EE 448
Prerequisite: EE 329

Grading

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

Course Description


Text Book


Reference Books


Course Objectives

This course is designed to give mechanical engineering students a concise and integrated treatment of the essentials of Power systems network: transmission, distribution, short circuit analysis and protection techniques.

Course Outline

Week Number 1: Elements of Power System
Week Number 2: Comparison of different transmission systems
Week Number 3: Direct current Distribution
Week Number 4: AC Distribution

Week Number 5: Mechanical Design of O.H.T.L

Week Number 6: Resistance and inductance of O.H.T.L

Week Number 7: Capacitance of O.H.T.L

Week Number 8: Representation of O.H.T.L (1).

Week Number 9: Representation of O.H.T.L (2).

Week Number 10: Underground cables

Week Number 11: Symmetrical faults (1)

Week Number 12: Symmetrical faults (2)

Week Number 13: Power system protection concepts

Week Number 14: Protection of feeders and motors

Week Number 15: General revision

Week Number 16: Final Exam
Industrial and Management Engineering Courses (IM)

IM 111 – Industrial Relations

COURSE INFORMATION

Course Title: Industrial Relations.

Code: IM 111.

Hours: Lecture – 1 Hr. Tutorial – 0 Hrs. Credit – 2.

Prerequisite: None.

GRADING

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam 40%

COURSE DESCRIPTION

This course identifies the different types of industries, production techniques, management and organization structure, the different types of hazards and dangers and how to prevent them. Also it clarifies the meaning of production planning and control and cost calculations.

TEXT BOOKS

Lecture Notes

REFERENCES BOOKS


COURSE AIM

To introduce students to the basic knowledge and concepts related to industrialization and work organizations, industrial health and safety, and the history of engineering and technology.

COURSE OBJECTIVES

- Identify the different types of industries, production techniques, and management and organization structure.
- Understand the meaning of production planning and control and cost calculations.
- Understand and identify the different types of hazards and dangers and to prevent them.
Course Outline

Week Number 1: Introduction to Course.
Week Number 2: Types of Industries and Production Techniques.
Week Number 3: Management and Organization Structure.
Week Number 4: Production Planning and Control.
Week Number 5: Industrial Cost Estimation Techniques.
Week Number 6: Industrial Economy and Breakeven Analysis.
Week Number 7: Exam # 1.
Week Number 8: Accidents at Work – Rules and Regulations.
Week Number 9: Hazards Classification, Prevention, and Personal Safety.
Week Number 10: Fire Hazards Identification and Prevention.
Week Number 11: Chemical Hazards and Prevention – Accident Reporting.
Week Number 12: Exam # 2.
Week Number 13: Quality Control and Labour Relations.
Week Number 14: Science, Engineering, and Technology.
Week Number 15: Industrial Revolutions.
Week Number 16: Final Exam.
IM 112 – Manufacturing Technology

COURSE INFORMATION

Course Title: Manufacturing Technology.
Code: IM 112.
Hours: Lecture – 1 Hr. Laboratory – 2 Hrs. Credit – 2.
Prerequisite: None.

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam 40%

COURSE DESCRIPTION

The course provides an introduction to engineering materials and their properties, production of common metals. It covers types of manufacturing, basic manufacturing processes such as casting, metal forming, welding and machining. An overview of some advanced manufacturing processes is also included. In addition, it introduces measurement standards, instruments, deviations and methods.

TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

Introduce the different methods for processing engineering materials and get acquainted with the basic concepts and necessary information related to manufacturing techniques.
COURSE OBJECTIVES

Understanding the different stages or phases for engineering materials processing, learning the basic concepts of metal forming and casting, understanding the concepts of metal machining and welding techniques and associated applications, learning different measuring techniques and how they can be used for quality control purposes.

COURSE OUTLINE

Week Number 1: Production of steel and cast iron.
Week Number 2: Forming operations (Rolling – Drawing – Extrusion –Forging).
Week Number 3: Heat treatment operations (Hardening-Annealing-Tempering-Nor realizing).
Week Number 4: Cutting tools (Geometry & materials).
Week Number 5: Mechanics of metal cutting and turning operations.
Week Number 6: Cutting fluids (Function – Type – Selection).
Week Number 7: Exam # 1.
Week Number 8: Sand casting (Pattern design & mould preparations).
Week Number 9: Centrifugal casting, die casting and aspects of the casting process.
Week Number 10: Gas and Electric arc welding.
Week Number 11: Electric resistance and pressure welding and aspects of the welding process.
Week Number 12: Exam # 2
Week Number 13: Standards of measurements, Measuring Instruments.
Week Number 14: Measuring Instruments (Vernier, micrometer, dial gauge, block gauges).
Week Number 15: Measuring methods (Indirect and comparative measurements).
Week Number 16: Final Exam.
IM 212 – Manufacturing Processes

Course Title: Manufacturing Process.
Code: IM 212.
Hours: Lecture – 2 Hrs. Laboratory – 2 Hrs. Credit – 3.
Prerequisite: IM 112

Grading

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

Course Description

This course is tailored for departments other than Industrial and Management Engineering and it covers the following topics: Chip type machining processes, cutting tools, work holding devices, mechanics of chip formation, and analytical study of machining processes. It also includes tool wear, process accuracy and product surface finish, precision measurements and metrology, and an overview of non-conventional machining processes.

Text Books


Reference Books


Course Aim

To introduce students to fundamentals of different manufacturing processes applied in the manufacturing industry.

Course Objectives

- To understand the fundamentals of chip type machining processes.
- To be familiar with the different cutting tools used in machining processes.
- To understand the basics of non-traditional and computerized machine tools.
- To comprehend the importance of inspection and quality control measures.
COURSE OUTLINE

Week Number 1: Fundamentals of chip – type machining processes.

Week Number 2: Fundamentals of chip – type machining processes.

Week Number 3: Cutting tools for machining.

Week Number 4: Turning and drilling processes.

Week Number 5: Milling Processes.

Week Number 6: Broaching and shaping processes.

Week Number 7: Abrasive machining processes 1.

Week Number 8: Abrasive machining processes 2.

Week Number 9: Numerical control machine tools.

Week Number 10: Non traditional machining processes 1.

Week Number 11: Non traditional machining processes 2.

Week Number 12: Measurements & Inspection 2.

Week Number 13: Measurements & Inspection 2.

Week Number 14: Quality Control.

Week Number 15: Revision

Week Number 16: Final Exam.
**IM 423 – Operations Research**  
**Course Information**

Course Title: Operations Research.  
Code: IM 423.  
Hours: Lecture – 2 Hrs.  
Tutorial – 2 Hrs.  
Credit – 3.  
Prerequisite: 90 Credit Hours.

**Grading**

Class Performance/Attendance: 10%  
Midterm # 1/Assignments – (7th Week): 30%  
Midterm # 2/Assignments – (12th Week): 20%  
Final Exam: 40%  

**Course Description**

The course provides the basic concepts and fundamentals of management science, problems addressed by operations research, and problem formulations in linear programs. It includes the graphical solution of linear programs, simplex method, transportation model, assignment model, network planning, and critical path and PERT methods.

**Text Books**


**Reference Books**


**Course Objectives**

- To promote the scientific approach to solve management problems.  
- To build up capability to construct mathematical models of practical problems and solve them.  
- To acknowledge the role of computer technology in solving problem of operations research.

**Course Outline**

*Week Number 1:* Course Overview.  
*Week Number 2:* Linear Programming.  
*Week Number 3:* Graphical Method.  
*Week Number 4:* Linear Programming Applications.
Week Number 5:  The Simplex Method.

Week Number 6:  Transportations Method – Formulation and Initial Solution.

Week Number 7:  7th Week Exam.

Week Number 8:  Transportations Method – Finding the Optimal Solution.

Week Number 9:  Assignment Method.

Week Number 10:  Critical Path Method.


Week Number 12:  12th Week Exam.

Week Number 13:  Project Crashing.

Week Number 14:  Network Analysis – Shortest Route and Minimal Spanning Tree.

Week Number 15:  Network Analysis – Maximal Flow.

Week Number 16:  Final Exam.
IM 535 – International Operations Management  

**Course Information**

Course Title: International Operations Management.
Code: IM 535.
Hours: Lecture – 3 Hrs.  Tutorial – 0 Hrs.  Credit – 3.
Prerequisite: 126 Credit Hours.

**Grading**

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

**Course Description**

The course introduces the students to the concepts of international business environment, international trade and direct foreign investments, foreign exchange, and economic cooperation.

**Text Books**


**Reference Books**


**Course Objectives**

The objective of this course, which is a part of the college requirements, is to introduce the students from different disciplines to the ever-growing field of international business. It tackles the main issues of the evolution of firm strategy as part of the internationalization process, plus the countervailing forces that firms are likely to encounter during that process. In addition, the elements of the external international business environment are briefly introduced. The student will be better able to interact with the business world in the environment of globalization.

**Course Outline**

*Week Number 1:* International Business Environment- An overview.
*Week Number 2:* The Cultural and Legal Environment.
*Week Number 3:* The Political Environment.
Week Number 4: The Economic Environment Facing Business (1).

Week Number 5: The Economic Environment Facing Business (2).

Week Number 6: International Trade Theories (1).

Week Number 7: 7th week Exam.

Week Number 8: International Trade Theories (2).

Week Number 9: Governmental Influence on Trade.

Week Number 10: Regional Economic Integration.

Week Number 11: Factor Mobility and Foreign Direct Investment.

Week Number 12: 12th week Exam.

Week Number 13: The Foreign Exchange Market.

Week Number 14: The determination of Exchange Rates.

Week Number 15: Global Manufacturing and Supply Chain management.

Week Number 16: Final Exam.
IM 542E – Reverse Engineering

**Course Information**

**Course Title:** Reverse Engineering.

**Code:** IM 542E.

**Hours:** Lecture – 2 Hrs.  Laboratory – 2 Hrs.  Credit – 3.

**Prerequisite:** 126 Credit Hours.

**Grading**

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**Course Description**

The course provides an introduction to product development with reverse engineering concept, product development tools, definition of customer needs, product architectures. It also covers product metrics, design for manufactures and assembly, design for environment, and several case studies.

**Text Books**


**Reference Book**


**Course Objectives**

The objective of this elective course is to introduce the student to reverse engineering in product development and design. The course covers manufacturing, materials selection, measurements and other applications through a semester-long, step-by-step project.

**Course Outline**

- **Week Number 1:** Introduction to product development phases.
- **Week Number 2:** Product development process tools.
- **Week Number 3:** Scoping product development.
- **Week Number 4:** Understanding customer needs.
Week Number 5: Establishing product functions.

Week Number 6: Product teardown and experimentation.

Week Number 7: 7th week Exam.

Week Number 8: Benchmarking and establishing engineering specifications.

Week Number 9: Product architecture.

Week Number 10: Generating concepts.

Week Number 11: Concept selection.

Week Number 12: 12th week Exam.

Week Number 13: Design for manufacturing and assembly.

Week Number 14: Design for the environment.

Week Number 15: Model solutions and prototyping.

Week Number 16: Final Exam.
Language, Humanities and Social Science (LH)

**LH 131 – ESP I**

**COURSE INFORMATION**

Course Title: ESP I.

Code: LH 131.

Hours: Lecture – 3 Hrs.  
Credit – 2.

Prerequisite: None.

**GRADING**

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

**TEXT BOOKS**


**REFERENCE BOOKS**

References available in AAST Library.

**COURSE AIM**

The course aims at enhancing learners’ four language skills, improving their general and technical lexical repertoire and preparing them to communicate their ideas effectively. The course is also designed to train learners to follow the principles and stages of the writing process and write academic paragraphs.

**COURSE OBJECTIVES**

By the end of the course, learners will be able to:

- Use listening and reading strategies appropriately.
- Communicate about a variety of technical topics orally.
- Use basic computer terms and relevant general vocabulary meaningfully and accurately.
- Apply word-formation rules of prefixation and suffixation.
- Use some relevant grammatical structures.
- Apply the stages of the writing process effectively.
Write well-structured, unified and coherent paragraphs.

**COURSE OUTLINE**

*Week Number 1:* Orientation + Unit 1 (Personal Computing).

*Week Number 2:* Unit 1 (Personal Computing) + Unit 2 (Portable Computers).

*Week Number 3:* Unit 2 (Portable Computers).

*Week Number 4:* The process of academic writing.

*Week Number 5:* An overview of paragraph writing.

*Week Number 6:* Unit 3 (Suffixes) + Unit 4 (Programming and Languages) + Graded workshop.

*Week Number 7:* Unit 4 (Programming and Languages) + Progress Test I.

*Week Number 8:* Unity and Coherence.

*Week Number 9:* Coherence + Writing workshop.

*Week Number 10:* Unit 5 (Computer Software).

*Week Number 11:* Unit 6 (Computer Networks) + Graded workshop.

*Week Number 12:* Unit 7 (Computer Viruses) + Progress test II.

*Week Number 13:* Unit 7 (Computer Viruses).

*Week Number 14:* Unit 8 (Computers in the Office).

*Week Number 15:* Unit 8 (Computers in the Office) + General revision.

*Week Number 16:* Final exam.
**LH 132 – ESP II**  
**COURSE INFORMATION**

Course Title: ESP II.  
Code: LH 132.  
Hours: Lecture – 3 Hrs. Credit – 2.  
Prerequisite: LH 131 - ESP I

**GRADING**

Class Performance/Attendance: 10%  
Midterm # 1/Assignments – (7th Week): 30%  
Midterm # 2/Assignments – (12th Week): 20%  
Final Exam: 40%

**TEXT BOOKS**


**REFERENCE BOOKS**

References available in AAST Library.

**COURSE AIM**

The course aims at enabling learners to decode technical discourse in English with ease and precision. The course is also designed to enhance the learners’ oral production and academic writing.

**COURSE OBJECTIVES**

By the end of the course, learners will be able to:

- Use a variety of listening and reading strategies appropriately.  
- Communicate about numerous technical topics orally.  
- Use basic computer terms and relevant general vocabulary meaningfully and accurately.  
- Apply word-formation rules of prefixation, suffixation and compounding.  
- Employ a variety of relevant grammatical structures.  
- Write academic essays and employment correspondence.


COURSE OUTLINE

Week Number 1: Orientation + Unit 9 (Computers in Education).

Week Number 2: Unit 9 (Computers in Education).

Week Number 3: Paragraph writing (Concrete Support).

Week Number 4: Unit 10 (Computers in Medicine).

Week Number 5: Unit 10 (Computers in Medicine) + Essay writing (Analysis).

Week Number 6: Essay writing (Application) + Graded workshop.

Week Number 7: Unit 11 (Robotics) + Progress test I.

Week Number 8: Unit 11 (Robotics) + Summary writing.

Week Number 9: Unit 12 (Virtual Reality).

Week Number 10: Unit 12 (Virtual Reality) + Unit 13 (Machine Translation).

Week Number 11: Unit 13 (Machine Translation) + Graded workshop.

Week Number 12: CVs & letters of application + Progress test II.

Week Number 13: Interviewing skills.

Week Number 14: Unit 14 (Multimedia).

Week Number 15: Unit 14 (Multimedia) + General revision.

Week Number 16: Final Exam.
**Course Information**

Course Title: ESP III  
Code: LH 231  
Hours: Lecture – 3 Hrs.  
Credit – 3.  
Prerequisite: None.

**Grading**

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<td>Final Exam</td>
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**Text Books**


**Reference Books**


**Course Aim**

The course aims at enhancing learners’ writing skills in order to write various types of technical reports following international standards. The course also includes a component on oral presentations of reports.

**Course Objectives**

By the end of the course, learners will be able to:

- Identify the different types of technical reports as well as their structure.  
- Write effective background reports.  
- Recognize the difference between instructional manuals and process description reports.  
- Write effective primary research (lab) and feasibility reports.  
- Recognize the different sections of a report and how to write each.
Use a dictionary to know the different meanings of a word / phrase / expression and to differentiate between synonyms.

Summarize relevant texts.

Paraphrase relevant texts.

Include in-text citations in writing when necessary.

Document report sources.

Give oral presentations.

**Course Outline**

*Week Number 1:* Orientation + Overview of technical report writing.

*Week Number 2:* Background reports.

*Week Number 3:* Process reports + Instructions and manuals.

*Week Number 4:* Primary research reports.

*Week Number 5:* Feasibility reports.

*Week Number 6:* Report format + Dictionary skills.

*Week Number 7:* Paraphrasing + Progress test I.

*Week Number 8:* Summarizing + Further practice on summarizing and paraphrasing.

*Week Number 9:* Discussion of report outlines + Presentation skills (CD viewing I).

*Week Number 10:* Quotations and source documentation + Report writing workshop.

*Week Number 11:* Use of visual aids in technical writing + Presentation skills (CD viewing II).

*Week Number 12:* Report writing workshop + Progress test II.

*Week Number 13:* Mini presentations + Report writing workshop.

*Week Number 14:* Rehearsals.

*Week Number 15:* End- of- term presentations.

*Week Number 16:* Final exam.
**Course Title:** Steam Plant Engineering  
**Code:** ME 423  
**Hours:** Lecture – 2 Hrs., Tutorial – 2 Hrs., Credit – 3  
**Prerequisites:** ME 431

**Grading**

- Class Performance/Attendance: 10%
- Midterm # 1/Assignments – (7th Week): 30%
- Midterm # 2/Assignments – (12th Week): 20%
- Final Exam: 40%

**Course Description**

- Thermodynamics of vaporous: ideal and practical cycles, re-heating superheating and regeneration. Steam tables and charts.
- Boilers: types and classification, heating surfaces, mountings and fittings, combustion and combustion equipment, insulation, de-superheats control systems.
- Turbines: theory, types, flow through nozzles, jet deflection, super saturation, power calculations, design of components, governors.
- Plant: Real cycle, steam systems, feed water system, plant performance, air ejector, dearators, evaporators, condenser.

**Text Books**


**Reference Books**

COURSE AIM

Studying steam power plant performance and the needs of high power units (Propulsion or Electric Generation). Design of components. Safety aspects of pressure vessels. Calculation of heat balance for huge power plants.

COURSE OBJECTIVES


COURSE OUTLINE

Week Number 1: Introduction, Characteristics of Steam Power Plants. Main Components Real Cycle Representation.
Week Number 2: Thermodynamics of Vapours Superheating, Reheating. Regeneration, Supersaturating and Under Cooling.
Week Number 3: Boilers: Types, Classification of Pressure Vessels
Week Number 4: Mountings, Fittings, Heating Surfaces & Tubing
Week Number 5: Efficiency Calculations & Equivalent Evaporation
Week Number 6: Combustion & Combustion Equipment Insulation Control
Week Number 7: Desuper Heaters Steam to Steam Generators - Quiz
Week Number 8: Steam Turbines: Types & Theory of Action
Week Number 9: Flow of Steam through Nozzles Power Calculation
Week Number 10: Turbine Efficiency Calculation Velocity Diagrams
Week Number 11: Turbine Design (Casing, Rotors and Blading)
Week Number 12: Glands, Bearings, and Governing - Quiz
Week Number 13: Steam Plant Systems, Performance & Heat Balance
Week Number 14: Condensers & Air Ejectors
Week Number 15: Deaerators & Evaporators
Week Number 16: Final Examination
ME 425 – Power Plant Technology

COURSE INFORMATION

Course Title: Thermal Plant Engineering
Code: ME 425
Hours: Lecture – 2 Hrs. Tutorial – 2 Hrs. Credit – 3
Prerequisites: ME 333 or ME 234

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION


TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

Studying all types of Thermal Power Plants including:

- Steam Power Plant
- Gas Turbine Power Plant
- Nuclear Power Plant
- Wind Energy Power Plant
- Geothermal Power Plant
COURSE OBJECTIVES

To develop the student’s capabilities to thoroughly understand the performance of the different thermal plants, evaluate this performance, compare and choose between them.

