INDUSTRIAL AND MANAGEMENT ENGINEERING
B. Sc. Program

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

Industrial and Management Engineering

Prepared by Departmental Committee and Coordinated by

Dr. Khaled S. El-Kilany

Head of Department
Department of Industrial and Management Engineering

DECEMBER 2009
Vision
Our vision is to become an internationally recognized body that provides and supports the industrial community with quality students and research work and that is self sufficient in terms of both human and educational resources.

Mission
Our mission is to provide our students quality education through our elite faculty and educational resources to transfer the up-to-date knowledge, skills, tools, and methods that are required by an industrial engineer.

Department Objectives

The objectives of the department of industrial and management engineering are:

- Continuously reviewing and updating the programs of studies to maintain the high level of education required by our students.
- Establishing strong relationships with the industry and community through continuous collaboration in terms of research, graduate studies, and training.
- Providing the business and industry communities with high quality industrial engineers who are produced through our learning and program flexibility, hands-on experience, training, and research opportunities.
- Attracting full-time faculty members that are of high calibre and are of different specializations for the next five years.
- Maintaining a minimum of eight full time teaching assistants (GTAs and TAs) in the department.
- Encouraging students to form chapters of international institutes and organizations within the department.
# Table of Contents

## Introduction
- Industrial and Management Engineering: An Overview  
- The Role of Industrial Engineers  
- Career Opportunities for Industrial Engineers  
- Program Aim and Objectives  
- Program Intended Learning Outcomes (ILOs)

## Program Planning Sheet
- Curriculum  
- Course Coding  
- Degree Offered  
- Graduation Requirements  
- Academic Program Sheet  
- Course Prerequisites  
- Academic Program Analysis  
- Program Analysis by Semester Offering  
- Program Analysis by Subject Field  
- Comparison with Previous Program

## Courses Summary
- Basic and Applied Science (BA)  
- Computer Engineering (CC)  
- Electrical Engineering (EE)  
- Language, Humanities, and Social Science (LH)  
- Industrial and Management Engineering (IM)  
- The Training and Senior Project Group  
- Materials and Manufacturing Engineering Group  
- Industrial Engineering Group  
- Management Engineering Group  
- Quality and Design Engineering Group  
- Mechanical Engineering (ME)  
- Non-Engineering (NE)

## Course File Summary
- Basic and Applied Science Courses – BA  
- Computer Engineering Courses – CC  
- Electrical Engineering Courses – EE

## Teaching Faculty List
- Full Time Staff  
- Part Time Staff  
- Assistants

## Department Facilities
- Experimental Facilities Supporting the Program
  - Computer Integrated Manufacturing (CIM) Laboratory  
  - Work Analysis and Ergonomics Laboratory  
  - Reverse Engineering Laboratory  
  - Engineering Workshop  
  - Testing of Materials Laboratory  
  - Non-Destructive Testing Laboratory  
  - Electrical Circuits Laboratory  
  - Digital Automatic Control Laboratory  
  - Analogue Automatic Control Laboratory  
  - Computer Laboratory  
  - Physics Laboratory  
  - Physics Laboratory  
  - Chemistry Laboratory  
  - Mechatronics Laboratory  
  - Advanced Manufacturing Laboratory
Introduction

Program overview, activities and job opportunities, and program objectives

Industrial and Management Engineering: An Overview

Industrial and Management Engineering is a broad professional discipline concerned with the, design, control and management of integrated systems and procedures for organizing the resources of production – people, materials, equipment and information – to achieve specific objectives.

The complexity of modern industrial and service organizations with their emphasis on competitiveness and quality increased their need for effectiveness and higher productivity. The extensive use of automation and computerization has led to an increased demand for a new breed of Industrial Engineering graduates. Although the discipline is relatively a new professional area developed during the past three decades, it is already one of the largest rapidly growing engineering professions.

The Role of Industrial Engineers

Industrial Engineers (IE’s) are those who understand the design, operation, inspection, management and use of systems and the integration of those functions. According to the Institute of Industrial Engineers (IIE), IE’s combine the abilities of engineers and managers. They draw upon the knowledge of mathematics, physical and technical engineering sciences combined with management behavioural sciences to function as problem solvers, innovators, designers, coordinators, and system integrators. Industrial Engineers practice in all phases of manufacturing industries, service industries and government agencies. They design and coordinate components of plant facilities, man-machine systems, material handling systems, information systems, computer-controlled systems, and inventory systems. In addition, they analyze costs and economic feasibility, human abilities and needs, jobs and work measurement, and mathematical models of systems. The background, experience and training of Industrial Engineers give them wide acquaintance with industrial problems.

Career Opportunities for Industrial Engineers

Industrial Engineering programs of study prepare graduates for careers in all phases of industrial, manufacturing and service firms. It qualifies them to perform different managerial and technical functions that require scientific and engineering background. By combining the study of science, mathematics, engineering fundamentals, design, management and quality principles, the programs provide a unique background and a sound basis for life-long career development in engineering practice, research, or management.
Recent developments such as wide spread industrial interest in systems approach, information systems, advanced materials, manufacturing processes, global firms, Supply chain, and quality systems have made the Industrial Engineer’s entrance into management even more likely. They are trained to have familiarity with qualitative and quantitative methods interaction and control. At present, the demand for Industrial Engineers exceeds supply assuring job opportunities expected to expand rapidly in the future.

Career opportunities for Industrial Engineers cover a whole spectrum of industrial systems and service systems. Industrial systems include, but are not limited to: Automotive, Aerospace, Apparel, Basic metals, Beverages, Building materials, Chemicals, Computers, Appliances, Electronics, Equipment, Fabricated metals, Food processing, Glass, Ceramics, heavy machinery, Paper, petroleum refining, Pharmaceuticals, Plastics, Power utilities, Publishing, Textiles, Tire and rubber, Wood and furniture. Service Systems include, but are not limited to: Banking, Education, Communications, Financial services, Government, Health and medical, Hotel, Information, Insurance, Repair and maintenance, Restaurant, Retail trade, Transportation, Wholesale trade, Transportation, and Warehousing.

Program Aim and Objectives

The Industrial and Management Engineering program at the Arab Academy for Science and Technology and Maritime Transport AASTMT was established in 1994 to prepare graduates for careers in various areas. The program enables them to perform technical and managerial functions that require sound basis for life-long career development in engineering practice, research and management.