COURSE OUTLINE

Week Number 1: Thermodynamics Review (1st, 2nd laws of thermodynamics)
Week Number 2: Steam Formation
Week Number 3: Steam Properties and Process
Week Number 4: Simple Rankine Cycle
Week Number 5: Modified Rankine Cycle
Week Number 6: Reheat and Regeneration Cycles
Week Number 7: Steam Turbine, Steam Generator and Steam Condenser
Week Number 8: Power Plant Control
Week Number 9: Simple Gas Turbine Cycle
Week Number 10: Gas Turbine Cycle with Reheat, Intercooling and Regeneration
Week Number 11: Combined Cycle Power Plant
Week Number 12: Nuclear Power Plant
Week Number 13: Renewable Power Generation, Solar Energy
Week Number 14: Wind Energy
Week Number 15: Geothermal Energy
Week Number 16: Final Examination
ME 520 – Thermal Plant Engineering

Course Information

Course Title: Thermal Plant Engineering
Code: ME 520
Hours: Lecture – 2 Hrs. Tutorial – 2 Hrs. Credit – 3
Prerequisites: ME 423

Grading

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

Course Description


Text Books


Reference Books


Course Aim

Studying all types of Thermal Power Plants.

Course Objectives

To develop the student’s capabilities to thoroughly understand the performance of the different thermal plants, Evaluate this performance, compare and choose between them.

Course Outline

Week Number 1: Thermodynamics Review
Week Number 2:  Thermodynamics Review
Week Number 3:  Steam Plant Components
Week Number 4:  Steam Plant Cycles
Week Number 5:  Modifications of Steam Plant Cycle
Week Number 6:  Design of Feed water Heater
Week Number 7:  Gas Turbine Power Plant - Quiz
Week Number 8:  Gas Turbine Cycles
Week Number 9:  Modifications of Gas Turbine Cycle
Week Number 10: Application of Gas Power Plant
Week Number 11: Combined Cycle
Week Number 12: Combined Cycle Application - Quiz
Week Number 13: Nuclear Power Plant
Week Number 14: Pressurized Water Reactors
Week Number 15: Boiling Water Reactors
Week Number 16: Final Examination
ME 522 – Power Plant Analysis & Design

COURSE INFORMATION

Course Title: Power Plant Analysis & Design

Code: ME 522

Hours: Lecture – 2 Hrs. Tutorial – 2 Hrs. Credit – 3

Prerequisites: ME 520

GRADING

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

COURSE DESCRIPTION

- Thermal power plants components and systems design: boiling, condensation and gas radiation. Design of steam generator, condensers, evaporators, deaerators economizers, air preheats. Air feed waters and drain systems.
- Design of gas turbine combustion chamber, intake and exhaust systems.
- Design of waste heat recovery boiler and combined cycle.
- Design of cooling towers.
- Simulation of components and systems.
- Dynamic, Geometric and linear programming

TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

Thermal design of thermal power plant components and economical aspects and simulation of components.

COURSE OBJECTIVES

Design of steam generators, condensers, evaporators, deaerators economizers, air preheats. Air, feed water and drain system. Design of gas turbine combustion chambers, intake and exhaust system.
COURSE OUTLINE

Week Number 1: Design of Steam Generator

Week Number 2: Construction of Steam Generator (Cont.).

Week Number 3: Burner Selection.

Week Number 4: Design of Condenser

Week Number 5: Construction of Condenser and air ejector selection.

Week Number 6: Water treatment technology.

Week Number 7: Air Feed Water and Drain system - Quiz

Week Number 8: Design of Evaporative Cooling Towers- Quiz

Week Number 9: Design of Evaporative Cooling Towers (Cont.)

Week Number 10: Design of Gas Turbine, Combined Cycle and Cogeneration

Week Number 11: Design of Gas Turbine, Combined Cycle and Cogeneration (Cont.)

Week Number 12: Simulation of Components and Systems

Week Number 13: Optimization

Week Number 14: Generalized Heat Balance Computer Program

Week Number 15: General Comments on Power Plant Design

Week Number 16: Final Examination
ME 523 – Power Plant Operation & Management

COURSE INFORMATION

Course Title: Power Plant Operation & Management
Code: ME 523
Hours: Lecture – 2 Hrs. Tutorial – 2 Hrs. Credit – 3
Prerequisites: ME 423

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION

Fuel handling, Piping systems, boiler codes, starting and shut down of power plant, trouble shooting, lubricating systems, load matching, load curves, effect of variable load on plant design and operation. Economics of meeting the variable loads. Plant economics. Maintenance programs.

TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

This study enables the engineer to design, operate and maintain power plant with the primary sufficient knowledge of component behaviour.

COURSE OBJECTIVES

Effect of variable load on power plant management, starting and shut down of power plant, trouble shooting, lubricating system, load matching.

COURSE OUTLINE

Week Number 1: Load Curves
Week Number 2: Power Plant Economics
Week Number 3: Investment in Power Plants
Week Number 4: Investment in Power Plants
Week Number 5: Selection of Plant
Week Number 6: Selection of Plant
Week Number 7: Station Performance, Revision and Evaluation - Quiz
Week Number 8: Station Performance, Revision and Evaluation
Week Number 9: Operation of Gas Turbines
Week Number 10: Typical Problems in Gas Turbines Operation
Week Number 11: Operation of Steam Turbines
Week Number 12: Operation of Boiler (1) - Quiz
Week Number 13: Operation of Boiler (2)
Week Number 14: Water Treatment
Week Number 15: Operation of Cooling Towers and Condensers
Week Number 16: Final Examination
**ME 524 – Renewable Energy Resources**

**COURSE INFORMATION**

Course Title: Renewable Energy Resources  
Code: ME 524  
Hours: Lecture – 2 Hrs. Tutorial – 2 Hrs. Credit – 3  
Prerequisites: 126 credit hours

**GRADING**

Class Performance/Attendance: 10%  
Midterm # 1/Assignments – (7th Week): 30%  
Midterm # 2/Assignments – (12th Week): 20%  
Final Exam: 40%

**COURSE DESCRIPTION**

This Course concentration on the theoretical and practical aspects of solar, wind, tidal and wave sources of energy. Design feasibility studies are undertaken on particular aspects of energy conversion from these resources. The impact of the environment of consumption of conventional energy forms is investigated. The nature and magnetite of energy consumption World-Wide and locally is considered.

**TEXT BOOKS**


**REFERENCE BOOKS**


**COURSE AIM**

Studying the different types of renewable energy sources

**COURSE OBJECTIVES**

To develop the student ability to assess the current energy situation, need for renewable energy sources & to understand and their current status of development.

**COURSE OUTLINE**

*Week Number 1:* The Current Energy Sources  
*Week Number 2:* Environmental Impact of Energy Production
Week Number 3:  Need for Renewable Sources + Introduction

Week Number 4:  Solar Energy: Photovoltaic Cells

Week Number 5:  Solar Energy: Thermal Energy Production

Week Number 6:  Solar Energy: Thermal Energy Production

Week Number 7:  Wind Energy - Quiz

Week Number 8:  Wind Energy

Week Number 9:  Hydropower

Week Number 10:  Wave & Tidal Energy

Week Number 11:  Ocean Thermal Energy Conversion

Week Number 12:  Geothermal Energy - Quiz

Week Number 13:  Breeder Nuclear Reactors

Week Number 14:  Fusion Energy

Week Number 15:  Environmental Impact of Renewable Energy Production

Week Number 16:  Final Examination
ME 526 – Power Plant Measurement & Control

Course Title: Power Plant Measurements & control

Code: ME 526

Hours: Lecture – 2 Hrs. Tutorial – 2 Hrs. Credit – 3

Prerequisites: EE 418

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION


TEXT BOOKS


REFERENCE BOOKS

- Applied Instrumentation in the process industry.

COURSE AIM

To deal and apply major process control for thermal power plant.

COURSE OBJECTIVES

To enrich the background of the student with Process Control Design steps, for Thermal Power Plant. Special emphasize on the Boiler measurement and control circuit as well as Turbines speed control method.
**Course Outline**

*Week Number 1:* Introduction to system concepts, instrumentation and process control

*Week Number 2:* Process Variables, Process-open and Closed Loop Cycles

*Week Number 3:* System model representation (modelling of mechanical, electrical, and electromechanical systems)

*Week Number 4:* System model representation (modelling of fluid and thermal systems)

*Week Number 5:* System response and design of dynamic systems

*Week Number 6:* Static Error Effects on Error System Stability

*Week Number 7:* Basic control action - Quiz

*Week Number 8:* Design of controller, Ziegler-Nicol method

*Week Number 9:* Measurement Means, Measurements Dynamics, Identification of Measurement Devices

*Week Number 10:* Sensors & its Requirement

*Week Number 11:* Sensors & its Requirement (Cont.)

*Week Number 12:* Analog signal conditioning - Quiz

*Week Number 13:* Analog signal conditioning (Cont.)

*Week Number 14:* Signal conditioning circuits

*Week Number 15:* Resistance – type strain gauges, force, torque and pressure load cells

*Week Number 16:* Final Examination
Heat, Thermodynamics, Refrigeration & Air conditioning Courses – (ME X3X)

ME 231 - Thermodynamics

COURSE INFORMATION:

Course Title: Thermodynamics
Code: ME 231
Hours: Lecture: 2Hrs. Tutorial: 2 Lab:2 Credit: 3
Prerequisites: (BA114) Physics II

GRADING:

Class Performance / Attendance 10%
Midterm # 1/ Assignments: (7th week) 30%
Midterm # 2/ Assignments: (12th week) 20%
Final Exam 40%

COURSE DESCRIPTION:

Classical thermodynamics-Heat transfer by conduction, convection and radiation-Air standard cycles- Steam cycles- Gas turbine cycle-Introduction to refrigeration and air conditioning- psychrometry.

TEXT BOOKS:


REFERENCE BOOKS:


COURSE AIM:

The course is designed to identify various aspects and area of thermodynamics in order to put the student in the right position to be able to solve the simple problems related to course topics.

COURSE OBJECTIVES:

The main objective of the course is to highlight the main topics which constitute general fundamental basic of Thermal Engineering.

COURSE OUTLINE:

Week Number 1: Introduction
Week Number 2: Heat Transfer (Fourier’s Law, Newton’s Law, Stefan-Boltzmann Law)
Week Number 3: Heat Transfer (Composite wall)

Week Number 4: Heat Transfer (cylinder & sphere)

Week Number 5: Heat Engine Cycles (Introduction, Carnot Cycle)

Week Number 6: Heat Engine Cycles (Constant Pressure Cycle, Constant Volume Cycle)

Week Number 7: Heat Engine Cycles (Diesel Cycle, Dual Cycle) - 7th Quiz

Week Number 8: Steam Cycle (Rankin Cycle)

Week Number 9: Steam Cycle (Using Steam Chart)

Week Number 10: Gas Turbine Cycle

Week Number 11: Gas Turbine Cycle

Week Number 12: Refrigeration and Air Conditioning - 12th Quiz

Week Number 13: Refrigeration and Air Conditioning (Using Refrigeration charts)

Week Number 14: Psychometry

Week Number 15: Psychometry (Psychometric charts)

Week Number 16: Final Examination
ME 232 - Thermodynamics (1)

**Course Information**

Course Title: Thermodynamics (1)

Code: ME 232

Hours: Lecture – 2 Hrs.  Tutorial – 2 Hrs.  Credit – 3

Prerequisites: BA 114

**Grading**

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

**Course Description**

Air standard cycles, steam cycles, combustion. Exhaust gas analysis. Heat transfer by conduction, convection and radiation. Single and multistage compressors. Introduction to refrigeration. Laboratory work

**Text Books**


**Reference Books**

- Engineering thermodynamics. B.M. David
- The thermodynamics problem solver.

**Course Aim**

The course aim is to give students a thorough grounding in the subject of thermodynamics and the design of thermal plant.

**Course Objectives**

The main objective is to illuminate the necessary theoretical rigor, the emphasis throughout is on the applications of theory to real processes undergoing in thermal plants.

**Course Outline**

*Week Number 1:* Heat Engine Cycles
Week Number 2: Heat Engine Cycles

Week Number 3: Heat Engine Cycles

Week Number 4: Steam Plant

Week Number 5: Steam Plant

Week Number 6: Heat Transfer

Week Number 7: Heat Transfer - Quiz

Week Number 8: Heat Transfer

Week Number 9: Heat Transfer

Week Number 10: Combustion

Week Number 11: Combustion

Week Number 12: Combustion - Practical Analysis of Combustion Products - Quiz

Week Number 13: Positive Displacement Machine

Week Number 14: Positive Displacement Machine

Week Number 15: Positive Displacement Machine

Week Number 16: Final Examination
ME 234 – Thermo Fluids

Course Information

Course Title: Thermo fluids
Code: ME 234
Prerequisite: BA 114

Grading:

Class Performance / Attendance 10%
Midterm #1/ Assignments: (7th week) 30%
Midterm #2/ Assignments: (12th week) 20%
Final Exam 40%

Course Description


Text Book

C Marquand & Craft, Thermofluids, Wiley.

Reference Books


Course Aim

To give the students of electric engineering a thorough grounding in elementary subject of thermodynamics and fluid mechanics

Course Objectives

This course is an elementary course for electric engineer. It is designed to identify various aspects and areas of thermodynamics and fluid mechanics.

Course Outline

Week Number 1: Heat Engine Cycles.
Week Number 2: Heat Engine Cycles.
Week Number 3: Steam Cycles.

Week Number 4: Steam Cycles.

Week Number 5: Positive Displacement Machine.

Week Number 6: Positive Displacement Machine.

Week Number 7: Gas Turbine – Quiz.

Week Number 8: Gas Turbine.

Week Number 9: Fluid Properties.

Week Number 10: Manometers.

Week Number 11: Hydrostatic Forces.

Week Number 12: Hydrostatic Forces – Quiz.

Week Number 13: Flow Characteristics.

Week Number 14: Continuity Equation.

Week Number 15: Bernoulli's Equation.

Week Number 16: Final Exam.
# ME 333 - Thermodynamics (2)

## Course Information

| Course Title: | Thermodynamics (2) |
| Code: | ME 333 |
| Hours: | Lecture – 2 Hrs. | Tutorial – 2 Hrs. | Credit – 3 |
| Prerequisites: | ME 232 |

## Grading

| Class Performance/Attendance: | 10% |
| Midterm # 1/Assignments – (7th Week): | 30% |
| Midterm # 2/Assignments – (12th Week): | 20% |
| Final Exam: | 40% |

## Course Description


## Text Books


## Reference Books

Engineering Thermodynamics, B.M. David

## Course Aim

To give students of engineering a through grounding in subject of thermodynamics and the design of thermal plant.

## Course Objectives

The main objective is to illuminate the necessary theoretical rigour, the emphasis throughout is on the applications of theory to real processes undergoing in thermal plants

## Course Outline

- **Week Number 1:** Mixtures
- **Week Number 2:** Mixtures
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<td>Refrigeration</td>
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<td>9</td>
<td>Refrigeration</td>
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<td>10</td>
<td>Gas Turbine</td>
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<td>11</td>
<td>Gas Turbine</td>
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<tr>
<td>12</td>
<td>Nozzles</td>
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<td>13</td>
<td>Nozzles</td>
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<td>14</td>
<td>Design of a selected topic</td>
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<td>15</td>
<td>Design of a selected topic</td>
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<td>16</td>
<td>Final Examination</td>
</tr>
</tbody>
</table>
ME 431 - Heat Transfer

**COURSE INFORMATION**

Course Title: Heat Transfer

Code: ME 431

Hours: Lecture – 2 Hrs.  Tutorial – 2 Hrs.  Credit – 3

Prerequisites: ME 333 or ME 231

**GRADING**

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

**COURSE DESCRIPTION**

Steady state conduction, one dimension unsteady state conduction. Principles of convection. Natural convection systems. Radiation heat transfer, Design of surface heat exchangers

**TEXT BOOKS**


**REFERENCE BOOKS:**

- V.P Mikhenks “Heat Transfer”
- Fogiel M “The Essentials of Heat Transfer” Vol 1 &2 Research and Education Association

**COURSE AIM**

This course presents on elementary treatment of the principles of heat transfer

**COURSE OBJECTIVES**

The main objective of this course is to highlight the general principles of heat transfer method, processes, heat exchangers design.

**COURSE OUTLINE**

*Week Number 1:* Review of Heat Transfer

*Week Number 2:* Steady State Conduction in One Dimension
Week Number 3: General Conduction Equations – External Surfaces
Week Number 4: General Conduction Equations – External Surfaces
Week Number 5: Steady State Conduction in Two Dimensions
Week Number 6: Steady State Conduction in Two Dimensions
Week Number 7: Principles of connections - Quiz
Week Number 8: Principles of connections
Week Number 9: Empirical Relations for Forced Connection
Week Number 10: Empirical Relations for Forced Convection
Week Number 11: Empirical Relations for Forced Convection
Week Number 12: Natural Convection Systems
Week Number 13: Radiation Heat Transfer
Week Number 14: Design of surface heat exchangers
Week Number 15: Design of compact heat exchangers
Week Number 16: Final Examination
ME 434 - Refrigeration & Air conditioning

Course Title: Refrigeration & Air conditioning

Code: ME 434

Hours: Lecture – 2 Hrs. Tutorial – 2 Hrs. Credit –: 3

Prerequisites: ME 431

GRADING

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

COURSE DESCRIPTION


TEXT BOOKS

- Charts and tables.
- Stoecker W.F., “Refrigeration and Air Conditioning“, McGraw Hill, NY

REFERENCE BOOKS

ASHRAE Hand book

COURSE AIM

To give the basic principles of the refrigeration and air conditioning systems and cycles

COURSE OBJECTIVES

To prepare the student for the advanced courses of the both branches.

COURSE OUTLINE

Week Number 1: Introduction

Week Number 2: Basic Vapor compression System-1
Week Number 3: Basic Vapor compression System-2

Week Number 4: Basic Vapor compression System-3

Week Number 5: Load Estimation

Week Number 6: Load Calculations

Week Number 7: Load Calculations - Quiz

Week Number 8: Air Conditioning Fundamentals-1

Week Number 9: Air Conditioning Fundamentals-2

Week Number 10: Air Conditioning Fundamentals-3

Week Number 11: Air conditioning design

Week Number 12: Summer & Winter Cycles

Week Number 13: Special systems

Week Number 14: Air Conditioning Equipment

Week Number 15: Air Conditioning Units

Week Number 16: Final Examination
ME 532 - Refrigeration Applications

COURSE INFORMATION

Course Title: Refrigeration Applications

Code: ME 532


Prerequisites: ME 434

GRADING

Class Performance/Attendance: 10%

Midterm #1/Assignments – (7th Week): 30%

Midterm #2/Assignments – (12th Week): 20%

Final Exam: 40%

COURSE DESCRIPTION

Engineering refrigeration systems. Ice manufacturing, refrigeration in the chemical industry. Food refrigeration. Distribution of the chilled and frozen food. Industrial applications of refrigeration. Low temperature refrigeration.

TEXT BOOKS

Modern Refrigeration and Air Conditioning, Althous, Androw GoodHeart, Willcox

REFERENCE BOOKS


COURSE AIM

To acknowledge the student about the refrigeration applications in many fields

COURSE OBJECTIVES

To make the student able to differentiate between the design data of each refrigeration application as well as the suitable refrigeration cycle.

COURSE OUTLINE

Week Number 1: Domestic systems

Week Number 2: Commercial
Week Number 3: Industrial
Week Number 4: Ice manufacturing-1
Week Number 5: Ice manufacturing-2
Week Number 6: Food refrigeration-1
Week Number 7: Food refrigeration-2 - Quiz
Week Number 8: Food refrigeration-3
Week Number 9: Freezing units
Week Number 10: Freezing cycles-1
Week Number 11: Freezing cycles-2
Week Number 12: Freezing cycles-3 - Quiz
Week Number 13: Low temperature refrigeration
Week Number 14: Gas liquefaction
Week Number 15: Industrial refrigeration plants
Week Number 16: Final Exam
ME 533 - Air Conditioning Applications

Course Title: Air Conditioning Applications
Code: ME 533
Prerequisites: ME 434

Grading

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

Course Description


Text Books

Modern refrigeration and air conditioning Althous, Androw Goodweart, Willcox

Reference Books

ASHRE hand book HVAC, applications volume

Course Aim

To acknowledge the student about the air conditioning application in various building and industry

Course Objectives

To make the student able to differentiate between the design data and ventilation requirements in air conditioning applications.

Course Outline

Week Number 1: Domestic air conditioning and ventilation
Week Number 2: Industrial air conditioning and ventilation
Week Number 3: Industrial air conditioning and ventilation
Week Number 4: Industrial air conditioning and ventilation
Week Number 5: Transportation units' air conditioning and ventilation
Week Number 6: Laboratories
Week Number 7: Clean spaces
Week Number 8: Printing factories.
Week Number 9: Textile Processing
Week Number 10: Hospitals and clinics.
Week Number 11: Photo graphic industries
Week Number 12: Environmental control of animals and plants
Week Number 13: Dry and storing farm corps
Week Number 14: Air conditioning of wood and paper products
Week Number 15: Electronic industry
Week Number 16: Final Exam
ME 534 – Energy Management

Course Title: Energy Management

Code: ME 534


Prerequisites: 126 Credit Hours

Grading

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

Course Description

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

Text Books

None

Reference Books


Course Aim

To acknowledge the student about the different energy resources, utilization and conversion.

Course Objectives

The student should be able to:
Acquire the management skills in the areas of energy classification, sources and utilization, energy conversion, environmental impact of combustion of fuels, monitoring of NO\(_x\), SO\(_x\) and CO\(_x\), emission control and energy management systems.

**COURSE OUTLINE**

*Week Number 1:* Energy classification.

*Week Number 2:* Sources and utilization.

*Week Number 3:* Principal fuels for energy conversion.

*Week Number 4:* Petroleum fuels characteristics.

*Week Number 5:* World natural gas production and reserves.

*Week Number 6:* Gas pipe lines and underground storage.

*Week Number 7:* Liquefied natural gas and absorption of acidic gases from natural gas.

*Week Number 8:* Energy storage.

*Week Number 9:* Environmental impact of combustion of fuels.

*Week Number 10:* Source monitoring of NOx and SOx. Low density heat transfer.

*Week Number 11:* Monitoring of carbon monoxide emissions.

*Week Number 12:* Control by furnace and burner design.

*Week Number 13:* Energy management systems.

*Week Number 14:* Total energy schemes.


*Week Number 16:* Pinch technology. Computer simulation using (MESSAGE).
ME 535 - Refrigeration Equipment & Control

COURSE INFORMATION

Course Title: Refrigeration Equipment & Control
Code: ME 535
Prerequisites: ME 434

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION


TEXT BOOKS

- Principles of Refrigeration “R Dusate”

REFERENCE BOOKS

ASHRAE Hand book “Refrigeration Volume”

COURSE AIM

To acknowledge the student with the different refrigeration cycles as well as the principles of the control system

COURSE OBJECTIVES

To make the student able to design and predict the performance of the refrigeration equipment.

COURSE OUTLINE

Week Number 1: Basic air cycle
Week Number 2: Modification of air cycles
Week Number 3: Thermoelectric refrigeration
Week Number 4: Absorption systems
Week Number 5: Absorption systems
Week Number 6: Vapor compression cycle
Week Number 7: Vapor compression cycle components Quiz.
Week Number 8: Vapor compression cycle components
Week Number 9: Vapor compression cycle components
Week Number 10: Vapor compression cycle components
Week Number 11: Safety and automatic control devices
Week Number 12: Defrost systems Quiz.
Week Number 13: Dual purpose refrigeration cycle
Week Number 14: Simple and integrated Control systems
Week Number 15: Simple and integrated Control systems
Week Number 16: Final Exam
ME 536 - Air Conditioning Units & Control

COURSE INFORMATION

Course Title: Air Conditioning units & Control
Code: ME 536
Prerequisites: ME 434

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION

Heating-Cooling units: Window, split, Package and central units – Humidifiers, filters-Temperature and humidity measuring equipment – Temperature controllers – Humidity controllers – Simple and integrated control systems.

TEXT BOOKS


REFERENCE BOOKS

ASHRAE HVAC “Equipment Volume”

COURSE AIM

To acknowledge the student with the different types of air conditioning equipment and control with technical experience on using the different controllers.

COURSE OBJECTIVES

To make the student able to make a complete layout of air handling unit and fan/coil for year-round operation.

COURSE OUTLINE

Week Number 1: Direct Contact Exchanger (Washers).
Week Number 2: Direct Contact Exchanger (Washers).
Week Number 3: Air washer and cooling tower design and performance.

Week Number 4: Heating and cooling coils.

Week Number 5: Fans.

Week Number 6: Filters.

Week Number 7: Pumps – Quiz.

Week Number 8: Piping.

Week Number 9: Air ducts.

Week Number 10: Air ducts.

Week Number 11: Air distribution components.

Week Number 12: AHU and FCU modules – Quiz.

Week Number 13: Temperature, humidity, and air flow sensors.

Week Number 14: Control systems and DDC.

Week Number 15: Integrated control systems and DDC.

Week Number 16: Final Examination.
ME 537 - Refrigeration Plant Design & Selection

COURSE INFORMATION

Course Title:  Refrigeration Plant Design & Selection
Code:       ME 537
Prerequisites:  ME 434

GRADING

Class Performance/Attendance:  10%
Midterm # 1/Assignments – (7th Week):  30%
Midterm # 2/Assignments – (12th Week):  20%
Final Exam:       40%

COURSE DESCRIPTION

Specifying the stores – Layout of cold stores – Method of product storing capacity- Calculation of products – Cooling load calculations – Selection of units and components.

TEXT BOOKS

Withman, “Refrigeration and Air Conditioning Technology”, Delmer.

REFERENCE BOOKS

ASHRAE Handbook, “Refrigeration volume”.

COURSE AIM

To make the student able to differentiate between storing spaces and cold store layout requirement.

COURSE OBJECTIVES

To make the student familiar with cold store spaces required for commercial refrigeration systems and cold store construction details.

COURSE OUTLINE

Week Number 1:  Cold stores capacities and layout
Week Number 2:  Constructional requirements and materials
Week Number 3:  Refrigerated stores classifications
Week Number 4: Refrigerated stores

Week Number 5: Loading and unloading

Week Number 6: Refrigeration load estimation.

Week Number 7: Selection of components Quiz.

Week Number 8: Selection of components

Week Number 9: Direct and brine systems

Week Number 10: Store temperatures.

Week Number 11: M/C room requirements

Week Number 12: Refrigeration capacity control system Quiz.

Week Number 13: Freezing tunnels

Week Number 14: Trouble shooting

Week Number 15: Trouble shooting

Week Number 16: Final Exam
ME 538 - A/C Systems, Design & Selection

Course Title: A/C Systems, Design & Selection

Code: ME 538


Prerequisites: ME 434

Grading

Class Performance/Attendance: 10%
Midterm #1/Assignments – (7th Week): 30%
Midterm #2/Assignments – (12th Week): 20%
Final Exam: 40%

Course Description

Air conditioning load estimation – Units capacity requirements – All air, all water and air-water systems – air distribution and flow controllers – Ducting system – Technical repair, check operation

Text Books


Reference Books


Course Aim

To acknowledge the student with the calculation of air conditioning loads – How to select the unitary and central equipment – How to design duct and pumping networks.

Course Objectives

To make the student able to select the suitable control system for buildings with complete design of the system equipment.

Course Outline

Week Number 1: Air Conditioning Load Estimation

Week Number 2: Air Conditioning Load Estimation
Week Number 3: Units Capacity Requirements

Week Number 4: Units Capacity Requirements

Week Number 5: Small (Separate) units applications

Week Number 6: All air central system

Week Number 7: All water and water air central system - Quiz.

Week Number 8: Central system Case study - 1

Week Number 9: Central system Case study - 2.

Week Number 10: Central system Case study - 3.

Week Number 11: Variable parameters

Week Number 12: Trouble shooting - Quiz

Week Number 13: Technical repair and commissioning

Week Number 14: Technical repair and commissioning

Week Number 15: Technical repair and commissioning

Week Number 16: Final Examination
ME 539 - Cryogenic Systems

COURSE INFORMATION

Course Title: Cryogenic Systems

Code: ME 534


Prerequisites: ME 434

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION

This is a course in the generation and use of cryogenic fluids, and the design and construction of low temperature apparatus. This course provides instruction in fundamental principles for cryogenic systems, and applications such as LNG, and air liquefaction. Also modelling and simulating of cryogenic systems will be included in the course.

TEXT BOOKS


REFERENCE BOOKS

- Ralph G. Scurlock, History and Origins of Cryogenics (Oxford)
- Randall F. Barron, Cryogenic Systems (second edition)
- Raymond G. Becker, John Gorrie, M.D. (Carlton Press)

COURSE AIM

This course provides students with a practical prospective on the cryogenic world. A historical and current picture of cryogenics in industry will help them in many careers. The technical aspects of both the classroom and field visits will prepare students to actually begin work in many different types of jobs in cryogenics, which has become ubiquitous in industry, government labs, and medical centres. They will be able to see the equipment and processes that are prevalent in the modern cryogenic workplace. They will also be given the background that will enable students to contribute to the advancement of the art of cryogenics in their future work.
COURSE OBJECTIVES

- Understand behaviour of materials at low temperatures
- Develop skills for designing cryogenic systems (which can include refrigeration, storage & transfer of cryogens, and instrumentation)
- Encounter industry-defined cryogenic design problem

COURSE OUTLINE

Week Number 1: Historical survey, Cryogenic safety, Properties of cryogenic fluids.
Week Number 2: Super-fluids-the helium's, superconductors, and BEC gases
Week Number 3: Super-fluids-the helium's, superconductors, and BEC gases continued
Week Number 4: Low Temperature mechanical properties of materials
Week Number 5: Quantum Turbulence
Week Number 6: Theory of refrigeration and liquefaction of gases
Week Number 7: Cryostat construction; Insulation techniques; Cryogenic instrumentation - Quiz.
Week Number 8: Hydrogen economy
Week Number 9: Recycling trash and space applications.
Week Number 10: Insulation, storage, and transfer of cryogens
Week Number 11: Cryogenic Simulation
Week Number 12: Cryogenic Simulation - Quiz
Week Number 13: Case study
Week Number 14: Case study
Week Number 15: Case study
Week Number 16: Final Examination
General Mechanical Courses – (ME X4X)

ME 241 – Experimental Methods

Course Title: Experimental Methods
Code: ME 2421
Hours: Lecture – 2Hrs., Tutorial – 2Hrs., Credit – 3
Prerequisites: None.

Grading

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

Course Description

Introduction to experimental methods, sensors, and computer-aided data acquisition with emphasis on mechanical applications. Survey of transducers and measurement methods for a broad range of phenomena significant for mechanical engineers. Particular emphasis will be given to data retrieval, oral and written communication of experimental results. Laboratories experiments will give students hands-on experience with instrumentation and modern computer-aided data acquisition methods.

Text Book

Experimental Methods for engineers Text/Handout.

Reference Books


Course Aims

- To understand modern engineering experimentation including experiment design, system calibration, data acquisition, analysis and presentation.
- To understand how to quantify error and uncertainty in physical measurements.
- To gain hands-on experience with modern instrumentation and systems-level experimentation.
To improve written and oral communication skills, to develop the ability to write engineering reports of high quality, and to improve the student’s ability to function as a member of an engineering team.

**COURSE OBJECTIVES**

At the end of the course, the student who has mastered the course material will be able to:

- Draw a concept map for a generalized measurement system that identifies the most important concepts.
- Apply basic statistical methods to design experiments, to analyze, and to present the results of experiments.
- Identify and describe the elements making up computer-based data acquisition systems, including alternative configurations and technologies.
- Identify and describe the various types of mechanical measurements including temperature, pressure, sound, motion and position, force and torque, stress and strain, flow visualization and measurement (e.g., volume flow rate, velocity, etc.) and explain the transduction principles that underlie them.
- Operate modern instrumentation systems that include mechanical and electro-optical technologies and computer-based data acquisition systems.
- Work productively and effectively in an engineering team.

**COURSE OUTLINE**

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Topic</th>
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<td>1</td>
<td>Introduction</td>
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<td>2</td>
<td>Generalized Measuring System, Significant Digits, Rounding, Truncation</td>
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<td>3</td>
<td>Data Acquisition, Signals, Signal Conditioning, Sampling</td>
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<td>4</td>
<td>Lab View – Lab View Tutorial</td>
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<td>5</td>
<td>Background and Introduction to thermal experiments</td>
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<td>6</td>
<td>Background and Introduction Fluid mechanics experiments</td>
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<td>7</td>
<td>Background and introduction to Material experiments</td>
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<td>8</td>
<td>Background and Introduction to solid mechanics experiments</td>
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<td>9</td>
<td>Presentation &amp; communication skills</td>
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<td>10</td>
<td>Accuracy, Precision, Error in Measurement, Calibration - Lab Work</td>
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<td>11</td>
<td>Uncertainty Analysis – Exercise</td>
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<td>12</td>
<td>Displacement and Dimensional Measurement – Lab work</td>
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<tr>
<td>13</td>
<td>Library Exercise</td>
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</tbody>
</table>
Week Number 14: Oral Presentation for Selected Topic

Week Number 15: Oral Presentation for Selected Topic

Week Number 16: Final Exam.
ME 542 - Maintenance Planning

**COURSE INFORMATION**

Course Title: Maintenance Planning  
Code: ME 521  
Hours: Lecture: 2 Hrs.  Tutorial: 2 Hrs.  Credit: 3  
Prerequisites: 126 Credit Hours

**GRADING**

Class Performance/Attendance: 10%  
Midterm # 1/Assignments – (7th Week): 30%  
Midterm # 2/Assignments – (12th Week): 20%  
Final Exam: 40%

**COURSE DESCRIPTION**

Maintenance definition, concept, objectives, Management functions, Types of maintenance, maintenance cycle, construction of maintenance planning system, computer management maintenance system, diagnostic capabilities of Predictive maintenance, Economic aspects of maintenance engineering, Investigation of failure, statistical techniques, Reliability, availability, system redundancy.

**TEXT BOOKS**

Maintenance Planning Prepared by Eng. Nabil El Khouly

**REFERENCE BOOKS**

- John M. Gross Fundamentals of Preventive Maintenance, NY.

**COURSE AIM**

Student should understand maintenance concept and types. The importance of maintenance planning & control to judge choose, and adapt maintenance system, which provide optimum solution to maintenance problems with the minimum expenditure.

**COURSE OBJECTIVES**

Providing a tool for better maintenance & regular operations and increasing safety for both crew and equipment, including many elements such as operational planning, cost control, stock control, information and instruction.
COURSE OUTLINE

Week Number 1: Introduction

Week Number 2: Maintenance situation.

Week Number 3: Maintenance cycle

Week Number 4: Working examples on cycle schedule

Week Number 5: Computer aided maintenance

Week Number 6: Economic aspects of maintenance engineering,

Week Number 7: Diagnostic capabilities of Predictive maintenance

Week Number 8: Vibration Analysis (introduction, Types of Equipment, system Applications.

Week Number 9: Case study

Week Number 10: Motor Analysis (introduction, Types of Equipment, system Applications, case study)

Week Number 11: Organization of different maintenance type

Week Number 12: Investigation of failure

Week Number 13: Reliability in maintenance

Week Number 14: Case study

Week Number 15: Case study

Week Number 16: Final examination
**Applied Mechanics Courses – (ME X5X)**

**ME 151 - Engineering Drawings & Projection**

**Course Information**

Course Title: Engineering Drawings & Projection

Code: ME 151

Hours: Lecture – 2Hrs  Tutorial – 2Hrs  Credit – 2

Prerequisites: None

**Grading**

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

**Course Description**


**Text Books**

Engineering Drawing Book prepared and edited from several related books.

**Reference Books**


**Course Aim**

To give the student the ability to communicate by means of engineering drawing and to relate the applications of drawing techniques to mechanical engineering practice.

**Course Objectives**

To provide the basic information for engineering drawing and to present the different types of drawings in generic and basic forms with enough depth.
CORSE OUTLINE

Week Number 1: Drawing practices and techniques (Exercises on geometrical construction)

Week Number 2: Methods of object projection (Exercises on geometrical construction – Exercises on object projection)

Week Number 3: Orthogonal projection (Exercises on orthogonal projection)

Week Number 4: Missing views, dimensioning and free hand sketching (Exercises on projection and free hand sketching)

Week Number 5: Sectioning and conventions (Exercises on sectional views)

Week Number 6: Intersection of geometrical surfaces and development (Exercises in intersection of geometrical surfaces and development)

Week Number 7: Standard metal sections and metal structures (Exercises on metal structures) – Quiz

Week Number 8: Compound metal sections and welds (Exercises on metal structures)

Week Number 9: Isometric projection (Exercises on Isometry)

Week Number 10: Isometric projection & Surface intersections (Exercises on Isometry and surface intersections)

Week Number 11: Perspective projection (Exercises on Perspective projection)

Week Number 12: Perspective projection (Cont.) (Exercises on interior and exterior perspective projection) – Quiz

Week Number 13: Computer Aided drafting using AutoCAD (General Introduction)

Week Number 14: Drawing and editing commands in AutoCAD

Week Number 15: Writing texts, Dimensioning and viewing commands

Week Number 16: Final Examination
ME 252 - Mechanical Engineering Drawing

COURSE INFORMATION

Course Title: Mechanical Engineering Drawing

Code: ME 252

Hours: Lecture – 2  Tutorial – 4  Credit – 3

Prerequisites: ME 151

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION

The course includes the following:


TEXT BOOKS

Notes prepared and edited (from several related text books, standards and codes in use) to cover the syllabus

REFERENCE BOOKS


COURSE AIM

To enable the student to make detail and assembly drawings with enough care and accuracy and according to appropriate conventions
COURSE OBJECTIVES:

As a Continuation to first term course. More applications to Mechanical Engineering Drawing – to relate the applications of drafting techniques to mechanical Engineering practice. To provide sufficiently understanding to conventional representation of different M/C elements, using current standards and Codes.