The program has been carefully designed and continuously updated according to the engineering criteria 2000 approved by the Accreditation Board for Engineering and Technology (ABET) board of directors on November 1st, 1997. Further improvements have been introduced into the program to match the recommendations by an advisory board form a distinguished group of British universities and institutes, so as to meet the requirements for accreditation by those institutes. The main objective of the program is to produce and qualify graduates that:

- Demonstrate the ability to design, develop, implement, and improve integrated systems that include people, materials, information, equipment and energy.
- Understand the engineering relationships between the management tasks of planning, organization, leadership, control, and the human elements in production, research and service organizations.
- Comprehend and handle the integration of management systems into a series of different technological environments.
- Provide strong ties and linkages between the local economic sectors and industrial communities with the department graduates in areas related to research, hands-on training, and field investigations.
- Emphasizing risk assessment and the impact of uncertainties associated with economic and process decisions in industrial and service sectors.
- Underlining the key roles of safety dimensions, sustainable technology, environmental friendliness, and cleaner production measures in manufacturing, materials, managerial and economic alternatives as reflected in the program course structure.
The responsibility of achieving this objective is carried out by industrial engineering staff experienced in the management of engineering and technical activities.

**Program Intended Learning Outcomes (ILOs)**

**Knowledge and Understanding**
On successful completion of the Industrial and Management Engineering (IME) program of study, the graduate should be able to demonstrate knowledge and understanding of:

- The fundamental manufacturing processes and the recent technologies used in that field including non-conventional machining, automated manufacturing, flexible manufacturing, and computer aided manufacturing systems.
- The different classes of materials that are used in industry such as metallic, polymeric, and composite materials; explaining their structure, properties, applications, and their modes of failure.
- Basics of industrial engineering such as production planning and control, production scheduling, and inventory management.
- Design manufacturing and services facilities for the production of goods and services.
- Design work methods and procedures that improve the productivity of industrial systems.
- Organisations, their internal structures and their management, including the management of human resources, financial resources and operations.
- Globalization and its effect on the different operations of an organization and the importance of industrial data systems in that regard.
- The key concepts of quality engineering and reliability systems and their importance in the production of goods and services.

**Intellectual Skills**
On completion of the Industrial and Management Engineering (IME) program of study, students should be able to:

- Select appropriate experiments and analyze data to characterize problems.
- Develop systems, components, and processes to meet specific needs, and to apply industrial engineering techniques to solve problems.
- Balance the tradeoffs of different alternatives and make responsible decisions using a multitude of decision making tools and exhibit integrity in classroom and real world projects.
- Collect, analyze, and interpret data in settings as well as drawing significant conclusions and developing sound recommendations.
- Effectively utilize industrial engineering design and problem solving skills.

**Practical and Professional Skills**
On completion of the Industrial and Management Engineering (IME) program of study, students should be able to:

- Practice industrial engineering as a service profession that must be practiced with integrity, honesty, and objectivity.
- Contribute effectively to multidisciplinary team efforts.
- Use the knowledge acquired with discretion and become responsible to the industrial engineering profession and to our modern global society.
B. S C. P R O G R A M S T A T U S R E P O R T 2 0 0 9

- Incorporate contemporary global, economic, and social perspectives into the practice of industrial engineering.
- Explore options for professional growth, including graduate study, conference attendance, and professional society participation.
- Utilize tools and techniques of industrial engineering to effectively and efficiently design systems, products and processes that meet the needs of the society.
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 program curriculum provides great flexibility in course selection and offers a broad scientific and engineering base by containing a sequence of courses in mathematics, physics, chemistry, computer and the engineering sciences. These courses are accompanied by industrial engineering courses covering the areas of manufacturing engineering and facility design, engineering statistics, engineering cost analysis, production and operations management, operations research, process control, work design and measurement, human factor engineering, computer utilization and information systems, systems analysis and design and total quality management.

Course Coding

Numbering System

The course code consists of five or six alphanumeric digits, MN XYZ (E) depending on the nature of the course; whether it is core or elective.

![Course Coding Diagram]
The **MN** 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.
- EE – Electrical Engineering.
- LH – Language, Humanities and Social Science.
- IM – Industrial and Management Engineering.
- ME – Mechanical Engineering.
- NE – Non-Engineering Courses.

### Industrial and Management Engineering Subject Field Groups

The Industrial and Management Engineering (IM) subject field offers courses in the following five groups:

- The Training and Senior Project Group (IM X0X).
- The Materials and Manufacturing Engineering Group (IM X1X).
- The Industrial Engineering Group (IM X2X).
- The Management Engineering Group (IM X3X).
- The Quality and Design Engineering Group (IM X4X).

### Degree Offered

The program offers the degree of Bachelor of Science (B. Sc.) in Industrial and Management 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 Industrial and Management 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 industrial and management engineering.
Graduation Requirements

College Requirements
A total of 60 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><strong>Compulsory Courses</strong></td>
<td></td>
<td></td>
<td>A total of 54 Cr. Hr. of the following compulsory courses</td>
<td></td>
<td></td>
</tr>
<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>1</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>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>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>CC</td>
<td>1</td>
<td>CC 111</td>
<td>Introduction to computer</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>CC 114</td>
<td>Introduction to Programming</td>
<td>3</td>
<td>CC 111</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>10</td>
<td>IM 535</td>
<td>International Business Management</td>
<td>3</td>
<td>126 Cr. Hr.</td>
</tr>
<tr>
<td>ME</td>
<td>2</td>
<td>ME 151</td>
<td>Eng. Drawing &amp; Projection</td>
<td>2</td>
<td>None</td>
</tr>
<tr>
<td>LH</td>
<td>1</td>
<td>LH 131</td>
<td>ESP I</td>
<td>2</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>LH 132</td>
<td>ESP II</td>
<td>2</td>
<td>LH 131</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>LH 231</td>
<td>ESP III</td>
<td>3</td>
<td>LH 132</td>
</tr>
<tr>
<td>NE</td>
<td>5</td>
<td>NE 364</td>
<td>Engineering Economy</td>
<td>3</td>
<td>54 Cr. Hr.</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>NE 365</td>
<td>Accounting and Finance</td>
<td>3</td>
<td>NE 364</td>
</tr>
<tr>
<td><strong>College Electives</strong></td>
<td></td>
<td></td>
<td>At least eight credit hours (6 cr. hr.) from the following list of the college electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NE</td>
<td>264</td>
<td>NE 264</td>
<td>Scientific Thinking</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>465</td>
<td>NE 465</td>
<td>Aesthetic Education and Art Appreciation</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>466</td>
<td>NE 466</td>
<td>Environmental Science and Technology</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>467</td>
<td>NE 467</td>
<td>Management of Energy Resources</td>
<td>3</td>
<td>None</td>
</tr>
</tbody>
</table>