COURSE OUTLINE:

Week Number 1: AutoCAD basics
Week Number 2: Object construction and manipulation
Week Number 3: Geometric construction
Week Number 4: Layers, text and dimensioning
Week Number 5: Section views, hatching and construction of blocks
Week Number 6: Solid modeling, primitives and Boolean operations
Week Number 7: Creating solid models from 2D polylines - Quiz
Week Number 8: Viewing, modifying and editing solids, solid modeling exercises
Week Number 9: Assembly drawing with applications in Mechanical, Industrial and Marine Engineering – Assembly drawing exercises
Week Number 10: Free hand sketching – Assembly drawing exercises
Week Number 11: Fits and Tolerances - Assembly drawing exercises
Week Number 12: Applications on Fits and Tolerance on Drawings - Assembly drawing exercises - Quiz
Week Number 13: Conventional representation of Mechanical elements - Assembly drawing exercises
Week Number 14: Surface finish and machining symbols - Assembly drawing exercises
Week Number 15: Welding and hydraulic symbols - Assembly drawing exercises
Week Number 16: Final Examination
**ME 255 – Computer Aided Drafting**

**Course Information**

Course Title: Computer Aided Drafting  
Code: ME 255  
Hours: Lecture – 0 Hrs. Tutorial – 0 Hrs. Lab: 6 Hrs.  
Credit – 3.  
Prerequisite: CB 221

**Grading**

Class Performance / Attendance 10%  
Midterm # 1/ Assignments: (7th week) 30%  
Midterm # 2/ Assignments: (12th week) 20%  
Final Exam 40%

**Course Description**


**Text Book & References**


**Course Aim**

To enable the student to develop the necessary knowledge and skills for using computer in machine drafting and to prepare them for computer Aided Design applications.

**Course Objectives**

Apply the engineering drawing basics using AutoCAD as a mean of computer aided drafting software to produce detailed and assembly engineering drawings in 2 dimensions, with an introduction to use computers to model an object in 3 dimensions.

**Course Outline**

*Week Number 1:* AutoCAD Basics.  
*Week Number 2:* AutoCAD Basics (Cont.)
Week Number 3: Object Construction and Manipulation 1.

Week Number 4: Object Construction and Manipulation 2.

Week Number 5: Object Construction and Manipulation 3.

Week Number 6: Object Construction and Manipulation 4.

Week Number 7: Geometric Construction.

Week Number 8: Layers and Text.

Week Number 9: Section Views and Hatching.

Week Number 10: Dimensioning Technique.

Week Number 11: Analyzing 2-D Drawings, Plot and Configure.

Week Number 12: Construction of Blocks.

Week Number 13: Isometric Drawings.

Week Number 14: 2-D Assembly Views.

Week Number 15: 3-D Modeling.

Week Number 16: Final Exam.
ME 355 - Theory of Machines

COURSE INFORMATION

Course Title: Theory of Machines
Code: ME 355
Hours: Lecture – 2Hrs. Tutorial – 2Hrs. Credit – 3
Prerequisites: BA 142

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION


TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

To provide a fair understanding of the performance of various mechanisms and principal machine elements as regards their Kinematics and dynamics

COURSE OBJECTIVES

Forming a base for studies in Robotics applications

COURSE OUTLINE:

Week Number 1: Introduction -Types of motion
Week Number 2: Velocity analysis of machine components – instantaneous center method

Week Number 3: Acceleration analysis

Week Number 4: Acceleration analysis (Cont.)

Week Number 5: Dynamic force analysis – Dynamic bearing reactions

Week Number 6: Balancing of rotating masses

Week Number 7: Balancing of reciprocating masses (Cont.) - Quiz.

Week Number 8: Balancing of reciprocating masses (Cont.)

Week Number 9: Cams

Week Number 10: Cams (Cont.)

Week Number 11: Kinetic energy storage and flywheel

Week Number 12: Gear geometry and fundamental law of gearing - Quiz.

Week Number 13: Gear trains (conventional and epicyclic)

Week Number 14: Gear trains (conventional and epicyclic) (Cont.)

Week Number 15: Gyroscopic couples

Week Number 16: Final Examination
ME 356 - Machine Design (1)

Course Title: Machine Design (1)

Code: ME 356

Hours: Lecture – 2Hrs  Tutorial – 2Hrs  Credit – 3

Prerequisites: ME 252 and ME 276

GRADING

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

COURSE DESCRIPTION

The course includes the following:

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

TEXT BOOKS:


REFERENCE BOOKS


COURSE AIM

- To impart an appreciation of basic design considerations
- To give the students an awareness of the factors effecting design in relation to problems in the mechanical engineering applications

COURSE OBJECTIVES

To establish a common base for further progress in machine design
COURSE OUTLINE:

Week Number 1: Introduction
Week Number 2: Stresses in Machine Parts
Week Number 3: Stresses, Material selection, and Factor of Safety
Week Number 4: Application to design of machine elements
Week Number 5: Introduction to fatigue in metals
Week Number 6: Stress concentration and design of members subjected to fatigue loading
Week Number 7: Power screws types and applications - Quiz
Week Number 8: Bolted joints, brackets, and pressure vessels
Week Number 9: Welded and adhesive joints
Week Number 10: Welded joint applications
Week Number 11: Spring types and applications – Helical compression springs
Week Number 12: Design of differential types of springs - Quiz
Week Number 13: Miscellaneous design problems
Week Number 14: Miscellaneous design problems (Cont.)
Week Number 15: Revision
Week Number 16: Final Examination
ME 357 - Machine Design (2)

COURSE INFORMATION:

Course Title: Machine Design (2)

Code: ME 357

Hours: Lecture – 2Hrs  Tutorial – 2Hrs  Credit – 3

Prerequisites: ME 356

GRADING:

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION:

The course includes the following:


TEXT BOOKS:


REFERENCE BOOKS:

- Deutschman “Machine design”, Macmillan, latest edition

COURSE AIM:

As a continuation to the course of machine design (1), the aim is to provide sufficient and advanced understanding of machine design concept.

COURSE OBJECTIVES:

Is to enviable the student to be creative and capable of dealing with several Mechanical Engineering design problems
COURSE OUTLINE:

Week Number 1: Power transmission systems, Specifications of different types of belts (Belt selection)

Week Number 2: Belt selection (Cont.), Chains. Types and selection

Week Number 3: Wire Rope selection

Week Number 4: Gear types and spur gear force analysis

Week Number 5: Design of spur gears

Week Number 6: Helical gear force analysis

Week Number 7: Bevel and Worm Gears - Quiz

Week Number 8: Introduction to Anti-Friction Bearings

Week Number 9: Selection of Ball and Roller Bearings

Week Number 10: Introduction to sliding bearings

Week Number 11: Design and Selection of Sliding Bearings

Week Number 12: Design of shafts based on strength and rigidity - Quiz

Week Number 13: Design of shafts based on strength and rigidity (Cont.)

Week Number 14: Clutches and Brakes

Week Number 15: Clutches and Brakes (Cont.)

Week Number 16: Final Examination
ME 454 - Machine Design

COURSE INFORMATION

Course Title: Machine Design
Code: ME 454
Hours: Lecture: 2  Tutorial: 2  Credit: 3
Prerequisites: ME 252

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION

The course includes an introduction to stress in machine parts, screws, fasteners, welded joints, flexible mechanical elements (belts, chains & wire ropes), sliding bearings, roller bearings, spur gears, helical gears, bevel gears, worm gears, and shafts

TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

- To import an appreciation of basic design consideration
- To give students an awareness of the factors effecting design in relation to problem in engineering applications

COURSE OBJECTIVES

To provide sufficiently advanced understanding of machine design concept and to enable student to use creative in mechanical, marine and industrial applications

COURSE OUTLINE

Week Number 1: Introduction & Stresses in Machine Parts
Week Number 2: Stresses in Machine Parts
Week Number 3: Screws
Week Number 4: Fasteners and Connections
Week Number 5: Welded Joints
Week Number 6: Welded Joints
Week Number 7: Flexible Mechanical Elements - Quiz
Week Number 8: Flexible Mechanical Elements
Week Number 9: Sliding Bearing
Week Number 10: Sliding Bearings
Week Number 11: Roller Bearings
Week Number 12: Gears - Quiz
Week Number 13: Gears
Week Number 14: Gears
Week Number 15: Shafts
Week Number 16: Final Examination
ME 455 - Computer Aided Design

Course Information:

Course Title: Computer aided design
Code: ME 455
Hours: Lecture – 2Hrs  Tutorial – 4Hrs  Credit – 3
Prerequisites: ME 356 or ME 454

Grading:

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

Course Description:

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

Text Books:

CAD lecture notes

Reference Books:


Course Aim:

The aim of this course is to enable the student to know how to design, analyze and present various problems encountered in the field of mechanical engineering with enough accuracy and speed by the aid of the computer.
**COURSE OBJECTIVES:**

To help the student to cope with modern computer software available for mechanical and general engineering systems and element design.

**COURSE OUTLINE:**

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to computer aided drafting and analysis</td>
</tr>
<tr>
<td>2</td>
<td>Introduction to the software &quot;Solid Edge&quot;</td>
</tr>
<tr>
<td>3</td>
<td>Basics of solid 2D and 3D parametric modeling using Solid Edge</td>
</tr>
<tr>
<td>4</td>
<td>Solid Edge profile environment</td>
</tr>
<tr>
<td>5</td>
<td>Primary and treatment features with Solid Edge</td>
</tr>
<tr>
<td>6</td>
<td>Introduction to finite element analysis</td>
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<tr>
<td>7</td>
<td>The finite element software &quot;FEMAP&quot; - Quiz</td>
</tr>
<tr>
<td>8</td>
<td>&quot;FEMAP&quot; model and mech generation</td>
</tr>
<tr>
<td>9</td>
<td>Application to different machine element problems</td>
</tr>
<tr>
<td>10</td>
<td>MATLAB analysis and graphics</td>
</tr>
<tr>
<td>11</td>
<td>MATLAB analysis and graphics (Cont.)</td>
</tr>
<tr>
<td>12</td>
<td>Simulation of dynamic systems - Quiz</td>
</tr>
<tr>
<td>13</td>
<td>Application to different Mechanical, Hydraulic and Thermal systems (MATLAB 'Simulink')</td>
</tr>
<tr>
<td>14</td>
<td>Introduction to Optimization</td>
</tr>
<tr>
<td>15</td>
<td>System and element optimum design problems</td>
</tr>
<tr>
<td>16</td>
<td>Final examination</td>
</tr>
</tbody>
</table>
ME 458 - Mechanical Vibration

COURSE INFORMATION:

Course Title: Mechanical Vibration
Code: ME 458
Hours: Lecture –2Hrs. Tutorial –2Hrs. Credit – 3
Prerequisites: ME 355

GRADING:

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION:


TEXT BOOKS:


REFERENCE BOOKS:

- William Thomson, “Theory of vibrations and applications “, prentice Hall.

COURSE AIM:

To enable the student to recognize the importance and significance of the mechanical vibrations phenomena

COURSE OBJECTIVES:

To build up students capabilities to formulate and analyze problems of vibrations

COURSE OUTLINE:

Week Number 1: Introduction & Harmonic and periodic motions

Week Number 2: Equivalent systems
Week Number 3: Equivalent systems (cont.)

Week Number 4: Free vibrations of single degree of freedom systems

Week Number 5: Free vibrations of single degree of freedom systems (cont.)

Week Number 6: Forced vibrations of single degree of freedom systems

Week Number 7: Forced vibrations of single degree of freedom systems - Quiz.

Week Number 8: Transmissibility

Week Number 9: Vibration measurements

Week Number 10: Vibration measurements (Cont.)

Week Number 11: Vibration under general forcing conditions

Week Number 12: Two degree of freedom systems - Quiz.

Week Number 13: Two degree of freedom systems (cont.)

Week Number 14: Multi-degree of freedom systems (Eigen value and Eigen vector problems)

Week Number 15: Revision

Week Number 16: Final Examination
ME 555 - Material Handling Equipment

**COURSE INFORMATION**

Course Title: Material Handling Equipment

Code: ME 555

Hours: Lecture – 2 Hrs.  Tutorial – 2 Hrs.  Credit – 3

Prerequisites: 126 Credit Hours

**GRADING**

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

**COURSE DESCRIPTION**


**TEXT BOOKS**

None

**REFERENCE BOOKS**


**COURSE AIM**

The aim is to give the student information on material handling equipment, its role in production and application in engineering practice.

**COURSE OBJECTIVES**

To gain experience and familiarity with material handling equipment in general modern engineering fields.

**COURSE OUTLINE**

*Week Number 1:* Introduction to Hoisting Machinery

*Week Number 2:* Cranes (Types, Drives, and Design Considerations)
Week Number 3: Elevators (Drive, Design Considerations)
Week Number 4: Miscellaneous Types of Hoisting Machinery
Week Number 5: Introduction to Conveying Machinery
Week Number 6: Belt Conveyors
Week Number 7: Screw Conveyors - Quiz
Week Number 8: Bucket and Cradle Conveyors
Week Number 9: Introduction to Land Reclamation Machinery
Week Number 10: Loaders Theory and Practice
Week Number 11: Bulldozers Theory and Practice
Week Number 12: Shovels and Graders - Quiz
Week Number 13: Operation of the Various Types of Material Handling Machinery
Week Number 14: Maintenance of Material Handling Machinery
Week Number 15: Safety Measures for Different Types of Machinery
Week Number 16: Final Examination
ME 361 - Fluid Mechanics

COURSE INFORMATION:

Course Title: Fluid Mechanics
Code: ME 361
Hours: Lecture: 2    Tutorial: 2    Credit: 3
Prerequisites: 72 Credit Hour

GRADING:

Class Performance / Attendance 10%
Midterm # 1/ Assignments: (7th week) 30%
Midterm # 2/ Assignments: (12th week) 20%
Final Exam 40%

COURSE DESCRIPTION:


TEXT BOOKS:


REFERENCE BOOKS:


COURSE AIM:

The student acquires deep understanding of fluid mechanics fundamentals and basic knowledge in the field of hydraulic power systems. The course covers subjects essential to understanding the analysis design, and operation of fluid power systems.

COURSE OBJECTIVES:

Introduction to fluid mechanics-hydraulic fluid properties-hydrostatic-concepts of fluid and fundamental equations-Bernoulli's Equation and its applications-steady flow in pipes-hydraulic
circuit components (pumps, valves & actuators)-design and analysis of simple hydraulic circuits – applications

**COURSE OUTLINE:**

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Fluid Mechanics, Physical Properties of Fluids.</td>
</tr>
<tr>
<td>2</td>
<td>Fluid Static</td>
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<tr>
<td>3</td>
<td>Fluid Static</td>
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<tr>
<td>4</td>
<td>Concepts of Fluid Flow</td>
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<td>5</td>
<td>Energy Equation and its Applications</td>
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<tr>
<td>6</td>
<td>Energy Equation and its Applications</td>
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<tr>
<td>7</td>
<td>Steady Flow in Pipes - Quiz</td>
</tr>
<tr>
<td>8</td>
<td>Introduction to Fluid Power Systems</td>
</tr>
<tr>
<td>9</td>
<td>Hydraulic Pumps</td>
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<td>10</td>
<td>Hydraulic Pumps</td>
</tr>
<tr>
<td>11</td>
<td>Hydraulic Control Valves</td>
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<tr>
<td>12</td>
<td>Hydraulic Control Valves - Quiz</td>
</tr>
<tr>
<td>13</td>
<td>Hydraulic Cylinder Motor</td>
</tr>
<tr>
<td>14</td>
<td>Hydraulic Cylinder Motor</td>
</tr>
<tr>
<td>15</td>
<td>Applications (Hydraulic Cranes and Presses)</td>
</tr>
<tr>
<td>16</td>
<td>Final exam</td>
</tr>
</tbody>
</table>
ME 362 – Hydraulics

COURSE INFORMATION

Course Title: Hydraulics
Code: ME 362
Hours: Lecture – 2 Hrs. Tutorial – 2 Hrs. Credit – 3
Prerequisites: BA 114

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION

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

TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

The subject aims at providing the student with the fundamental knowledge of incompressible flow, and easily understanding the basic principle of hydrostatics and hydrodynamics.

COURSE OBJECTIVES

The course objective is to help acquiring good insight into the field of hydraulics in general.
## COURSE OUTLINE

<table>
<thead>
<tr>
<th>Week Number</th>
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</tr>
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<tbody>
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<td>1</td>
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</tr>
<tr>
<td>2</td>
<td>Physical properties of fluids</td>
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<tr>
<td>3</td>
<td>Fluid statics</td>
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<td>4</td>
<td>Forces on submerged surfaces and buoyancy</td>
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<tr>
<td>5</td>
<td>Introduction to fluids kinematics</td>
</tr>
<tr>
<td>6</td>
<td>Dynamics of incompressible flow</td>
</tr>
<tr>
<td>7</td>
<td>Flow Measurements - Quiz</td>
</tr>
<tr>
<td>8</td>
<td>Velocity measurement</td>
</tr>
<tr>
<td>9</td>
<td>Similitude and dimensional analysis</td>
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<tr>
<td>10</td>
<td>Similitude and dimensional analysis (Cont.)</td>
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<tr>
<td>11</td>
<td>Flow through pipes</td>
</tr>
<tr>
<td>12</td>
<td>Flow through pipes (Cont.) - Quiz</td>
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<tr>
<td>13</td>
<td>Pumps (Types)</td>
</tr>
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<td>14</td>
<td>Pumps (Performance)</td>
</tr>
<tr>
<td>15</td>
<td>Revision</td>
</tr>
<tr>
<td>16</td>
<td>Final Examination</td>
</tr>
</tbody>
</table>
ME 461 - Fluid Mechanics

Course Title: Fluid Mechanics
Code: ME 461
Hours: Lecture – 2 Hrs. Tutorial – 2 Hrs. Credit – 3
Prerequisites: ME 362

Grading

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

Course Description


Text Books


Reference Books


Course Aim

To enable the student to have a systematic and easily understood account of the basic principles of fluid Mechanics.

Course Objectives

To give a lucid and concise exposition of flow patterns, fluid forces and resistance to motion and applications of fluid flow theories to engineering problems.
Course Outline

Week Number 1: Differential analysis of fluid flow
Week Number 2: Kinematics of fluids flow
Week Number 3: Kinematics of fluids flow (Cont.)
Week Number 4: Linear Motion, Angular Motion and Deformation
Week Number 5: Conservation of Mass and Stream Function
Week Number 6: Velocity potential and irrotational flows
Week Number 7: General equations of motion (Navier-Stokes equations) - Quiz
Week Number 8: Euler’s equations of motion
Week Number 9: Basic two-dimensional potential flows
Week Number 10: Superposition of plane potential flows
Week Number 11: Introduction to compressible fluid flow
Week Number 12: Mach number and speed of sound - Quiz
Week Number 13: Isentropic and Non-isentropic flow of ideal gas
Week Number 14: Normal shock waves
Week Number 15: Revision
Week Number 16: Final Exam
ME 464 – Hydraulic Systems

COURSE INFORMATION

Course Title: Hydraulic Systems
Code: ME 464
Hours: Lecture – 2 Hrs. Tutorial – 2 Hrs. Credit – 3
Prerequisites: ME 362

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION


TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

The student will acquire deep understanding of the theoretical methods and practical techniques in the area of hydraulic power systems

COURSE OBJECTIVES

The student is introduced to the current technologies in the hydraulic power systems

COURSE OUTLINE

Week Number 1: Introduction to Fluid Power Systems
Week Number 2: Hydraulic Fluids and Transmission Lines
Week Number 3: Hydraulic Fluids and Transmission Lines

Week Number 4: Hydraulic Pumps

Week Number 5: Hydraulic Pumps

Week Number 6: Hydraulic Pumps

Week Number 7: Fluid Power Actuators (Cylinders, Rotary Actuators, Motors) - Quiz

Week Number 8: Fluid Power Actuators (Cylinders, Rotary Actuators, Motors)

Week Number 9: Control Components of Hydraulic Systems

Week Number 10: Control Components of Hydraulic Systems

Week Number 11: Control Components of Hydraulic Systems

Week Number 12: Accumulators and Pressure Intensifiers - Quiz

Week Number 13: Hydraulic Circuit Design and Analysis

Week Number 14: Hydraulic Circuit Design and Analysis

Week Number 15: Hydraulic Circuit Design and Analysis

Week Number 16: Final Examination
ME 465 - Computational Fluid Dynamics

COURSE INFORMATION:

Course Title: Computational Fluid Dynamics

Code: ME 464

Hours: Lecture: 2 Tutorial: 2 Credit: 3

Prerequisites: ME 461 and ME 431

GRADING:

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION:


TEXT BOOKS:

Computational Fluid Dynamics Lecture notes

REFERENCE BOOKS:


COURSE AIM:

The aim of this course is to provide good understanding of computational fluid dynamic techniques using the finite difference, finite element and finite volume methods and to assure familiarity with modern computer software.

COURSE OBJECTIVES:

The course enables the student to study, analyze and present various problems in the field of thermofluids by the aid of various computer software.
COURSE OUTLINE:

***Week Number 1***: Introduction to Computational Fluid Dynamics

***Week Number 2***: The Finite Difference Method (FDM)

***Week Number 3***: The Finite Difference Method (FDM) (Cont.)

***Week Number 4***: Solution of inviscid flow problems using the FDM with MATLAB

***Week Number 5***: Solution of viscous flow problems using the FDM with MATLAB

***Week Number 6***: The Finite Element Method (FEM)

***Week Number 7***: Solution of fluid flow problems using the FEM with MATLAB (PDE Tool) - Quiz

***Week Number 8***: Solution of fluid flow problems using the FEM with MATLAB (PDE Tool) (Cont.)

***Week Number 9***: The Finite Volume Method (FVM)

***Week Number 10***: Solution of fluid flow problems using the FVM with MATLAB

***Week Number 11***: Solution of fluid flow problems using the FVM with MATLAB (Cont.)

***Week Number 12***: Thermofluid problems using the software FLUENT - Quiz

***Week Number 13***: Mesh Generation using the Software Gambit

***Week Number 14***: Examples using the FLUENT solver

***Week Number 15***: Examples using the FLUENT solver (Cont.)

***Week Number 16***: Final Exam
ME 565 – Turbomachinery

COURSE INFORMATION

Course Title: Turbomachinery
Code: ME 525
Hours: Lecture – 2 Hrs. Tutorial – 2 Hrs. Credit – 3
Prerequisites: ME 461

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION

Various types of turbo-machines, from wind turbines to high-ratio compressors. Compressible flow turbo-machines and their characteristics. Emphasis on practical design and performance parameter. Theory, practice and educational of turbine Components

TEXT BOOKS:


REFERENCE BOOKS


COURSE AIM

Study different types of pumps, compressors, and turbines to evaluate their characteristics and performance.

COURSE OBJECTIVES

- The student is introduced to different types of turbomachinery.
- The student can determine the performance of different types of turbomachinery.

COURSE OUTLINE

Week Number 1: Main Types of Turbomachines and Performance Basic Laws
Week Number 2: Main Types of Turbomachines and Performance Basic Laws

Week Number 3: Dimensional Analysis and Model Testing

Week Number 4: Dimensional Analysis and Model Testing

Week Number 5: Hydraulic Pumps (Centrifugal and Axial Pumps)

Week Number 6: Hydraulic Pumps (Centrifugal and Axial Pumps)

Week Number 7: Hydraulic Pumps (Centrifugal and Axial Pumps) - Quiz

Week Number 8: Hydraulic Turbines

Week Number 9: Hydraulic Turbines

Week Number 10: Hydraulic Turbines

Week Number 11: Centrifugal Compressors and Fans

Week Number 12: Centrifugal Compressors and Fans - Quiz

Week Number 13: Centrifugal Compressors and Fans

Week Number 14: Axial Compressors and Fans

Week Number 15: Axial Compressors and Fans

Week Number 16: Final Examination
Materials Science Courses – (ME X7X)

ME 274 - Materials Science

**COURSE INFORMATION:**

Course Title: Material Science

Code: ME 274

Hours: Lecture – 2Hrs  Tutorial – 2Hrs  Credit – 3

Prerequisites: BA 114 & BA 142

**GRADING:**

- Class Performance/Attendance: 10%
- Midterm # 1/Assignments – (7th Week): 30%
- Midterm # 2/Assignments – (12th Week): 20%
- Final Exam: 40%

**COURSE DESCRIPTION:**


**TEXT BOOKS:**


**REFERENCE BOOKS:**

- B.Hull & V. John “Non-Destructive testing “, Macmillan ,1988

**COURSE AIM:**

To give the student a sound background in the science of Engineering materials

**COURSE OBJECTIVES:**

To cover the relationship between the structure & properties of engineering materials. How to modify the structure to achieve specific properties with emphasis on some typical applications.
COURSE OUTLINE:

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Topic</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Classification of Engineering Materials – General Introduction</td>
</tr>
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<td>2</td>
<td>Atomic Bonding in Solids</td>
</tr>
<tr>
<td>3</td>
<td>The Crystalline Structure of Materials</td>
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<tr>
<td>4</td>
<td>The Crystalline Structure of Materials</td>
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<tr>
<td>5</td>
<td>The Crystalline Structure of Materials</td>
</tr>
<tr>
<td>6</td>
<td>Properties, Testing, and Inspection of Engineering Materials</td>
</tr>
<tr>
<td>8</td>
<td>Properties, Testing, and Inspection of Engineering Materials</td>
</tr>
<tr>
<td>9</td>
<td>Introduction to Thermal Equilibrium Diagrams</td>
</tr>
<tr>
<td>10</td>
<td>Introduction to Thermal Equilibrium Diagrams</td>
</tr>
<tr>
<td>11</td>
<td>Non-Destructive Testing</td>
</tr>
<tr>
<td>12</td>
<td>Heat Treatment of Metals - Quiz.</td>
</tr>
<tr>
<td>13</td>
<td>Heat Treatment of Metals</td>
</tr>
<tr>
<td>14</td>
<td>Corrosion: An Introduction</td>
</tr>
<tr>
<td>15</td>
<td>General Revision</td>
</tr>
<tr>
<td>16</td>
<td>Final Examination</td>
</tr>
</tbody>
</table>
ME 276 - Stress Analysis

COURSE INFORMATION:

Course Title: Stress Analysis

Code: ME 276

Hours: Lecture: 2  Tutorial: 2  Credit: 3

Prerequisites: ME 274

GRADING:

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION:

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

TEXT BOOKS:


REFERENCE BOOKS:


COURSE AIM:

To present the advanced concepts and modern techniques of stress and strain analysis with applications to various mechanical components and structures and to introduce the students to the modern experimental techniques in stress analysis.
COURSE OBJECTIVES:

To develop ability to calculate normal forces, shearing forces and bending moments in members subjected to various types of loadings. The course enables the students to determine different types of stresses in different members and to calculate the deflection and buckling of beams and columns.

COURSE OUTLINE:

Week Number 1: Introduction to the concept of stress and strain: Normal stresses and strains.
Week Number 2: Shear stresses, shearing strains and bearing stresses.
Week Number 3: Shear stresses and deformations due to torsion.
Week Number 4: Normal forces, shearing forces and bending moments in beams.
Week Number 5: Stresses due to bending.
Week Number 6: Stress and strain transformations: Introduction.
Week Number 7: Stress and strain transformations: Principal stresses and planes and Mohr's circle of stress - Quiz
Week Number 8: Maximum shear stress, yield criteria, analysis of strain.
Week Number 9: Analysis of stresses in thin walled and thick walled pressure cylinders.
Week Number 10: Stress concentration in machine elements.
Week Number 11: Experimental stress analysis: strain gauges.
Week Number 12: Deflection due to bending: Double integration - Quiz
Week Number 13: Deflection due to bending: Strain energy and Castigiano's method.
Week Number 14: Buckling of columns: Euler equation.
Week Number 15: Buckling of columns: Eccentric loading of slender columns.
Week Number 16: Final Exam
ME 277 - Strength of Materials

COURSE INFORMATION:

Course Title: Strength of Materials
Code: ME 277
Hours: Lecture: 2, Tutorial: 2, Credit: 3
Prerequisites: ME 274

GRADING:

Class Performance / Attendance: 10%
Midterm # 1/ Assignments: (7th week): 30%
Midterm # 2/ Assignments: (12th week): 20%
Final Exam: 40%

COURSE DESCRIPTION

Direct stresses, tension stress, compression stress, shear stress deformation and strain. Simple beams and cantilevers, normal force, shearing force and bending moment diagrams – Bending theory, bending stress, shear stress in beams – Torsion stress & deformation – Statically indeterminate axial members - Computer applications

TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

To cover the calculations of various types of stresses and related deformations and strains for beams, trusses, structural and mechanical components under different loading conditions.

COURSE OBJECTIVES

Ability to calculate and sketch normal force, shear force and bending moment diagrams and determine stresses and strains in beams and simple structural members subjected to various types of loading.
COURSE OUTLINE

Week Number 1: Review of Units, Static.

Week Number 2: Supports Reactions and Internal Forces.

Week Number 3: Types of Beams, Normal Force and Shear Force Diagrams.

Week Number 4: Shear Force Diagrams

Week Number 5: Bending Moment Diagrams

Week Number 6: SFD and BMD for Linearly Varying Distributed Loads.

Week Number 7: Introduction to Stresses and Strains, Simple Normal and Simple Shear - Quiz.

Week Number 8: Direct Normal and Shear stresses.

Week Number 9: Bending Theory and Bending Stresses

Week Number 10: Stresses Due to Unsymmetrical Bending

Week Number 11: Transverse Shear Stress.

Week Number 12: Introduction to Torsion in Shafts - Quiz.

Week Number 13: Stresses and Deformation Due to Torsion

Week Number 14: Strain and Deformation Due to Axial Loads.

Week Number 15: Statically Indeterminate Axial Members.

Week Number 16: Final Examination
Automotive & Internal Combustion Engines Courses – (ME X8X)

ME 381 – Internal Combustion Engines (1)

Course Title: Internal Combustion Engines (1)
Code: ME 381
Hours: Lecture – 2Hrs. Tutorial – 4Hrs. Credit – 3
Prerequisites: ME 232

GRADING

Midterm # 1/ Assignments: (7th week) 40%
Midterm # 2/ Assignments: (12th week) 30%
Class Performance / Attendance 10%
Final Exam 20%

COURSE DESCRIPTION

Study of theoretical and operating cycles, construction aspects of engines, combustion in the spark ignition engines, carburetor, injection systems, ignition systems, combustion chamber design, lubricating systems, cooling systems, and lubrication engine performance analysis. Natural gas and hydrogen engines. Hands-on laboratory work is an integral part of this course.

TEXT BOOKS

Davis N. Dales, “Automotive Electronics and Engine” Frank J. THIESSEN, Performance 1995

REFERENCE BOOKS


COURSE AIM

To enable students to visualize the different type of S.I.E. and their components – Basic knowledge of fundamentals, constructions engine systems and operation.

COURSE OBJECTIVES

Providing the students with the basic information’s about performance – operation – maintenance of S.I.E.

COURSE OUTLINE

Week Number 1: Modern Development in SIE – Classification of ICE – Heat Balance
Week Number 2: Air Standard Cycles Applied to ICE
Week Number 3: Analysis of Actual Cycle
Week Number 4: Combustion in SIE
Week Number 5: Carburetor Performance
Week Number 6: Carburetor Calculations and Fuel Injection
Week Number 7: 7th Week Exam
Week Number 8: Ignition System
Week Number 9: Engine Friction
Week Number 10: Engine Lubrication
Week Number 11: Engine Cooling
Week Number 12: Engine Test
Week Number 13: Engine Performance
Week Number 14: Engine Performance
Week Number 15: Review
Week Number 16: Final Examination
ME 382 - Internal Combustion Engines (2)

Course Title: Internal Combustion Engines (2)
Code: ME 382
Hours: Lecture – 2Hrs. Tutorial – 2Hrs. Credit – 3
Prerequisites: ME 381.

Grading

Midterm # 1/ Assignments: (7th week) 40%
Midterm # 2/ Assignments: (12th week) 30%
Class Performance / Attendance 10%
Final Exam 20%

Course Description

Comparison of characteristics and performance of several forms of internal combustion engines including the Otto, and Diesel types of piston engines (LHR Engines – Dual Fuel Engines). Construction aspects of engines, air-intake, exhaust and supercharging systems, fuels, fuel injection systems, lubricating systems, cooling systems, starting systems combustion, diesel knocking, engine performance and heat balance analysis, operation and fault management. Hands on laboratory diesel work are an integral part of this course.

Text Books


Reference Books

William K. Tobold, ” Diesel Fundamentals, service, repair”, latest edition, the Goreadheart, willeax company Inc.

Course Aim

The course aims to provide students with practical and theoretical knowledge about diesel engines.

Course Objectives

- To enable students to visualize the different types of engine and their components.
- To provide the students with basic knowledge of fundamentals, construction and operation of diesel engines.
COURSE OUTLINE

Week Number 1: Introduction to D.E.
Week Number 2: Analysis of Actual Cycle of Diesel Engine Using “El Chelberg Chart”
Week Number 3: Analysis of Actual Cycle of D.E. Using “El Chellberg Chart”
Week Number 4: Charging and Scavenging Process
Week Number 5: Combustion Process in D.E.
Week Number 6: Combustion Process in D.E.
Week Number 7: Fuel Injection System
Week Number 8: 7th Week Exam
Week Number 9: Cooling System
Week Number 10: Starting System
Week Number 11: Lubrication System
Week Number 12: Super Charging - 12th Week Exam
Week Number 13: Supper Charging
Week Number 14: Engine Operating Characteristics
Week Number 15: Revision
Week Number 16: Final examination
ME 481 – Automotive Technology

Course Title: Automotive Technology

Code: ME 481


Prerequisites: ME 381.

GRADING

Midterm # 1/ Assignments: (7th week) 40%
Midterm # 2/ Assignments: (12th week) 30%
Class Performance / Attendance 10%
Final Exam 20%

COURSE DESCRIPTION

Engine construction, engine systems, exhaust and emission control systems, suspension and steering systems, brakes, clutches, transmission systems, tires, heating and air conditioning systems, safety systems.

TEXT BOOKS

Lecture notes.

REFERENCE BOOKS

- Martin W. Stockel, "Auto Mechanics Fundamentals"
- Julian Happian Smith, "An Introduction to Modern Vehicle Design".
- William k. Toboldt & Larry Johnson “Automotive Encyclopedia”

COURSE AIM

To provide the student with a comprehensive overview on the various elements of automotive technology.

COURSE OBJECTIVES

The student should be able to:

- Identify the different systems of the motor car.
- Understand the theory and operation of each system
COURSE OUTLINE

Week Number 1: Introduction, history of automotive industry, automotive tools & measuring instruments

Week Number 2: Engine construction

Week Number 3: Engine lubrication

Week Number 4: Engine cooling systems

Week Number 5: Engine fuel systems

Week Number 6: Engine electrical systems

Week Number 7: Engine ignition systems - Quiz

Week Number 8: Exhaust and emission control systems

Week Number 9: Suspension and steering systems

Week Number 10: Automotive brakes

Week Number 11: Clutches

Week Number 12: Transmission systems - Quiz

Week Number 13: Tires

Week Number 14: Heating and air conditioning systems

Week Number 15: Safety systems

Week Number 16: Final Examination.
ME 482 – Automotive Engines

**Course Information**

Course Title: Automotive Engines  
Code: ME 482  
Prerequisites: ME 382.

**Grading**

Midterm # 1/ Assignments: (7th week) 40%  
Midterm # 2/ Assignments: (12th week) 30%  
Class Performance / Attendance 10%  
Final Exam 20%

**Course Description**


**Text Books**

Lecture notes

**Reference Books**


**Course Aim**

To give the student the detailed technical information relating to the design, operation and maintenance of gasoline and diesel engines.

**Course Objectives**

The student will have the knowledge and skill to:

- Understand the different systems of the engine.  
- Be familiar with methods of testing and diagnosis.  
- Perform maintenance and repair operations for the engine components.
COURSE OUTLINE

Week Number 1: Gasoline engine operation
Week Number 2: Gasoline engine operation
Week Number 3: Diesel engine operation
Week Number 4: Diesel engine operation
Week Number 5: Cooling system operation and diagnosis
Week Number 6: Lubrication system operation and diagnosis
Week Number 7: Starting and charging system diagnosis - Quiz
Week Number 8: Ignition system operation and diagnosis
Week Number 9: Gasoline fuel and emission control systems
Week Number 10: Diesel fuel and emission control systems
Week Number 11: Engine condition diagnosis
Week Number 12: Engine condition diagnosis (cont.) - Quiz
Week Number 13: Engine removal and disassembly
Week Number 14: Engine service and assembly
Week Number 15: Engine installation and in-vehicle service
Week Number 16: Final Examination
ME 483 – Alternative Fuels and Power Systems

C O U R S E  I N F O R M A T I O N

Course Title: Alternative Fuels and Power Systems
Code: ME 483
Prerequisites: ME 382.

G R A D I N G

Midterm # 1/ Assignments: (7th week)  40%
Midterm # 2/ Assignments: (12th week)  30%
Class Performance / Attendance  10%
Final Exam  20%

C O U R S E  D E S C R I P T I O N


T E X T  B O O K S

Lecture notes

R E F E R E N C E  B O O K S

- Ron Hodkinson, John Fenton, Light weight electric/ hybrid vehicle design”
- M.L. Poulton, “Alternative fuels for road vehicles”
- M.L. Poulton, “Alternative Engines for road vehicles”

C O U R S E  A I M

To present the latest technologies regarding the various alternative fuels used and the different power systems which can be applied for modern motor cars.