Department Requirements
A total of 120 credit hours are required by the department, which are distributed as follows:

- 96 credit hours of compulsory courses.
- A minimum of 24 credit hours of department restricted electives that are selected from the four main course groups.
The required compulsory courses are listed in the following table:

<table>
<thead>
<tr>
<th>Subject Field</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Cr. Hr.</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM</td>
<td>IM 213</td>
<td>Material Removal Processes</td>
<td>3</td>
<td>IM 112</td>
</tr>
<tr>
<td>IM</td>
<td>IM 314</td>
<td>Material Forming Processes</td>
<td>3</td>
<td>IM 213, ME 277</td>
</tr>
<tr>
<td>IM</td>
<td>IM 315</td>
<td>Materials Technology</td>
<td>3</td>
<td>ME 277</td>
</tr>
<tr>
<td>IM</td>
<td>IM 316</td>
<td>Advanced Manufacturing Systems</td>
<td>3</td>
<td>IM 314</td>
</tr>
<tr>
<td>IM</td>
<td>IM 417</td>
<td>Failure Analysis</td>
<td>3</td>
<td>IM 315</td>
</tr>
<tr>
<td>IM</td>
<td>IM 221</td>
<td>Introduction to Industrial Engineering</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>IM</td>
<td>IM 422</td>
<td>Work Design and Measurements</td>
<td>3</td>
<td>90 Cr. Hr.</td>
</tr>
<tr>
<td>IM</td>
<td>IM 423</td>
<td>Operations Research</td>
<td>3</td>
<td>90 Cr. Hr.</td>
</tr>
<tr>
<td>IM</td>
<td>IM 424</td>
<td>Production Planning and Control</td>
<td>3</td>
<td>IM 432</td>
</tr>
<tr>
<td>IM</td>
<td>IM 425</td>
<td>Management Science</td>
<td>3</td>
<td>IM 423</td>
</tr>
<tr>
<td>IM</td>
<td>IM 426</td>
<td>Industrial Facilities Planning</td>
<td>3</td>
<td>IM 423</td>
</tr>
<tr>
<td>IM</td>
<td>IM 432</td>
<td>Operations Management</td>
<td>3</td>
<td>90 Cr. Hr.</td>
</tr>
<tr>
<td>IM</td>
<td>IM 433</td>
<td>Industrial Data Systems Management</td>
<td>3</td>
<td>90 Cr. Hr.</td>
</tr>
<tr>
<td>IM</td>
<td>IM 434</td>
<td>Engineering Project Management</td>
<td>3</td>
<td>IM 423</td>
</tr>
<tr>
<td>IM</td>
<td>IM 341</td>
<td>Engineering Statistics</td>
<td>3</td>
<td>BA 224</td>
</tr>
<tr>
<td>IM</td>
<td>IM 342</td>
<td>Statistical Analysis</td>
<td>3</td>
<td>IM 341</td>
</tr>
<tr>
<td>IM</td>
<td>IM 443</td>
<td>Quality Engineering</td>
<td>3</td>
<td>IM 342</td>
</tr>
<tr>
<td>IM</td>
<td>IM 444</td>
<td>Reliability Engineering</td>
<td>3</td>
<td>IM 443</td>
</tr>
<tr>
<td>IM</td>
<td>IM 501</td>
<td>Senior Project I</td>
<td>3</td>
<td>S.S.</td>
</tr>
<tr>
<td>IM</td>
<td>IM 502</td>
<td>Senior Project II</td>
<td>6</td>
<td>IM 501</td>
</tr>
<tr>
<td>ME</td>
<td>ME 252</td>
<td>Mechanical Eng. Drawing</td>
<td>3</td>
<td>ME 151</td>
</tr>
<tr>
<td>ME</td>
<td>ME 274</td>
<td>Materials Science</td>
<td>3</td>
<td>BA 114, BA 142</td>
</tr>
<tr>
<td>ME</td>
<td>ME 231</td>
<td>Thermodynamics</td>
<td>3</td>
<td>BA 114</td>
</tr>
<tr>
<td>ME</td>
<td>ME 241</td>
<td>Experimental Methods</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>ME</td>
<td>ME 277</td>
<td>Strength of Materials</td>
<td>3</td>
<td>ME 274</td>
</tr>
<tr>
<td>ME</td>
<td>ME 355</td>
<td>Theory of Machines</td>
<td>3</td>
<td>BA 142</td>
</tr>
<tr>
<td>ME</td>
<td>ME 361</td>
<td>Fluid Mechanics</td>
<td>3</td>
<td>54 Cr. Hr.</td>
</tr>
<tr>
<td>ME</td>
<td>ME 454</td>
<td>Machine Design</td>
<td>3</td>
<td>ME 252</td>
</tr>
<tr>
<td>ME</td>
<td>ME 455</td>
<td>Computer Aided Design</td>
<td>3</td>
<td>ME356 or ME454</td>
</tr>
<tr>
<td>EE</td>
<td>EE 236</td>
<td>Electrical Engineering (1)</td>
<td>3</td>
<td>BA 124</td>
</tr>
<tr>
<td>EE</td>
<td>EE 326</td>
<td>Electrical Engineering (2)</td>
<td>3</td>
<td>EE 236</td>
</tr>
</tbody>
</table>

* Senior Standing (Semesters 9 and 10 only).
The restricted elective courses are listed in the table below; where, selection of courses from the four main course groups is as follows:

- Three courses equivalent to 9 credits from the main area of interest (concentration).
- Three courses, one from each of the remaining groups, equivalent to 9 credits.
- Two courses from any group equivalent to 6 credits (free electives).