C O U R S E  O B J E C T I V E S

The student should have the ability to:

- Understand the theory and operation of the various forms, power systems using alternative fuels.
- Compare and discuss the relative advantages and disadvantages, costs and the suitable applications for each system
**Course Outline**

*Week Number 1:* Methanol  
*Week Number 2:* Methanol (cont.)  
*Week Number 3:* Ethanol  
*Week Number 4:* Bio-diesel and vegetable oils  
*Week Number 5:* Liquefied petroleum gas  
*Week Number 6:* Liquefied petroleum gas (cont.)  
*Week Number 7:* Natural gas + 7th week exam  
*Week Number 8:* Natural gas (cont.)  
*Week Number 9:* Hydrogen  
*Week Number 10:* Wankel rotary engine  
*Week Number 11:* Gas turbines  
*Week Number 12:* Electric vehicles + 12th week exam  
*Week Number 13:* Electric vehicles (cont.)  
*Week Number 14:* Hybrid vehicles  
*Week Number 15:* Hybrid vehicles (cont.)  
*Week Number 16:* Final Examination
ME 581 – Automotive fuel and Ignition Systems

COURSE INFORMATION

Course Title: Automotive fuel and Ignition Systems
Code: ME 581
Prerequisites: ME 481.

GRADING

Midterm # 1/ Assignments: (7th week) 40%
Midterm # 2/ Assignments: (12th week) 30%
Class Performance / Attendance 10%
Final Exam 20%

COURSE DESCRIPTION


TEXT BOOKS

Lecture notes

REFERENCE BOOKS

- William k. Toboldt & Larry Johnson “Automotive Encyclopedia”

COURSE AIM

To present the latest technologies regarding the various alternative fuels used and the different power systems which can be applied for modern motor cars.

COURSE OBJECTIVES

The student will be capable of:

- Understanding the theory and operation of the different equipment and components of both the fuel and ignition systems.
- Performing basic tests and service operations for the different components.
COURSE OUTLINE

Week Number 1: Automotive fuels
Week Number 2: Principles of carburetor operation, Carburetor circuits.
Week Number 3: Types of carburetors, Manual and automatic chokes
Week Number 4: Engine manifolds, Air filters
Week Number 5: Carburetor adjustment and service
Week Number 6: Fuel supply systems
Week Number 7: Fuel injection + 7th week exam
Week Number 8: Fuel injection (cont.)
Week Number 9: Ignition coils, Ignition condensers.
Week Number 10: Ignition distributors
Week Number 11: Spark advance
Week Number 12: Distributor service + 12th week exam
Week Number 13: Spark plugs
Week Number 14: Electronics ignition
Week Number 15: Electronics ignition (cont.)
Week Number 16: Final Examination
### Course Information

**Course Title:** Automotive Chassis Systems  
**Code:** ME 581  
**Hours:** Lecture – 2Hrs.  
**Credit:** 3.  
**Prerequisites:** ME 481.

### Grading

- Midterm # 1/ Assignments: (7th week) 40%  
- Midterm # 2/ Assignments: (12th week) 30%  
- Class Performance / Attendance 10%  
- Final Exam 20%

### Course Description


### Text Books

- Lecture notes.

### Reference Books

- J. Reimpell & H. Stoll, "The Automotive Chassis: Engineering principles"

### Course Aim

To cover in detail all the technical aspects regarding the various components of the automotive chassis systems.

### Course Objectives

The student will have the technical background and the necessary information skills to:

- Understand the theory and operation of the different chassis systems.  
- Perform tests, diagnosis and repair work for the components of the systems.
**Course Outline**

- **Week Number 1**: Engine clutches
- **Week Number 2**: Engine clutches (cont.)
- **Week Number 3**: Manual transmission
- **Week Number 4**: Automatic transmission
- **Week Number 5**: Propeller shaft and differential carrier
- **Week Number 6**: Types of drive and suspension
- **Week Number 7**: Front axle and front suspension + 7th week exam
- **Week Number 8**: Front axle and front suspension (cont.)
- **Week Number 9**: Rear axle and rear suspension
- **Week Number 10**: Rear axle and rear suspension (cont.)
- **Week Number 11**: Brake systems
- **Week Number 12**: Brake systems (cont.) + 12th week exam
- **Week Number 13**: Wheels and tires
- **Week Number 14**: Steering systems
- **Week Number 15**: Steering systems (cont.)
- **Week Number 16**: Final Examination
ME 583 – Vehicle Control and Safety Systems

COURSE INFORMATION

Course Title: Vehicle Control and Safety Systems
Code: ME 583
Prerequisites: ME 481.

GRADING

Midterm # 1/ Assignments: (7th week)  40%
Midterm # 2/ Assignments: (12th week)  30%
Class Performance / Attendance  10%
Final Exam  20%

COURSE DESCRIPTION


TEXT BOOKS

Lecture notes

REFERENCE BOOKS


COURSE AIM

To present the theory, principle of operation and application of the various modern automotive control and safety systems.

COURSE OBJECTIVES

The student will have the technical background and the necessary information and skills to:

- Understand the functions and operation of the automotive control and safety systems
- Be familiar with the safety requirements and emission control regulations
- Select and specify systems and equipment according to the recognized standards to achieve adequate safety requirements.

**COURSE OUTLINE**

*Week Number 1:* Automotive control systems, Modelling of dynamic systems
*Week Number 2:* Basic Control actions, Hydraulic and Pneumatic controllers
*Week Number 3:* Engine management systems, Cruise control
*Week Number 4:* Antilock brake systems
*Week Number 5:* Crash avoidance systems
*Week Number 6:* Smart air bags
*Week Number 7:* Vehicle dynamic control, Anti slip control + 7th week exam
*Week Number 8:* Active and semi-active suspension
*Week Number 9:* Automatic gear box control
*Week Number 10:* Traction control system
*Week Number 11:* Restraint system electronics
*Week Number 12:* Parking aids, Vision enhancement systems + 12th week exam
*Week Number 13:* Intelligent vehicle diagnostics, On-board navigation systems
*Week Number 14:* Safety requirements related to impact, Fire hazards
*Week Number 15:* Regulations related to emission control.
*Week Number 16:* Final Examination
ME 584 - Automotive Electric & Electronic Systems

Course Title: Mechanical Engineering
Code: ME 584
Prerequisites: ME 481

GRADING

Midterm # 1/ Assignments: (7th week) 40%
Midterm # 2/ Assignments: (12th week) 30%
Class Performance / Attendance 10%
Final Exam 20%

COURSE DESCRIPTION


TEXT BOOKS

Lecture notes

REFERENCE BOOKS

- William k. Toboldt & Larry Johnson “Automotive Encyclopedia”

COURSE AIM

To discuss in detail the theory and operation of the different equipment and systems covering both automotive electric and electronic applications

COURSE OBJECTIVES

The student will have the skills and ability to:
Deal with the electric and electronic systems and components.
Perform necessary tests, diagnosis, maintenance and repair operations efficiently

Course Outline

*Week Number 1:* Direct current generator, generator regulators  
*Week Number 2:* The alternator, Alternator regulators  
*Week Number 3:* Generator and alternator testing and servicing  
*Week Number 4:* Starting motor, starter service.  
*Week Number 5:* Storage batteries  
*Week Number 6:* Storage batteries (cont.)  
*Week Number 7:* Body electrical wiring, Lighting system & signal lamp system + 7th week exam  
*Week Number 8:* Meters and gauges  
*Week Number 9:* Meters and gauges (cont.)  
*Week Number 10:* Ignition switch and steering lock, wind shield wipers and washers  
*Week Number 11:* Engine management systems, Cruise control  
*Week Number 12:* Anti- Lock brake system (ABS), Electronic traction support (ETS), Acceleration ship regulation (ASR) + 12th week exam  
*Week Number 13:* Electronic stability programme (ESP), Adaptive damping system (ADS)  
*Week Number 14:* Parking aids, Vision enhancement systems  
*Week Number 15:* Intelligent vehicle diagnostics  
*Week Number 16:* Final Examination.
ME 585 – Automotive Power Trains

COURSE INFORMATION

Course Title: Automotive Power Trains
Code: ME 585
Prerequisites: ME 481

GRADING

Midterm # 1/ Assignments: (7th week) 40%
Midterm # 2/ Assignments: (12th week) 30%
Class Performance / Attendance 10%
Final Exam 20%

COURSE DESCRIPTION


TEXT BOOKS

Lecture notes

REFERENCE BOOKS

- William k. Toboldt & Larry Johnson “Automotive Encyclopedia”
- Martin W. Stockel, "Auto Mechanics Fundamentals"
- Heinz Heisler, Vehicle and Engine Technology, Arnold, Hodder Headline Group, 1999

COURSE AIM

To provide the student with technical information and skills covering the theory and operation of clutches, transmission systems and drive shafts and their components.

COURSE OBJECTIVES

The student will be capable of:

- Understanding the principles and theory of operation of the different elements of automotive power trains.
Diagnosing the defects and problems, performing maintenance and repair operations for the components of the automotive power trains.

**COURSE OUTLINE**

*Week Number 1:* Automotive Clutches

*Week Number 2:* Transmission fundamentals, Torque multiplication, Transmission gears, Gear ratios

*Week Number 3:* Manual transmission, Transmission construction and operation

*Week Number 4:* Transmission construction and operation (cont.)

*Week Number 5:* Synchronizing mechanism

*Week Number 6:* Transmission overdrives, Overdrive construction and operation

*Week Number 7:* Automatic transmissions, Hydraulic and mechanical principles of automatic transmission, Fluid coupling, Torque Converter

*Week Number 8:* Construction and operation of automatic transmission

*Week Number 9:* Transaxle transmission

*Week Number 10:* Drive lines, Propeller shaft, Universal joints

*Week Number 11:* Rear axle assembling

*Week Number 12:* Automotive differentials + 12th week exam

*Week Number 13:* Four-wheel drive, Four-wheel drive applications

*Week Number 14:* Maintenance and repair operations of power trains

*Week Number 15:* Maintenance and repair operations of power trains (cont.)

*Week Number 16:* Final Examination.
ME 586 – Vehicle Design and Engineering

**COURSE INFORMATION**

Course Title: Vehicle Design and Engineering  
Code: ME 586  
Hours: Lecture – 2 Hrs.  
Tutorial – 2 Hrs.  
Credit – 3  
Prerequisites: ME 481

**GRADING**

Midterm # 1/ Assignments: (7th week) 40%  
Midterm # 2/ Assignments: (12th week) 30%  
Class Performance / Attendance 10%  
Final Exam 20%

**COURSE DESCRIPTION**


**TEXT BOOKS**

Lecture notes.

**REFERENCE BOOKS**

- Julian Happian, Smith “An Introduction to Modern Vehicle Design”  
- Ron Hodkinson, John Fenton, “Light Weight Electric/ Hybrid Vehicle Design”

**COURSE AIM**

To provide the student with comprehensive and in depth information covering the latest techniques of vehicle body and chassis systems analysis and design.

**COURSE OBJECTIVES**

The student should acquire the technical background and the necessary skills to:

- Perform body design work  
- Perform design and analysis work for the main components of the vehicle chassis
COURSE OUTLINE

*Week Number 1:* Modern materials and vehicle design
*Week Number 2:* Body design: The styling process
*Week Number 3:* Body design: The styling process (cont.)
*Week Number 4:* Body design: Aerodynamics
*Week Number 5:* Body design: Aerodynamics (cont.)
*Week Number 6:* Chassis design and analysis
*Week Number 7:* 7th week exam + Chassis design and analysis (cont.)
*Week Number 8:* Crash worthiness
*Week Number 9:* Noise, vibration and harshness
*Week Number 10:* Occupant accommodation
*Week Number 11:* Suspension systems and components
*Week Number 12:* 12th week exam + Control systems in vehicles
*Week Number 13:* The design of engine characteristics for vehicle use
*Week Number 14:* Transmissions and driveline
*Week Number 15:* Braking systems
*Week Number 16:* Final Examination
ME 587 – Automotive Manufacturing

COURSE INFORMATION

Course Title: Automotive Manufacturing
Code: ME 587
Prerequisites: ME 481

GRADING

Midterm # 1/ Assignments: (7th week) 40%
Midterm # 2/ Assignments: (12th week) 30%
Class Performance / Attendance 10%
Final Exam 20%

COURSE DESCRIPTION


TEXT BOOKS

Lecture notes.

REFERENCE BOOKS

 Ron Hodkinson, John Fenton, “Light Weight Electric/ Hybrid Vehicle Design”
 William k. Toboldt & Larry Johnson “Automotive Encyclopedia”

COURSE AIM

To present the various aspects of automotive manufacturing technology starting from materials selection to the design and management of production and assembly lines.

COURSE OBJECTIVES

The student should be able to:

 Identify the proper material used for a particular application
 Understand the layout and design of production and assembly lines
 Acquire the basic information relating to the economics of manufacturing and assembly operations
COURSE OUTLINE

Week Number 1: Structure and manufacturing technology of automotive materials.
Week Number 2: Mechanical and physical properties of automotive materials
Week Number 3: Materials selection for automotive components
Week Number 4: Lightweight construction materials and techniques
Week Number 5: Design to manufacture as a single process
Week Number 6: Manufacturing analysis, tools and methods
Week Number 7: 7th week exam + Manufacturing and assembly processes
Week Number 8: Manufacturing and assembly processes (cont.)
Week Number 9: Assembly lines
Week Number 10: Assembly lines (cont.)
Week Number 11: Design of production lines
Week Number 12: 12th week exam + Quality control and inspection
Week Number 13: Testing and failure prediction and avoidance
Week Number 14: Testing of the final product
Week Number 15: Economics of manufacturing and assembly operations
Week Number 16: Final Examination
ME 588 – Vehicle Maintenance & Repair

Course Information

Course Title: Vehicle Maintenance
Code: ME 588
Hours: Lecture – 2Hrs., Tutorial – 2Hrs., Credit – 3.
Prerequisites: ME 481.

Grading

Midterm # 1/ Assignments: (7th week) 40%
Midterm # 2/ Assignments: (12th week) 30%
Class Performance / Attendance 10%
Final Exam 20%

Course Description


Text Books

Lecture notes.

Reference Books

- William k. Toboldt & Larry Johnson “Automotive Encyclopaedia”

Course Aim

To cover the different maintenance and repair operations for the engine and its auxiliary equipment, maintenance of the chassis systems and the vehicle body.

Course Objectives

The student should be able to:

- Discuss proper maintenance schedules
- Understand the different maintenance and repair operations for the engine auxiliary systems and the body.
- Gain basic information regarding the management of auto-service centers
<table>
<thead>
<tr>
<th>Week Number</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Maintenance schedules, workshop layout and planning</td>
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<td>2</td>
<td>Automotive tools, measuring instruments, testers and analyzers</td>
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<td>3</td>
<td>Tests to evaluate engine performance</td>
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<td>4</td>
<td>Engine reconditioning and tune-up</td>
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<td>5</td>
<td>Engine reconditioning and tune-up (cont.)</td>
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<td>6</td>
<td>Fault diagnosis, maintenance and repair for: Fuel system components</td>
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<td>7</td>
<td>7th week exam + Ignition system</td>
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<td>8</td>
<td>Charging system, starting system</td>
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<td>9</td>
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<td>13</td>
<td>Body repairing and refinishing (cont.)</td>
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<td>14</td>
<td>Body repairing and refinishing (cont.)</td>
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<td>15</td>
<td>Management of out-service and repair centres</td>
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<td>16</td>
<td>Final Examination</td>
</tr>
</tbody>
</table>
Course Title: Mechatronics
Code: ME 591
Hours: Lecture – 2Hrs   Tutorial – 2Hrs   Credit – 3
Prerequisites: CC 442

Class Performance / Attendance 10%
Midterm # 1/ Assignments: (7th week) 30%
Midterm # 2/ Assignments: (12th week) 20%
Final Exam 40%

Introduction to Mechatronics and measurement instruments and systems-sensors and transducers temperature sensing devices. Actuating devices analog signal processing and digital circuits and systems. Analog digital and digital to analog conversion data acquisition system and applications.


To teach students the principles of and techniques of Mechatronics Engineering

- Understand the basic principles of Mechatronics and Measurement systems,
- Provide a review of basic electrical relations, circuit element and circuit analysis,
- Provide an overview of the sensors, amplifiers, conditioning circuits, and actuators, and
- Understand the Data Acquisition Systems (DAS).
COURSE OUTLINE:

<table>
<thead>
<tr>
<th>Week Number 1:</th>
<th>Introduction to Mechatronics and Measurement Systems</th>
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<tbody>
<tr>
<td>Week Number 2:</td>
<td>Mechatronics Key Elements</td>
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<td>Week Number 3:</td>
<td>Introduction to Sensors and Transducers</td>
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<td>Week Number 4:</td>
<td>Position and Motion Sensors</td>
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<td>Week Number 5:</td>
<td>Temperature Sensing Devices</td>
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<td>Week Number 6:</td>
<td>Pressure, Flow, Stress, and Strain Sensors</td>
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<td>Week Number 8:</td>
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<td>Week Number 14:</td>
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<td>Week Number 15:</td>
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<td>Week Number 16:</td>
<td>Final examination</td>
</tr>
</tbody>
</table>
ME 592 - Mechatronics Systems

COURSE INFORMATION:

Course Title: Mechatronics Systems
Code: ME 529
Hours: Lecture – 2 Hrs. Tutorial – 2 Hrs. Credit – 3
Prerequisites: ME 591

GRADING:

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION:


TEXT BOOKS:


REFERENCE BOOKS:


COURSE AIM:

To provide students with an overview of Mechatronics design process and a general description of the technologies employed in the Mechatronics approaches.

COURSE OBJECTIVES:

- Understand and analyze the Mechatronics systems,
- Introducing the key elements, techniques, control, and design process user for Mechatronics system design,
- Study the important components Data Acquisition Systems (DAS).
**COURSE OUTLINE:**

<table>
<thead>
<tr>
<th>Week Number 1:</th>
<th>Introduction to Mechatronics Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week Number 2:</td>
<td>Mechatronics of System Performance</td>
</tr>
<tr>
<td>Week Number 3:</td>
<td>Computer Control</td>
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<tr>
<td>Week Number 4:</td>
<td>Z-transform</td>
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<tr>
<td>Week Number 5:</td>
<td>Discrete Controllers I</td>
</tr>
<tr>
<td>Week Number 6:</td>
<td>Discrete Controllers II</td>
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<tr>
<td>Week Number 7:</td>
<td>7th Week Exam</td>
</tr>
<tr>
<td>Week Number 8:</td>
<td>Interfacing Sensors and Actuators to Computer</td>
</tr>
<tr>
<td>Week Number 9:</td>
<td>Real-Time Interfacing</td>
</tr>
<tr>
<td>Week Number 10:</td>
<td>Computer I/O Cards and Software I</td>
</tr>
<tr>
<td>Week Number 11:</td>
<td>Computer I/O Cards and Software II</td>
</tr>
<tr>
<td>Week Number 12:</td>
<td>12th Week Exam</td>
</tr>
<tr>
<td>Week Number 13:</td>
<td>Data Acquisition and Control Case Studies</td>
</tr>
<tr>
<td>Week Number 14:</td>
<td>Liquid Level Control</td>
</tr>
<tr>
<td>Week Number 15:</td>
<td>Robotics Applications</td>
</tr>
<tr>
<td>Week Number 16:</td>
<td>Final Examination</td>
</tr>
</tbody>
</table>
ME 593 - Electromechanical Systems

COURSE INFORMATION

Course Title: Electromechanical Systems and Microprocessor Applications
Code: ME 593
Hours: Lecture – 2Hrs   Tutorial – 2Hrs   Credit – 3
Prerequisites: ME 591

GRADING

Class Performance/Attendance:  10%
Midterm # 1/Assignments – (7th Week):  30%
Midterm # 2/Assignments – (12th Week):  20%
Final Exam:  40%

COURSE DESCRIPTION

The course includes the following: An introduction to Mechatronics applications, electric circuits and components, semiconductors, diode rectifiers, power transistors, digital systems and circuits, actuators, microprocessors and micro controllers

TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

To deal with and apply electromechanical systems and understand microprocessor applications

COURSE OBJECTIVES

- Understand the operating principles of electromechanical actuators, motors, sensors, drives and analogue motion control.
- Provide an overview of the applications of microprocessors and micro controllers for smart products and process control.
Week Number 1: Introduction to Power Electronics and Industrial Control Systems, Devices and characteristics (diodes, thyristors, triacs, power BJT, MOSFETS, IGBTs)

Week Number 2: Power Diodes, single phase rectifiers, free-wheeling action

Week Number 3: Power Thyristors, Delay Angles, single phase controlled rectifiers

Week Number 4: Three phase circuits for diodes and thyristors

Week Number 5: DC Motor Speed Control using thyristors and Diode Circuits

Week Number 6: Triacs, AC Controllers and Dimmer Circuits, AC Motor Speed Control

Week Number 7: 7th Week Exam

Week Number 8: IGBTs, Chopper Circuits, DC Motor Control

Week Number 9: Inverters, AC control

Week Number 10: PWM, AC Motor Control, UPS

Week Number 11: Introduction to Sensors and Transducers (Position, Motion, Pressure, Flow, Stress, and Strain Sensors, …)

Week Number 12: 12th Week Exam

Week Number 13: Relay Logic Control

Week Number 14: PLCs – 1

Week Number 15: PLCs – 2

Week Number 16: Final examination
ME 594 - Robotics and Applications

Course Title: Robotics & Applications

Code: ME 594

Hours: Lecture – 2Hrs. Tutorial – 2Hrs. Credit – 3

Prerequisites: ME 355

Grading

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

Course Description

Introduction and field of applications of robotics. Basic concepts in robotics. Homogeneous transformation and coordinate frames. Direct kinematics and forward kinematic algorithm. Inverse kinematics. Control circuits and path control of robots. External and internal sensors for robots. Fluid and electric actuator for robotic applications.

Text Books:


Reference Books


Course Aim

To introduce the basic concepts and the components of robots with emphasis on kinematics and position control

Course Objectives

- Introduce the diverse applications of robots
- Introduce the subsystem and components of the robot
- Analyze robot kinematics
- Control the position of the robot hand
COURSE OUTLINE

Week Number 1: Introduction (fields of applications)
Week Number 2: Basic Concepts in Robotics
Week Number 3: Homogeneous Transformation
Week Number 4: Coordinate Frames, Transform Graph
Week Number 5: Assignment of Coordinate Frames
Week Number 6: Direct Kinematics
Week Number 7: Forward Kinematics Algorithm - Quiz
Week Number 8: Inverse Kinematics
Week Number 9: Problems with Programming Kinematic Models
Week Number 10: Control Circuits
Week Number 11: Path Control
Week Number 12: External Sensors - Quiz
Week Number 13: Internal Sensors
Week Number 14: Fluid Actuators
Week Number 15: Electrical Actuators
Week Number 16: Final Examination
ME 595 – Automation of Mechanical Systems

Course Title: Automation of Mechanical Systems

Code: ME 595

Hours: Lecture – 2 Hrs. Tutorial – 2 Hrs. Credit – 3

Prerequisites: ME 593

GRADING

Class Performance/Attendance: 10%
Midterm # 1/Assignments – (7th Week): 30%
Midterm # 2/Assignments – (12th Week): 20%
Final Exam: 40%

COURSE DESCRIPTION

Introduction to Programmable Logic Controllers - Relay Logic - PLC Basics - Hardware Architectures - Bit Logic - Ladder Diagram - Timers/Counters - Flow chart and state diagram conversion to Ladder Diagram - SCADA and HMI interfaces - DCS Systems

TEXT BOOKS


REFERENCE BOOKS

Siemens PLC S7-200 Reference Manual

COURSE AIM

To teach students the principles and techniques of Industrial and Power Electronics and Systems Control using power electronic devices and Industrial Automation.

COURSE OBJECTIVES

- Understand the basic principles of Industrial and Power Electronics systems,
- Provide a review of basic electrical machines and machine control,
- Provide an overview of Automation, Relay Logic, PLCs, and
- Provide an overview of the sensors, amplifiers, conditioning circuits, and actuators.
## COURSE OUTLINE

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction to Programmable Logic Controllers</td>
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<tr>
<td>2</td>
<td>Relay Logic</td>
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<tr>
<td>3</td>
<td>PLC Basics - Hardware Architectures</td>
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<tr>
<td>4</td>
<td>Bit Logic</td>
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<tr>
<td>5</td>
<td>Ladder Diagram</td>
</tr>
<tr>
<td>6</td>
<td>Application – 1</td>
</tr>
<tr>
<td>7</td>
<td>7th Week Exam</td>
</tr>
<tr>
<td>8</td>
<td>Application – 2</td>
</tr>
<tr>
<td>9</td>
<td>Timers/Counters</td>
</tr>
<tr>
<td>10</td>
<td>Flow chart and state diagram conversion to Ladder Diagram</td>
</tr>
<tr>
<td>11</td>
<td>Application – 3</td>
</tr>
<tr>
<td>12</td>
<td>12th week exam</td>
</tr>
<tr>
<td>13</td>
<td>Application – 4</td>
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<tr>
<td>14</td>
<td>SCADA and HMI interfaces</td>
</tr>
<tr>
<td>15</td>
<td>DCS Systems</td>
</tr>
<tr>
<td>16</td>
<td>Final Examination</td>
</tr>
</tbody>
</table>
Non Engineering Courses (NE)

**NE 264 – Scientific Thinking**

**COURSE INFORMATION**

Course Title: Scientific Thinking.

Code: NE 264.

Hours: Lecture – 4 Hrs. Credit – 3.

Prerequisite: None.

**GRADING**

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

**COURSE DESCRIPTION**


**TEXT BOOKS**

Abdel-Moneim Hassan, Scientific Thinking

**REFERENCE BOOKS**

References available in the Academy library.

**COURSE AIM**

The main goal of the course is to develop the thinking skills of engineering and technology students.
COURSE OBJECTIVES

The objectives of the course is to have students learn to define science use reasoning skills such as, analysis, synthesis, including, deducing, increasing, apply the methods science to solve problems, use creative thinking skills in real situations.

COURSE OUTLINE

Week Number 1: Thinking Patterns Development.

Week Number 2: Meaning & Construction of Science; Scientific Values & Directions.

Week Number 3: Science, non-science & other-than science. Engineering & Technology.

Week Number 4: Properties of science & the thinking processes.

Week Number 5: Objectives of science & postulates of scientific thinking.

Week Number 6: Mental operations used in science, scientific guessing methods of reasoning in mathematics.

Week Number 7: Types of deductions & the 7th week exam.

Week Number 8: Methods of reasoning in Natural sciences.

Week Number 9: Research methods in natural sciences.

Week Number 10: Experiments & Observations; Scientific postulates & their conditions Creative thinking.

Week Number 11: Verification of scientific postulates.

Week Number 12: Flexibility & originality.

Week Number 13: Creative thinking, fluency types.

Week Number 14: Basics of brainstorming; methods of decision making.

Week Number 15: General Revision.

Week Number 16: Final exam.
NE 364 – Engineering Economy

**Course Information**

Course Title: Engineering Economy.

Code: NE 364.

Hours: Lecture – 2 Hrs.  Tutorial – 2 Hrs.  Credit – 3

Prerequisite: 54 Credit Hours.

**Grading**

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

**Course Description**

A study of basic concepts emphasizing analysis of aggregate economy. Examination of the processes of price determination and calculation of optimum demand for maximum profit. Basic principles of money-time relationship. Methods of investment assessment and fundamental techniques of comparison of investment opportunities. Theories of depreciation of physical facilities and study of cost recovery systems.

**Text Books**


**Reference Books**


**Course Objectives**

- Introducing the basic cost concepts and economic environment.
- Familiarization of the principles of money time relations and basics of investments opportunities assessment and evaluation.

**Course Outline**

*Week Number 1:* Introduction and overview.

*Week Number 2:* Cost concepts and the economic environment.
Week Number 3: Principles of money – time relations, the concept of economic equivalence.

Week Number 4: Cash flow diagrams: Interest formulas and uniform series.

Week Number 5: Cash flow diagrams: Uniform gradient series and geometric sequence

Week Number 6: Nominal and effective interest rates, continuous compounding and continuous cash flows.

Week Number 7: Exam # 1.

Week Number 8: Applications of engineering economy: Methods of investment assessment.

Week Number 9: Comparing alternatives: Useful life is equal to the study period.

Week Number 10: Comparing alternatives: Useful life is shorter than the study period.

Week Number 11: Comparing alternatives: Useful life is longer than the study period.

Week Number 12: Exam # 2.

Week Number 13: The imputed market value technique.

Week Number 14: Depreciation: Historical Methods.

Week Number 15: Depreciation: Cost recovery systems.

Week Number 16: Final Exam.
NE 466 – Environmental Science and Technology

Course Information

Course Title: Environmental Science and Technology.

Code: NE 466.

Hours: Lecture – 4 Hrs. Credit – 3.

Prerequisite: None.

Grading

Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7th Week): 30%

Midterm # 2/Assignments – (12th Week): 20%

Final Exam: 40%

Course Description


Text Books


Reference Books

- Tolba, KK., Saving Our Planet Challenges and Hopes, Centre for Arab Unity Studies, Beirut 1992 (Arabic).

Course Aim

To raise the level of environmental awareness of the students, and provide them with the necessary knowledge, capabilities and attitude that will enable them to deal more positively with environmental resources and their components, through learning about the diversity and
complexity within the environment and the changes and transformations that occur through human activities.

**COURSE OBJECTIVES**

Developing the students understanding of the earth’s resources – Helping the students to understanding man kinds position within the environment – Correcting the common erroneous notion that natural resources can limitlessly sustain human exploitation – Explaining that most forms of environmental degradation are a result of consumerist lifestyle – Stressing the role of Science and technology in the development of man’s relation with the environment – changing students negative attitudes regarding the environment.

**COURSE OUTLINE**

- **Week Number 1**: The biosphere the natural built environment, ecosystem components.
- **Week Number 2**: Environmental resources, ecological systems and equilibrium.
- **Week Number 3**: The evolution of mankind’s relation with the environment.
- **Week Number 4**: The development of human awareness regarding environment problems.
- **Week Number 5**: Population and the environment.
- **Week Number 6**: Development and the environment.
- **Week Number 7**: 2 hrs revision and 2 hrs the seventh week exam.
- **Week Number 8**: Environment and sustainable development.
- **Week Number 9**: Poverty and the environment.
- **Week Number 10**: Environment and consumer lifestyle.
- **Week Number 11**: Relation between human health and environmental degradation.
- **Week Number 12**: Discussion of reports as a 12th week exam.
- **Week Number 13**: Environmental improvement.
- **Week Number 14**: Economic and social returns / benefits of pollution abatement.
- **Week Number 15**: Environmental management.
- **Week Number 16**: Final Exam.
Teaching Faculty List

A list of teaching faculty staff includes: Alphabetical names (last name first), position, date, university, specialization, experience in industry, research activities.

Full Time Staff

ABDEL AZIZ, HASSAN ABD EL HAMID (VISITING)

Ph D. 1966, University Manchester, UK.

Specialization

- Stress Analysis
- Machine Design
- Mechanical Vibrations

Experience in Industry

- 8 years of industrial experience during work in the Engineering department of the Suez Canal authority.
- 6 years of experience (applied research) in the research centre of Suez Canal authority dealing with industrial problems arising during the operation of dredgers, tugboats, widening and deepening the Suez Canal….etc.

Research Activities
16 publications during working in the Suez Canal research centre and the various universities in Egypt, Australia and UK.

ABDUO, KHALED MAHMOUD

Ph D, 2003, University of Demum fort.

Specialization
Concurrent Engineering.
B. SC. PROGRAM STATUS REPORT 2009

Experience in Industry

- Research work in collaboration with Rolls-Royce in UK.
- Petroleum companies working in Egypt.

Research Activities

- Quality improvement projects by applying concurrent engineering-
- Product development management.

ABO ELAZM, MOHAMED MAHMOUD

Ph D, 2008 Ain Shams university, Egypt.

Specialization

- Heat and mass transfer.
- Refrigeration and Air conditioning.
- HVAC Systems.

Experience in Industry

- Involved in HVAC commissioning processes.
- Teaching courses in ELNG company.

Research Activities

- CFD simulation.
- Indoor air quality.

ELSAFTY, AHMED FAROUK

Ph. D. 2002, Coventry University

Specialization

- Thermodynamics, Heat & Mass Transfer
- Refrigeration and Air Conditioning
- Renewable Energy
- Energy Resources
- Energy Management
- Absorption refrigeration.

Experience in Industry

- Consulting and Supervising- Air conditioning system and Fire Fighting work Radisson Hotel, Alex-West, Alexandria. [2008]
- Consulting and Supervising – Air Conditioning system and Fire fighting work – Conference Hall, Alex West- Alexandria. [2008]
Consulting and Supervising - Air Conditioning - Sporting Club - Club house extension- Alexandria. [2008]
Design and Selection of Air conditioning System for Mina Florence Mall- Serihank St. Alex. – Egypt Feb. 2005.
Design and Consultation of HVAC work for [Future Pipe Line Flat]- Solitaire Tower. Cairo, Egypt- 2004
Designing and selection of an air conditioning system for Pizza-Station restaurant in Smouha Mall, Alexandria, Egypt- 2003.
Supervising retrofitting of the air conditioning system for; Kabary hospital, Alexandria and AASTMT simulator.

Research Activities

- Advanced Topics in Absorption cooling
- Advanced Topics in Gas Cooling
- Absorption Refrigeration Technologies
- Absorption Cooling Systems
- Energy Conservation and HVAC&R

ELSAYED , ELSAYED SABER

Ph.D., Faculty of Engineering, University of Alexandria, Egypt.

Specialization

- Mechanical Vibrations.
- Theory of machines.
- Machine Design.
- Modelling and simulation of dynamic systems.
- Instrumentations and experimentations.
- Tribology.

Experience in Industry

- Abu Quir Fertilizers Co.: Solving of some vibrations problems.
- ALEX PETROLEUM CO.: fire fighting pipe line.
- Abu Quir Electrical Power Station: Solving the mechanical seal problem for the feedwater pumps.
- Zakher Marine Oil Field Service EST.: Investigation and repair for highly flexible VAULKAN EZ-S coupling series 30.
- Distribution for the SNR rolling bearing (France).
Research Activities

- Non contact seals (performance and dynamic characteristics).
- Vibration control in fluid valves.
- Performance of viscoelastic sleeve guides subjected to dynamic loading.
- Flow induced vibrations.
- Stability analysis of hydrodynamic journal bearing.
- Magneto-Rheological dampers: Modelling simulation and analysis.
- Modelling and simulation of dynamic systems.
- Model analysis.

ELFELY, MAHMOUD ZAKI (VISITING)

Ph.D. 1988, Faculty of Engineering, University of Alexandria, Egypt.

Specialization

- Nuclear Energy

Experience in Industry

- Nuclear energy engineering organization.

Research Activities

- Fluid Mechanics.
- Heat transfer.

HAMMOUDA, ROUSHDY MOHAMED (VISITING)

Ph.D. 1969, ODENSSA University, USSR

Specialization

Refrigeration and Air conditioning

Experience in Industry

- Consultant Engineer For:
  - Mohararam press in Alexandria since 1992

- Industrial Projects:
  - Design and erection of cold stores for Mr. Essam Adly on 1978.
  - Design and erection of cold stores for Dr. Abdelmagid Elabd on 1985.
  - Design of air conditioning systems for Mahrousa, Alexandria
  - Design of air conditioning systems for Mahrousa extensions, Alexandria
Design of air conditioning systems for Hospital, Ismailia.
Design of air conditioning systems for Nowabaa passes.
Design of air conditioning systems for Engineering Committee, Alexandria, Elshatpy.
Design of air conditioning systems for Engineering Committee club, Alexandria, Sababasha.
Design of air conditioning systems for Medical Committee club, Alexandria, Sababasha
Design of air conditioning systems for Faculty of Low, Alexandria Elshatpy.
Design of air conditioning systems for Faculty of Commerce, Alexandria, Elshatpy.
Design of air conditioning systems for Student Hospital, Alexandria University, Elshatpy.
Design of air conditioning systems for Alexandria club, Alexandria, Ramleh station.
Design of air conditioning systems for Alexandria Sporting club, Alexandria, sporting.
Design of air conditioning systems for Theaters, Alexandria, Fayoum and Giza.
Design and erection of air conditioning systems for Alexandria Spinning Company.
Design and erection of air conditioning systems for Ahlia Spinning and Textile Company.
Design and erection of air conditioning systems for Arafa hotel in Tanta.
Design of air conditioning systems for LeRio hotel in Ghardaka.
Design of air conditioning systems for Tourist village Lagon in Sharm.

Research Activities
Refrigeration and Air conditioning.

KASAB, SADEK ZAKARIA

Ph.D. 1986, University of Manitoba, Faculty of Engineering, Canada.

Specialization

- Fluid mechanics.
- Hydraulic machines.

Experience in Industry

- Calibration of hydraulic equipment and hydraulic machines (Pressure Gauges, Pumps, Valves, Pipes, Pipe Fittings …)
- Engineering Community Development Centre, Faculty of Engineering, Alexandria University, Egypt. (1998 – Present).
- "Project of Field Calibration of Centrifugal Pumps used for irrigation” Nobaria District, Egypt.

Research Activities

- Experimental Fluid Mechanics
- Lubrication.
- Energy, Environment and Pollution.

TAEMA, MOHAMED ABD EL FATAH

Ph.D. 1988, Faculty of Engineering, University of Alexandria, Egypt.
**Specialization**

- Heat and mass transfer.
- Engineering thermodynamics.
- Fluid mechanics and hydraulic machine.
- Refrigeration and air conditioning.
- Thermal power station.
- Thermal equipment design.
- Power plant operation and management

**Experience in Industry**

- Consultant and designer for water chillers line production with 120 T.O.R. ALKFAH BATCH PLANT / Industrial city kingdom.
- Consultant for LNG waste heat recovery unit.
- Consultant for West Delta power Production Company.
- Designer and consultant for general engineering for business and consultant C.O.
- Consultant for soquar for Foods Company.

**Research Activities**

- Double diffusive natural convection.
- Combined heat and mass transfer in partitioned space.
- Evaporative cooler (air washer).
- Heat exchanger.
- Energy storage systems.
- New and renewable energy.
- Industrial ventilation.

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**Rezeka, Sohaïr Fathy**

Ph.D. (M.E.), Wayne State University, 1984.