<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>Group 1</td>
<td>9 – 10</td>
<td>IM 511E</td>
<td>Engineering Metrology</td>
<td>3</td>
<td>126 Cr. Hr.</td>
</tr>
<tr>
<td></td>
<td>9 – 10</td>
<td>IM 512E</td>
<td>Integrated Manufacturing Systems</td>
<td>3</td>
<td>126 Cr. Hr.</td>
</tr>
<tr>
<td></td>
<td>9 – 10</td>
<td>IM 513E</td>
<td>Advanced Joining Processes</td>
<td>3</td>
<td>IM 417</td>
</tr>
<tr>
<td></td>
<td>9 – 10</td>
<td>IM 514E</td>
<td>Polymers, Ceramics &amp; Composite Materials</td>
<td>3</td>
<td>IM 417</td>
</tr>
<tr>
<td></td>
<td>9 – 10</td>
<td>IM 515E</td>
<td>Selection of Engineering Materials</td>
<td>3</td>
<td>126 Cr. Hr.</td>
</tr>
<tr>
<td></td>
<td>9 – 10</td>
<td>IM 516E</td>
<td>Engineering Solid Mechanics</td>
<td>3</td>
<td>IM 417</td>
</tr>
<tr>
<td>Group 2</td>
<td>9 – 10</td>
<td>IM 521E</td>
<td>Discrete Event System Simulation</td>
<td>3</td>
<td>IM 423</td>
</tr>
<tr>
<td></td>
<td>9 – 10</td>
<td>IM 522E</td>
<td>Industrial Systems Simulation</td>
<td>3</td>
<td>IM 521E</td>
</tr>
<tr>
<td></td>
<td>9 – 10</td>
<td>IM 523E</td>
<td>Human Factors Engineering and Design</td>
<td>3</td>
<td>IM 422</td>
</tr>
<tr>
<td></td>
<td>9 – 10</td>
<td>IM 524E</td>
<td>Industrial Safety</td>
<td>3</td>
<td>126 Cr. Hr.</td>
</tr>
<tr>
<td></td>
<td>9 – 10</td>
<td>IM 525E</td>
<td>Industrial Material Handling Systems</td>
<td>3</td>
<td>IM 426</td>
</tr>
<tr>
<td></td>
<td>9 – 10</td>
<td>IM 526E</td>
<td>Factory Physics</td>
<td>3</td>
<td>IM 424</td>
</tr>
<tr>
<td></td>
<td>9 – 10</td>
<td>IM 532E</td>
<td>Industrial Distribution Systems</td>
<td>3</td>
<td>IM 432</td>
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Where the four main course groups are:

- Group 1: Materials and Manufacturing Engineering.
- Group 2: Industrial Engineering.
- Group 3: Management Engineering.
- Group 4: Quality and Design Engineering.
### Academic Program Sheet

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**INDUSTRIAL AND MANAGEMENT ENGINEERING**
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Course Prerequisites

The course prerequisites that are listed in the table below are illustrated through a number of flowcharts that are to be used by advisors to guide the students through their program of study.

These flowcharts are organized as follows:

- Figure 1 to Figure 3 show the courses and their relationship to each other (prerequisites) offered in the five years of study.
- Figure 4 shows the elective courses and their relationship to each other (prerequisites).
- Figure 5 to Figure 8 show the courses within each course group and their relationship to each other (prerequisites) offered in the five years of study.

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Figure 1: Course prerequisites - Years 1 and 2.
Figure 2: Course prerequisites - Years 3 and 4.
Figure 3: Course prerequisites - Year 5.

*Senior Standing (Semesters 9 and 10 only).
Figure 4: Course prerequisites - Department Restricted Electives.
Materials and Manufacturing Engineering

IM 111 Manufacturing Technology

IM 112E Engineering Metrology

IM 213E Integrated Manufacturing Systems

IM 314E Advanced Manufacturing Processes

IM 316E Advanced Manufacturing Systems

IM 315E Materials Technology

IM 417E Failure Analysis

ME 277

IM 111 Industrial Relations

IM 314E Advanced Manufacturing Processes

IM 513E Polymers, Ceramics, and Composite Materials

IM 515E Selection of Engineering Materials

IM 515E Engineering Solid Mechanics

Figure 5: Course group prerequisites - Materials and Manufacturing Engineering.
Figure 6: Course group prerequisites - Industrial Engineering,
Figure 7: Course group prerequisites - Management Engineering.
Figure 8: Course group prerequisites - Quality and Design Engineering.
Figure 9: Prerequisite flowchart
## Academic Program Analysis

### YEAR ONE

#### SEMESTER ONE

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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 Two

**Semester 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
## YEAR THREE

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### 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

** S.S.: Senior Standing.

---

**INDUSTRIAL AND MANAGEMENT ENGINEERING**
## Program Analysis by Semester Offering

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**Grand Total** | 120 | 96 | 44 | 260 | 16 | 44 | 41 | 41.5 | 14.5 | 12 | 11 | 180 |

**Percentage** | 46 | 37 | 17 | 100 | 9  | 24 | 23 | 23   | 23   | 8  | 7  | 100 |

---

* 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 10: Distribution of contact hours by semester.
Figure 11: Distribution of contact hour percentages by semester.

Figure 12: Distribution of total contact hours.
Figure 13: Distribution of credit hours per semester.

Figure 14: Distribution of credit hour percentage per semester.
Figure 15: Distribution of total credit hours.

Program Analysis by Subject Field

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Figure 16: Contact hours by subject field.

Figure 17: Contact hour percentages by subject field.
Figure 18: Contact hour percentages by subject.

Figure 19: Percentage of IM courses total contact hours per week.
Figure 20: Percentage of total contact hours by IM course group.

Figure 21: Credit hours by subject field.
Figure 22: Credit hour percentage by subject field.

Figure 23: Distribution of total credit hour percentage by subject field.
Figure 24: Distribution of total credit hours by subject field.

Figure 25: Distribution of total IM courses credit hours.
Comparison with Previous Program

Changes to Previous Program

The previous Industrial and Management Engineering program has been redesigned according to the national academic reference standards of engineering and industrial and management engineering; and, at the same time, satisfying the requirements of the Supreme Council of Egyptian Universities.