**Specialization**

- Automatic Control
- Intelligent Control Systems (Neural network, Fuzzy systems)
- Mechatronics
- Dynamics and Vibrations
- Principles of Mechanisms and Robotics
- System Modeling and Simulations
- Instrumentation and Experimentation
- Machine Design
- Synthesis of Mechanisms
Experience in Industry

- Consultant to Alexandria Port Authority, (1998)
- Control systems of gas turbines, Ameria Textiles, Alexandria (1988)
- Control of hydraulic circuits in fire engines, Ameria Refineries, Alexandria (1987)
- Frictional losses in 2-stroke vs. 4-stroke engines, General Motors Electro-Motive Div. (1984)

Research Activities

- System analysis and control as applied to:
  - Neuro-control of aircraft trajectories, Stepper motor driving flexible rotor, Semi-active suspension, Antilock braking system (ABS), Intelligent steering control, diesel unit injector, Nanometer positioning of power screw, Slewring flexible beam, Servo valves, Outside-air economy cycle, refrigerant evaporators, Fuzzy control of magnetic bearing, Vibration control using piezo-electric materials, ER and MR dampers, Hot and dry climate temperature and humidity control, Chilled-water fan-coil system, and Fuzzy control of cooling and dehumidifying coil.
- Fault diagnosis using neuro-fuzzy models in marine diesel engines and in hydraulic servo valves.
- Synthesis of four-link space mechanism for optimal performance.
- Torsional vibrations of non prismatic shafts.
- Vibrations of imperfect conical shells and of thin ellipsoidal shell of revolution.
- Synthesis of an optimum energy-absorbing system

Part Time Staff

**A B D E L - A Z I Z , M O H A M E D**

Ph.D. 1981, Odessa University, USSR.

**Specialization**
Heat Transfer

**A B D E L - N A B Y , A H M E D A L I**

Ph.D. 1995, Faculty of Engineering, University of Alexandria, Egypt.

**Specialization**
Fluid Dynamic

**A G A M I , S A E D A B D E L M E G I D**

Ph.D. 1979, Macmaster University, CANADA.

**Specialization**
Thermodynamics
ATEA, EL-ARABY MORSY MOHAMED

Ph.D. 1995, Faculty of Engineering, University of Alexandria, Egypt.

Specialization
Theory of machine

EL-KASABGY, MOHAMED MAHAMAD

Ph.D. 1983, Faculty of Engineering, University of Alexandria, Egypt.

Specialization
“Diesel engine”

EL-GAMAL, HASSAN ANWAR

Ph.D. 1977, University College, LONDON, UK.

Specialization
“Fluid mechanics”

EL-GOHARY, MOHAMED MORSI ABDEL MEGID

Ph.D. 2004, Hanover University, GERMANY.

Specialization
“Internal combustion engine and maintenance planning”

EL-HABROUK, MOHAMED MOHAMED SEDKY

Ph.D. 1998, Donal, UK.

Specialization
“Electromechanical systems and microprocessors”

EL-MASRY, OSAKA AHMED ABDEL RAHMAN

Ph.D. 1978, Macmaster University, CANADA.

Specialization
“Heat transfer”

EL-MIDANY, AYMAN ABDEL AZIZ

Ph.D. 1996, Faculty of Engineering, University of Alexandria, Egypt.

Specialization
“Theory of machine”

EL-SHERBINY, SAMY MORSI

Ph.D. 1981, Waterlo University, CANADA.
Specialization
“Steam power plants”

EL-SHEIKH, AHMED MOSTAFA FARAG MOSTAFA ABO ALI

Ph.D. 1983, Faculty of Engineering, University of Alexandria, Egypt.

Specialization
“Engineering drawing and descriptive geometry”

EL-SHERIF, AHMED HASSAN METWALLY

Ph.D. 1983, Faculty of Engineering, University of Alexandria, Egypt.

Specialization
“Engineering drawing and descriptive geometry”

IBRAHIM, KAMAL ABDEL AZIZ


Specialization
“Fluid dynamic”

METWALLY, HUSSIEN MOHAMED

Ph.D. 1974, Faculty of Engineering, University of Alexandria, Egypt.

Specialization
“Theory of machine”

OSMAN, MOHSEN MOHAMED MORSI

Ph.D. 1984, North Carolina University, USA.

Specialization
“Automotive”

SAAFAN, AMR ABDEL GHANY

Ph.D. 1990, Faculty of Engineering, University of Alexandria, Egypt.

Specialization
“Theory of machines”

SALEM, AHMED MOHAMED MOHAMED ABDEL MEGID

Ph.D. 1999, UK.

Specialization
“Mechanics of materials”
Assistants

A L A K H T A B Y ,  A H M A D  M O H A M E D

B.Sc. 2009 (AASTMT, Alexandria, Egypt)

Specialization

- Mechatronics.
- Machine Design.
- CAD.

Experience in Industry
None.

Research Activities
Mechatronic systems.

A N A N Y ,  M O O T A Z  N A B I L

B.Sc. 2009 (AASTMT, Alexandria, Egypt)

Specialization

- Mechatronics systems.
- Robotics.
- Machine Design.

Experience in Industry
None.

Research Activities
- Mechatronics systems.
- Robotics applications.

B A Y O U M Y ,  A H M E D  S I E F

M.Sc. 2007, (AASTMT, Alexandria, Egypt)

Specialization

- Material science.
- Stress analysis.

Experience in Industry
None.

Research Activities
Renewable energy.
EL DEKKI, MAHMOUD HASSAN

B.Sc. 2009 (AASTMT, Alexandria, Egypt)

Specialization

- Mechatronic systems.
- Material science.
- Stress analysis

Experience in Industry

None.

Research Activities

Mechatronic systems.

EL GAZZAR, ENASS ZAKARIA

B.Sc. 2007 (AASTMT, Alexandria, Egypt)

Specialization

- Thermal power plants.
- Fluid Mechanics.

Experience in Industry

None.

Research Activities

Heat and mass transfer.

EL HARIDI, ALI MOHAMED

B.Sc. 2008 (AASTMT, Alexandria, Egypt)

Specialization

- Heat transfer.
- Refrigeration and air conditioning.

Experience in Industry

None.

Research Activities

- Heat transfer.
- Renewable energy.

ELS HAFIE, SAMEH AHMED

B.Sc. 2009 (AASTMT, Alexandria, Egypt)
Specialization

- Mechatronics systems.
- Stress analysis.
- Mechanics of material.

Experience in Industry
None

Research Activities
None

ESMAEL, ALY MOHAMED

M.Sc. 2006, (AASTMT, Alexandria, Egypt)

Specialization
Refrigeration and Air conditioning

Experience in Industry
None

Research Activities

- Absorption systems
- Refrigeration and Air conditioning
- Heat and mass transfer.

KHALLAF, SARAH MOHAMED

B.Sc. 2009 (AASTMT, Alexandria, Egypt)

Specialization

- Thermal power plant
- Fluid mechanics
- Internal combustion.

Experience in Industry
None.

Research Activities
Thermal power plant

SALAMA, MOSTAFA ALY

B.Sc. 2007 (AASTMT, Alexandria, Egypt)

Specialization

- Mechatronics systems- Embedded systems.
Modelling and control of mechanical systems.
Measurements and control.
Robotics.

Experience in Industry
None.

Research Activities
- System modelling and control.
- Control algorithms and techniques.
- Robotics.

SALEM, MAHMOUD HOSNY

B.Sc. 2009 (AASTMT, Alexandria, Egypt)

Specialization
- Mechatronic systems.
- Material science.

Experience in Industry
None.

Research Activities
Mechatronic systems.

SELIM, MOHAMED MAGDY

B.Sc. 2008 (AASTMT, Alexandria, Egypt)

Specialization
- Fluid dynamics.
- Thermal power plants.

Experience in Industry
None.

Research Activities
- Drag reduction.
- Turbulent flow behaviour.
Department Facilities

Description of the department facilities including laboratories, workshops, computing and information facilities, and the courses supported by these facilities.

Experimental Facilities Supporting the Program

The program utilizes a number of well-equipped laboratories for instructions and research. Hands-on experience is highly emphasized throughout the program and ultra modern equipment is to serve the interests of both the students and staff. The laboratories serving the program are:

1. Fluid Mechanics & Hydraulic Laboratory.
2. Refrigeration & Air Conditioning Laboratory.
3. Thermodynamics Laboratory.
4. Mechanical Vibration Laboratory.
5. Testing of Materials Laboratory.
6. Mechatronics Engineering Laboratory.
7. Renewable Energy Laboratory.
9. Internal combustion engine Laboratory.
10. Automotive Engineering Laboratory.
Fluid Mechanics and Hydraulics Laboratory

LABORATORY INFORMATION

Room no.: 007
Capacity: 25 students

LABORATORY EQUIPMENT

- Venture meter.
- Orifice meter.
- Smoke tunnel.
- Pumping station.
- Wind tunnel.
- Fluid circuit demonstrator.
- Hydraulic flow channel.
- Fluid power trainer.
- Hydraulic bench.
- Pipe friction.
- Flow in closed channel.

THE LABORATORY SERVES THE FOLLOWING COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 241</td>
<td>Experimental Methods</td>
<td>4</td>
</tr>
<tr>
<td>ME 362</td>
<td>Hydraulics</td>
<td>6</td>
</tr>
<tr>
<td>ME 461</td>
<td>Fluid Mechanics</td>
<td>7</td>
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<tr>
<td>ME 464</td>
<td>Hydraulic Systems</td>
<td>8</td>
</tr>
<tr>
<td>ME 565</td>
<td>Turbo machinery</td>
<td>9</td>
</tr>
</tbody>
</table>
Refrigeration & Air Conditioning Laboratory

LABORATORY INFORMATION

Room no.: 008
Capacity: 25 students

WORKSHOP EQUIPMENT

- Advanced Commercial Refrigeration Trainer.
- Building Management Trainer.
- Commercial Refrigeration Trainer.
- Recalculating Air Conditioning Demonstrator.
- Thermoelectric Pump.
- Vapour Compression Cycle Demonstrator.
- Refrigerant Recovery Units.
- Container Reefer.
- Cooling Tower.
- Air conditioning cycle.

THE LABORATORY SERVES THE FOLLOWING COURSES

<table>
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<tr>
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<tbody>
<tr>
<td>ME 241</td>
<td>Experimental Methods</td>
<td>4</td>
</tr>
<tr>
<td>ME 333</td>
<td>Thermodynamics (2)</td>
<td>4</td>
</tr>
<tr>
<td>ME 434</td>
<td>Refrigeration &amp; Air Conditioning</td>
<td>8</td>
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<tr>
<td>ME 535</td>
<td>Refrigeration Equipment and Control</td>
<td>Elective course</td>
</tr>
<tr>
<td>ME 536</td>
<td>AC Units &amp; Control</td>
<td>Elective course</td>
</tr>
</tbody>
</table>
Thermodynamics Laboratory

LABORATORY INFORMATION

Room No.: 005

Capacity: 25 students

MAJOR EQUIPMENT

- Vortex Tube Refrigerator.
- Modular Heat Exchanger.
- Forced Convection Demonstrator.
- Gas Turbine Trainer.
- Steam Turbine Trainer.
- Cross Flow Heat Exchanger.
- Air Compressor System.
- Thermal Conduction Demonstrator.
- Concentric tube heat exchanger.

LABORATORY SERVES THE FOLLOWING COURSES

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<th>Semester</th>
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</thead>
<tbody>
<tr>
<td>ME 232</td>
<td>Thermodynamics (1)</td>
<td>3</td>
</tr>
<tr>
<td>ME 333</td>
<td>Thermodynamics (2)</td>
<td>4</td>
</tr>
<tr>
<td>ME 241</td>
<td>Experimental Methods</td>
<td>4</td>
</tr>
<tr>
<td>ME 431</td>
<td>Heat Transfer</td>
<td>6</td>
</tr>
<tr>
<td>ME 520</td>
<td>Thermal Plant Engineering</td>
<td>9</td>
</tr>
</tbody>
</table>
Mechanical Vibration Laboratory

LABORATORY INFORMATION

Room No.: 205
Capacity: 25 students

MAJOR EQUIPMENT

- Velocity Sensor (Screw Mounting).
- Seismic Vibration Transmitter (Screw Mounting).
- Seismic Accelerometer Sensor.
- Seismic Indicator Transmitter.
- Signal Conditioner for Remote Sensor.
- Strain Gauges (Precision Strain).
- Proximity Sensor with Cable.
- Proximity Probe Driver.
- Proximity Signal Conditioner.
- Proximity Sensor Calibrator.
- Extension Cable with Insulator.
- Trend Setter.
- Miniature Vibration Meter Device.
- Hydro Scout Toil Cartridges.
- Portable Shaker System.
- Velocity Transducer.
- Vibration Switch.
- Audio Amplifier.
- Digital Vibration Controller.
- Triaxial Accelerometer.
- Blower (Compressed Air).
- Flowmeters for Liquids.
- Low Frequency Accelerometer.
- Industrial Accelerometer.
- Noise Level Meter.
- Linear Strain Gauge.
- Differential Pressure Transducer.
- Absolute Pressure Transducer.
- Tachometer Speed Range.
- Signal Generator.
- Handy Oscilloscope Fluke.

LABORATORY SERVES THE FOLLOWING COURSES

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<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 241</td>
<td>Experimental Methods</td>
<td>4</td>
</tr>
<tr>
<td>ME 458</td>
<td>Mechanical Vibration</td>
<td>7</td>
</tr>
</tbody>
</table>
Testing of Materials Laboratory

LABORATORY INFORMATION

Room No.: 011
Capacity: 25 students

MAJOR EQUIPMENT

- Oscilloscope machine
- 2 Impact testing machines
- Hardness testing machines
- Pressure vessel machine
- Tensile testing machine.

LABORATORY SERVES THE FOLLOWING COURSES

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</tr>
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<tbody>
<tr>
<td>ME 241</td>
<td>Experimental Methods</td>
<td>4</td>
</tr>
<tr>
<td>ME 274</td>
<td>Material Science</td>
<td>3</td>
</tr>
<tr>
<td>ME 276</td>
<td>Stress Analysis</td>
<td>4</td>
</tr>
</tbody>
</table>
Mechatronics Laboratory

LABORATORY INFORMATION

Room No.: 009

Capacity: 15 students

MAJOR EQUIPMENT

- ProLight 3000 Turning Centre, versatile 2-axis CNC lathe for training, engineering and light-duty industrial turning applications.
- The SCORBOT-ER 9Pro, Robot with 6 degree of freedom.
- Intelitek, Robot with 4 degree of freedom.
- Automatic Storage and Retrieval System (ASRS).
- Conveyor.
- One PC per station.
- CAD/CAM software.

LABORATORY SERVES THE FOLLOWING COURSE

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Courses Title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 591</td>
<td>Mechatronics</td>
<td>8</td>
</tr>
<tr>
<td>ME 592</td>
<td>Mechatronics Systems</td>
<td>9</td>
</tr>
<tr>
<td>ME 593</td>
<td>Electromechanical Systems</td>
<td>9</td>
</tr>
<tr>
<td>ME 594</td>
<td>Robotics Applications</td>
<td>10</td>
</tr>
<tr>
<td>ME 595</td>
<td>Automation of Mechanical Systems</td>
<td>10</td>
</tr>
</tbody>
</table>
Renewable Energy Laboratory

LABORATORY INFORMATION

Room No.: 010
Capacity: 10 students

MAJOR EQUIPMENT

- Mobile Solar Systems Trainer
- Solar Photovoltaic Trainer

LABORATORY SERVES THE FOLLOWING COURSES

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Courses Title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 434</td>
<td>Refrigeration &amp; Air Conditioning</td>
<td>8</td>
</tr>
<tr>
<td>ME 523</td>
<td>Power Plant operation &amp; Management</td>
<td>10</td>
</tr>
<tr>
<td>ME 524</td>
<td>Renewable Energy Resources</td>
<td>Elective course</td>
</tr>
</tbody>
</table>
Computer Laboratories

Laboratory Information

Room No.: 328-330
Capacity: 25 students

Major Equipment

- 25 Computers with the following software:
  - Microsoft Office
  - AutoCAD 2000 software
  - Mat Lab software
  - Arena Simulation Software.

Laboratory Serves The Following Courses

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Courses Title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 256</td>
<td>Mechanical Eng. Drawing</td>
<td>3</td>
</tr>
<tr>
<td>ME 455</td>
<td>Computer Aided Design</td>
<td>8</td>
</tr>
</tbody>
</table>
Internal Combustion Engine Workshop

LABORATORY INFORMATION

Room no.: Workshop (2)

Capacity: 25 students.

MAJOR EQUIPMENT

- AKASAKA diesel engine with auxiliary systems (1 unit)
- SULZAR diesel engine with auxiliary systems (1 unit)
- FIAT diesel engine with switch board (2 units)
- DEUTZ diesel engine for maintenance training (2 units)
- Diesel engine for maintenance training (2 units)

THE LABORATORY SERVES THE FOLLOWING COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 382</td>
<td>Internal Combustion Engine (2)</td>
<td>6</td>
</tr>
</tbody>
</table>
Automotive Engineering Laboratory

LABORATORY INFORMATION

Room No.: Automotive workshop
Capacity: 20 students

MAJOR EQUIPMENT

Training & educational equipments:

- Automotive Diagnostic Equipment As 3000:
  - Action scope Oscilloscope for As 3000
  - Monitor For As3000
  - Cabinet Stand
  - Low Amp Probe
  - High Amp Probe
  - Universal Compressor
  - Digital Eng. Analy
  - Battery Tester.

- Brake System Tester:
  - Bleeding
  - Pressure
  - Vacuum

- Cooling System And Radiator Cap Testing Kit
- Ultraviolet Leak Detection System
- Vacuum and Fuel Pump Testers
- Exhaust Back Pressure Test Kit
- Engine and Transmission Oil Pressure Tester
- Bore Scopes (Fibre Optic)
- Engine diagnosis for electric systems of automotive.
- Injector inspection and cleaning for gasoline engines.
- Air conditioning service unit for automotive.
- 4 post lift
- Advanced car for training.
- All automotive system units such as; engines, transmissions, differentials, suspensions, steering, brakes,…etc

Workshop equipments:

- Drilling machine.
- Press unit up to 10 ton.
- Battery charger.
- Air compressor 50 litres.
- 4 post lift.
- Work shop jack 3 ton.
- Car stand up to 2 ton.
- Mobil lift up to 2 ton.

**LABORATORY SERVES THE FOLLOWING COURSES**

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 381</td>
<td>Internal combustion engines (1)</td>
<td>4</td>
</tr>
<tr>
<td>ME 481</td>
<td>Automotive Technology</td>
<td>8</td>
</tr>
<tr>
<td>ME 482</td>
<td>Automotive Engines</td>
<td>8</td>
</tr>
<tr>
<td>ME 483</td>
<td>Alternative Fuels &amp; Power Systems</td>
<td>8</td>
</tr>
<tr>
<td>ME 581</td>
<td>Automotive Fuel &amp; Ignition Systems</td>
<td>9</td>
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<tr>
<td>ME 582</td>
<td>Automotive Chassis Systems</td>
<td>9</td>
</tr>
<tr>
<td>ME 583</td>
<td>Vehicle Control &amp; safety Systems</td>
<td>9</td>
</tr>
<tr>
<td>ME 584</td>
<td>Automotive Electric &amp; Electronics Systems</td>
<td>9</td>
</tr>
<tr>
<td>ME 588</td>
<td>Automotive Maintenance and Repair</td>
<td>10</td>
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</tbody>
</table>