All changes made to the courses are listed in the following table:

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<td>EE 326</td>
<td>Electrical Engineering 2</td>
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<td>IM 331</td>
<td>Engineering Management</td>
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<td>IM 417</td>
<td>Failure Analysis</td>
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<td>IM 422</td>
<td>Work Design and Measurements</td>
<td>IM 331</td>
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<td>7</td>
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<td>Operations Management</td>
<td>IM 331</td>
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<td>IM 433</td>
<td>Industrial Data Systems Management</td>
<td>IM 331</td>
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<td>IM 418</td>
<td>Automated Industrial Systems</td>
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<td>IM 512E</td>
<td>Integrated Manufacturing Systems</td>
<td>IM418</td>
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<td>9</td>
<td>IM 515E</td>
<td>Selection of Engineering Materials</td>
<td>IM 514E</td>
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<td>IM 524E</td>
<td>Industrial Safety</td>
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<td>IM 533E</td>
<td>Supply Chain Management</td>
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<td>9</td>
<td>IM 543E</td>
<td>Reverse Engineering</td>
<td>IM 541E</td>
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</tbody>
</table>
Courses Summary Description

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

Basic and Applied Science (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: BA 113

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 223 – Mathematics (3)**
*Cr.3. Prerequisite: B.A124*

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*

evaluation - Residue Theorem / Application to Real Integral - Introduction to Fourier Integrals and Transforms.

**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.

**Computer Engineering (CC)**

**CC 111 – Introduction to Computers**  
*Cr.3. Prerequisite: None*


**CC 114 – Introduction to Programming**  
*Cr.3. Prerequisite: CC 111*


**Electrical Engineering (EE)**

**EE 236 – Electrical Engineering (1)**  
*Cr.3. Prerequisite: BA 124*


EE 326 – Electrical Engineering (2)
Cr.3. Prerequisite: EE 236


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 132

Industrial and Management Engineering (IM)

The Training and Senior Project Group

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 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 Industrial and Management Engineering. The research should contribute to the advancement of knowledge in the field. Written report and formal presentation are required.

IM 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 Industrial and Management Engineering. The research should contribute to the advancement of knowledge in the field. Written report and formal presentation are required.

Materials and Manufacturing Engineering Group

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


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

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


IM 213 – Material Removal Processes  
*Cr.3. Prerequisite: IM 112*


IM 314 – Material Forming Processes  
*Cr.3. Prerequisite: IM 213, ME 277*


IM 315 – Materials Technology  
*Cr.3. Prerequisite: ME 277*


IM 316 – Advanced Manufacturing Systems  
*Cr.3. Prerequisite: IM 314*


IM 417 – Failure Analysis  
*Cr.3. Prerequisite: IM 315*

IM 511E – Engineering Metrology  
*Cr.3. Prerequisite: 126 Credit Hours*


IM 512E – Integrated Manufacturing Systems  
*Cr.3. Prerequisite: 126 Credit Hours*


IM 513E – Advanced Joining Processes  
*Cr.3. Prerequisite: IM 417*


IM 514E – Polymers, Ceramics and Composite Materials  
*Cr.3. Prerequisite: IM 417*


IM 515E – Selection of Engineering Materials  
*Cr.3. Prerequisite: 126 Credit Hours*

The role of materials and design in industrial enterprise – Performance of materials in service – Fundamentals of materials selection – Environmental degradation – Case study on the selection of materials liable to environmental degradation – Selection of materials to resist failure – Case study on the selection of materials to resist failure – Effect of material properties on design – Effect of manufacturing processes on design – Case study on the effect of material properties and
managing processes on design – Economics of materials and processes – Case study on the economics of materials and processes – Selection of materials based on aesthetics and forces for change – The materials selection process – Case study on the materials selection process.

**IM 516E – Engineering Solid Mechanics**  
*Cr.3. Prerequisite: IM 417*


**Industrial Engineering Group**

**IM 221 – Introduction to Industrial Engineering**  
*Cr.3. Prerequisite: None*


**IM 422 – Work Design and Measurements**  
*Cr.3. Prerequisite: 90 Credit Hours*


**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 424 – Production Planning and Control**  
*Cr.3. Prerequisite: IM 432*


**IM 425 – Management Science**  
*Cr.3. Prerequisite: IM 423*

IM 426 – Industrial Facility Planning  
Cr.3. Prerequisite: IM 423

Introduction to facilities design – Sources of information for facilities design – Time study – Process design – Flow analysis techniques – Activity relationship analysis – Ergonomics and workstation design – Auxiliary services requirements space – Employees services – Material handling equipment – Office layout techniques – Area allocation – Facilities Design, the master layout

IM 521E – Discrete Event System Simulation  
Cr.3. Prerequisite: IM 423


IM 522E – Industrial Systems Simulation  
Cr.3. Prerequisite: IM 521E


IM 523E – Human Factors Engineering and Design (Ergonomics)  
Cr.3. Prerequisite: IM 422


IM 524E – Industrial Safety  
Cr.3. Prerequisite: 126 Credit Hours


IM 525E – Industrial Material Handling Systems  
Cr.3. Prerequisite: IM 426
Introduction to material handling classifications and concepts – Pallets, containers, and packaging – Conveyors – Vehicles (AGVs, forklifts, and hand trucks) – Vehicle systems analysis – Overhead systems (cranes and hoists) – Storage equipment introduction and analysis – Warehouse operations – Warehouse management data analysis, storage, order picking – Robots and automation – Automatic identification

**IM 526E – Factory Physics**  
_Cr. 3. Prerequisite: IM 424_


## Management Engineering Group

**IM 432 – Operations Management**  
_Cr. 3. Prerequisite: 90 Credit Hours_


**IM 433 – Industrial Data Systems Management**  
_Cr. 3. Prerequisite: 90 Credit Hours_


**IM 434 – Engineering Project Management**  
_Cr. 3. Prerequisite: IM 423_


**IM 535 – International Operations Management**  
_Cr. 3. Prerequisite: 126 Credit Hours._

foreign exchange market – The determination of exchange rates – Global manufacturing and supply chain management.

IM 531E – Human Resource Management

Cr.3. Prerequisite: 126 Credit Hours.


IM 532E – Industrial Distribution Systems

Cr.3. Prerequisite: IM 432


IM 533E – Supply Chain Management

Cr.3. Prerequisite: IM 432


IM 534E – Maintenance Management

Cr.3. Prerequisite: IM 432


IM 535E – Marketing Management

Cr.3. Prerequisite: IM 424

IM 536E – Engineering Cost Analysis  
*Cr.3. Prerequisite: 126 Credit Hours*

Importance of engineering cost analysis – Labour analysis – Case study, labour cost analysis – Case study, material cost analysis and policies – Case study, accounting analysis – Case study, estimating methods, universal and operation methods – Case study, estimating methods, product and project methods – Case Study – Estimating Methods – Case study, operation estimating. – Case study, product estimating. – Case study, cost analysis.

**Quality and Design Engineering Group**

**IM 341- Engineering Statistics**  
*Cr.3. Prerequisite: B/A 224*

Introduction to statistical sciences – Descriptive statistics and inferential statistics – Methods of graphical presentation of data – Fundamentals of probability distributions for discrete and continuous variables sampling distributions – Percentiles, quartiles and box plots – Introduction to probability theory – Addition and multiplication of probability – Conditional and total probability – Bayes theorem – Frequently used mass functions, and probability density functions.

**IM 342– Statistical Analysis**  
*Cr.3. Prerequisite: IM 341*

Statistical estimator – Point estimator – Interval estimator – Sample distributions – Test of hypotheses – Linear regression – Multiple regression – Analysis of variance.

**IM 443- Quality Engineering**  
*Cr.3. Prerequisite: IM 342*

Introduction to statistical quality control – Quality improvement tools – Control charts for variable control charts for attribute – Analysis of process control charts – Process capability – Introduction to acceptance sampling plans – Double and multiple acceptance sampling plan – Characteristics of acceptance sampling plan – Appropriate selection of acceptance sampling plans – Standards for acceptance sampling plan.

**IM 444- Reliability Engineering**  
*Cr.3. Prerequisite: IM 443*

Review of probability concepts – Failure probability distributions – Systems reliability – Application of Markov analysis to system reliability – Systems reliability (Standby) - Multimodal reliability and conditional reliability – Applying simulation modelling to systems reliability – Failure mode effect and criticality analysis – Failure tree analysis.

**IM 541E – Product Design and Development**  
*Cr.3. Prerequisite: 126 Credit Hours*

Introduction to the process of product design and development – Development processes and organizations – Product planning – QFD technique (house of quality) – Identifying customer needs, planning matrix – Product specifications (substitute quality characteristics) – Correlation between customer needs and technical requirements – Concept generation/selection/testing –

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


**IM 543E – Design of Experiments**  
*Cr.3. Prerequisite: 126 Credit Hours*

Revision of models of statistical analysis – Single factor designs (fixed/random effect) – Several factors design – 2<sup>k</sup> factorial designs – Fractional factorial design – Orthogonal arrays and Taguchi methods – Robust design.

**IM544E – Quality Assurance Systems**  
*Cr.3. Prerequisite: IM 443*


**IM 545E – Total Quality in Industrial Management**  
*Cr.3. Prerequisite: IM 443*


**IM546E – Machinery Condition Monitoring**  
*Cr.3. Prerequisite: 126 Credit Hours*


**Mechanical Engineering (ME)**

**ME 151 – Engineering Drawing & Projection**  
*Cr.2. Prerequisite: None*

Drawing practices and techniques – Geometrical constructions - Dimensioning and free hand sketching – Methods of projection – Orthogonal projection — Sectioning and conventions –
Intersection of geometrical surfaces and development – Standard metal sections and metal structures – Pictorial projection (Isometry) – Surface intersections – Perspective projection – An introduction to Computer Aided Drafting using AutoCAD.

ME 231 – Thermodynamics  
Cr. 3. Prerequisite: BA114


ME 241 – Experimental Methods  
Cr. 3. Prerequisite: None

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.

ME 252 – Mechanical Engineering Drawing  
Cr. 3. Prerequisite: ME 151


ME 274 – Materials Science  
Cr. 3. Prerequisite: BA 114 & BA 142


ME 277 – Strength of Materials  
Cr. 3. Prerequisite: ME 274

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.

ME 355 – Theory of Machines  
Cr. 3. Prerequisite: BA 142

**ME 361 – Fluid Mechanics**  
*Cr. 3. Prerequisite: 72 Credit Hours*


**ME 455 – Computer Aided Design**  
*Cr. 3. Prerequisite: ME 456*

Introduction to computer aided drafting and analysis – 2D and 3D Drafting (parametric solid modelling) – Introduction to the software "Solid Edge" – 2D and 3D parametric modelling – 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 456 – Machine Design**  
*Cr. 3. Prerequisite: ME 256*


**Non-Engineering (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 365 – Accounting and Finance

Cr.3. Prerequisite: NE 364


NE 465 – Aesthetic Education and Art Appreciation

Cr.3. Prerequisite: None

Aesthetic training and appreciation on a wide range of types of arts, including Music, Drawing, Painting, Sculpture and Engraving - Applied art (major and minor arts) - The Ancient world, Classical world and Christian world (Christianity) - Islamic and oriental arts - Medieval Western world - Renaissance in the 17th, 18th and 19th Centuries - Modern arts in the 20th Century.

NE 466 – Environment Science and technology

Cr.3. Prerequisite: None


NE 467 – Management of Energy Resource

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 Management Engineering program. The course files are organized as follows:

- Basic and Applied Science Courses – BA
- Computer Engineering Courses – CC
- Electrical Engineering Courses – EE
- Language, Humanities, & Social Science Courses – LH
- Industrial and Management Engineering Courses – IM
  - Materials and Manufacturing Engineering Courses – IM X1X
  - Industrial Engineering Courses – IM X2X
  - Management Engineering Courses – IM X3X
  - Quality and Design Engineering Courses – IMX4X
- Mechanical Engineering Courses – ME
- Non-Engineering Courses – NE
Basic and Applied Science Courses – BA

BA 113 – Physics (1)

COURSE INFORMATION

Course Title: Physics (1).
Code: BA113.
Hours: Lecture – 2 Hrs. Tutorial-2 Hrs. 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


REFERENCE BOOKS


COURSE AIM

The aim of this course is to Supply the students with strong background 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.

**COURSE OUTLINE**

*Week Number 1:* Introduction to static electricity and Coulomb’s law (1).

*Week Number 2:* Introduction to static electricity and Coulomb’s law (2).

*Week Number 3:* Electric field.

*Week Number 4:* Electric potential.

*Week Number 5:* Capacitors(1).

*Week Number 6:* Capacitors(2).

*Week Number 7:* Exam # 1.

*Week Number 8:* Electric current, ohm’s law resistors in series and parallel (1).

*Week Number 9:* Electric current, ohm’s law resistors in series and parallel (2).

*Week Number 10:* Kirchhoff’s rule.

*Week Number 11:* Introduction to theory of magnetism and different applications.

*Week Number 12:* Exam # 2.

*Week Number 13:* Electromagnetic induction.

*Week Number 14:* Optics and waves (nature of light, properties of light waves).

*Week Number 15:* Young’s double slit ‘polarization of light waves.

*Week Number 16:* Final Exam.
BA 114 – Physics (2)

COURSE INFORMATION

Course Title: Physics (2).
Code: BA114.

Hours: Lecture – 2 Hrs. Tutorial-2 Hrs. Laboratory – 1 Hr. Credit – 3.

Prerequisite: BA113.

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 behaviour 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


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 (1.1) (steam).
Week Number 6: Working Fluid (1.2) (steam).
Week Number 7: Working Fluid (2.1) (perfect gas).
Week Number 8: Working Fluid (2.2) (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 INFORMATION**

**Course Title:** Chemistry.

**Code:** BA118.

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

**Prerequisite:** None.

**GRADING**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Lab., Performance/Attendance</td>
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<tr>
<td>Midterm # 1/Assignments – (7th Week):</td>
<td>30%</td>
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<tr>
<td>Midterm # 2/Assignments – (12th Week):</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>40%</td>
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</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Topic</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Electrochemical Reactions and cells. volumetric Analysis (Practical).</td>
</tr>
<tr>
<td>2</td>
<td>Principles of corrosion. Titrate Technique, Determine of acidity (practical).</td>
</tr>
<tr>
<td>3</td>
<td>Metals and corrosive Environments. Determine of Alkalinity and chloride (practical).</td>
</tr>
<tr>
<td>4</td>
<td>Forms of corrosion uniform, Galvanic and Differential aeration cell. Determination of Hardness (Practical).</td>
</tr>
<tr>
<td>5</td>
<td>Pitting, stress corrosion cracking and intergranular corrosion forms. Determination of Dissolved oxygen (Practical).</td>
</tr>
<tr>
<td>6</td>
<td>Atmospheric and Erosion Corrosion. Spectrophotometer Analysis (Practical).</td>
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<tr>
<td>7</td>
<td>Coating and inhibitors as protection methods. Determination of nitrite and nitrate (Practical).</td>
</tr>
<tr>
<td>8</td>
<td>Cathodic protection. Determination of phosphate and silica (Practical).</td>
</tr>
<tr>
<td>9</td>
<td>Classification of fuel, properties of liquid fuel. Determination of some heavy Metals (Practical).</td>
</tr>
<tr>
<td>10</td>
<td>Combustion of fuel. Determination of fluorine and chlorine (Practical).</td>
</tr>
<tr>
<td>11</td>
<td>Air supply and Exhaust Gases. Determination of turbidity (Practical).</td>
</tr>
<tr>
<td>12</td>
<td>Classification of lubricants Advantages and disadvantages of different types. Oil Analysis Determination of Viscosity and T.B.N (Practical).</td>
</tr>
<tr>
<td>13</td>
<td>Properties of lubricants and Additives. Determination of Insoluble and Saltwater (Practical).</td>
</tr>
<tr>
<td>15</td>
<td>Water Treatment. Determination of PH (Practical).</td>
</tr>
<tr>
<td>16</td>
<td>Air and water pollution. Determination of TDS and salinity (Practical).</td>
</tr>
</tbody>
</table>
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.

REFERENCE BOOKS

References available in AAST Library.


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 N\textsuperscript{th} 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.

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

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.

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

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 223 – Mathematics (3)

**Course Information**

Course Title: Mathematics (3).

Code: BA223.


Prerequisite: BA124.

**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 modelling 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

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Solving first order differential equations: Separable of variables and Homogeneous equation.</td>
</tr>
<tr>
<td>2</td>
<td>Solving first order differential equations: Exact and Linear equations.</td>
</tr>
<tr>
<td>3</td>
<td>Solving first order differential equations: Bernoulli's equation and revision on first order differential equations.</td>
</tr>
<tr>
<td>4</td>
<td>Solving second order homogeneous differential equations with constant coefficients. Method of undetermined coefficients.</td>
</tr>
<tr>
<td>5</td>
<td>Solving second order non-homogeneous differential equations with constant coefficients. Method of variation of parameters.</td>
</tr>
<tr>
<td>6</td>
<td>Continue method of variation of parameters. Solving second order differential equations with variable coefficients (Euler's equation).</td>
</tr>
<tr>
<td>7</td>
<td>Laplace transform: Basic definition, First shifting theorem.</td>
</tr>
<tr>
<td>8</td>
<td>Laplace transform: Transform differentiation and integration.</td>
</tr>
<tr>
<td>9</td>
<td>Unit step function, second shifting theorem, and convolution theorem.</td>
</tr>
<tr>
<td>10</td>
<td>Inverse Laplace transforms.</td>
</tr>
<tr>
<td>11</td>
<td>Solving differential equations by using Laplace transform.</td>
</tr>
<tr>
<td>12</td>
<td>Fourier series: Fourier series for functions of period 2P.</td>
</tr>
<tr>
<td>13</td>
<td>Fourier series for even and odd functions.</td>
</tr>
<tr>
<td>14</td>
<td>Fourier series for harmonic functions.</td>
</tr>
<tr>
<td>15</td>
<td>Revision.</td>
</tr>
<tr>
<td>16</td>
<td>Final Exam.</td>
</tr>
</tbody>
</table>
BA 224 – Mathematics (4)

COURSE INFORMATION

Course Title: Mathematics (4).
Code: BA 224.
Prerequisite: BA 223.

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 141 – Engineering Mechanics (1)

Course Information
Course Title: Engineering Mechanics (1).
Code: BA141.
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
Books available in the AAST Library

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

Course Objectives
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

Course Outline
Week Number 1: Rectangular components of a force.
Week Number 2: Parallelogram law.
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.


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


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 – 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 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 – 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

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

Week Number 1: Introduction to the World of Computers Input and Output.
Week Number 2: The System Unit: Processing and Memory.
Week Number 3: Storage and Input/output Devices.
Week Number 4: System Software and Application Software.
Week Number 5: Quiz 1 + Program Development, Programming Languages, and Flow charts.
Week Number 6: Visual Basic 1.
Week Number 7: 7th Week Exam.
Week Number 8: Visual Basic 2.
Week Number 9: Visual Basic 3.
Week Number 10: Quiz 2 + Web page design using HTML 1.
Week Number 11: Web page design using HTML 2.
Week Number 12: 12th Week Exam.
Week Number 13: Communications and Networks 1.
Week Number 14: Communications and Networks 2.
Week Number 15: Ethics, Computer Crime, Privacy, and other Social Issues.
Week Number 16: Final Exam.
**CC 114 – Introduction to Programming**

**Course Information**

Course Title: Introduction to programming.

Code: CC 112.

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

Prerequisite: CC 111 - Introduction to computer.

**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**

This course will help students know the concepts of programming using VB, and knowing how to use editors to implement these concepts.

**Course Objectives**

Upon completion of this course, students should be able to:

- Explain the different concepts of programming, and knowing the different tools that can be used.
- Experiment this using visual studio

**Course Outline**

*Week Number 1:* Introduction to visual basic.

*Week Number 2:* Introducing variables, memory concepts and arithmetic.

*Week Number 3:* Illustrating application example.
Week Number 4: Introducing algorithms, pseudocode, program control, checkboxes and dialogs.

Week Number 5: Sample applications.

Week Number 6: Introducing the Do While…Loop and Do Until…Loop Repetition Statements.

Week Number 7: Introducing the Do …Loop While and Do …Loop Until Repetition Statements.

Week Number 8: Introducing the For … Next Repetition Statement.

Week Number 9: Introducing the Select Case Multiple-Selection Statement.

Week Number 10: Introducing One-Dimensional Arrays.

Week Number 11: Introducing Two-Dimensional Arrays.

Week Number 12: Two-Dimensional Arrays Application.

Week Number 13: General Application.

Week Number 14: Functions and Procedures.

Week Number 15: Fibonacci Application.

Week Number 16: Students’ projects.
Electrical Engineering Courses – EE

EE 236 – Electrical Engineering (1)

Course Title: Electrical Engineering (1)
Code: EE 236
Hours: Lecture – 2 Hrs. Tutorial/Lab – 2/2 Hrs. Credit – 3.
Prerequisite: BA 124

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 provide a thorough coverage of behaviour of circuit elements under direct and alternating current sources. The phasor concepts and of impedance and admittance are introduced. Basic concepts of magnetic circuit and electromagnetism are given. Three phase circuit and power calculation is covered.

COURSE OUTLINE

Week Number 1: Basic d-c circuit elements, series and parallel network.
Week Number 2: Resistance, Voltage, current, Ohm’s law and Kirchhoff’s laws.
Week Number 3: Resistances in series or parallel, current divider and voltage divider.
Week Number 4: Nodal analysis.
Week Number 5: Mesh analysis.
Week Number 6: Laws of magnetic force.
Week Number 7: 7th week + Field strength, flux density, relation between B, H, I, K.
Week Number 8: Magnetic circuits.
Week Number 9: Alternating currents, waves, effective, mean values.
Week Number 10: RL, RC circuits, power calculation.
Week Number 11: Analysis of A-C networks.
Week Number 12: 12th week + Analysis of three phase circuits.
Week Number 13: Analysis of three phase circuits (1).
Week Number 14: Analysis of three phase circuits (2).
Week Number 15: Analysis of three phase circuits (3).
Week Number 16: Final Exam.
**EE 326 – Electrical Engineering (2)**

**Course Information**

Course Title: Electrical engineering (2).

Code: EE 326.

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

Prerequisite: EE 236.

**Grading**

Class Performance/Attendance: 10%

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

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

Final Exam: 40%

**Course Description**


**Text Book**

Lecturer notes.

**Reference Books**


**Course Objectives**

- To investigate the different electrical measurements techniques.
- To study the different electrical machines (DC, AC).
- To understand the idea of automatic control systems.

**Course Outline**

*Week Number 1:* Moving coil instrument.

*Week Number 2:* Moving iron instrument.

*Week Number 3:* Dynamometer type instruments.
Week Number 4: Induction type instruments.
Week Number 5: Watt-meters and power factor meter.
Week Number 6: DC Machines.
Week Number 7: 7th week + Transformers.
Week Number 8: Induction motors.
Week Number 9: Synchronous generators.
Week Number 10: Special type motors.
Week Number 11: Control systems.
Week Number 12: 12th week + Open loop & closed loop systems.
Week Number 13: Control system components.
Week Number 14: Transient response.
Week Number 15: PID controllers.
Week Number 16: Final Exam.
Language, Humanities, & Social Science Courses – 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.

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.
LH 231 – ESP III
COURSE INFORMATION

Course Title: ESP III.
Code: LH 231.
Hours: Lecture – 3 Hrs. Credit – 3.
Prerequisite: LH 132.

GRADING

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

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.
Industrial and Management Engineering Courses – IM

Materials and Manufacturing Engineering Courses Group

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

REFERENCE BOOKS


COURSE AIM

To introduce students to the basis 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

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

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 the department of 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 213 – Material Removal Processes

COURSE INFORMATION

Course Title: Material Removal Processes
Code: IM 213.
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

The course covers a variety of topics including: Chip type machining processes, cutting tools, tool wear, turning processes, drilling, broaching, and abrasive machining. It also includes the mechanics of chip formation, analytical study of machining processes, work piece holding devices, and thread and gear manufacturing. Furthermore, it gives an overview of non-traditional machining processes, process accuracy and product surface finish, precision measurements and metrology.

TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

The aim of this course is to study the manufacturing processes, which convert the materials into functionally usable goods by means of material removal. Processes must be selected for compatibility with the selected materials; keeping in mind the quality, cost, and production rate. Finally the aim of this course has been to produce a state of the art introduction to the material removal processes used in manufacturing.

COURSE OBJECTIVES

The student should be able to understand the fundamentals of the material removal processes and to optimize these processes and machine tools i.e. minimize waste and cost and maximize performance and quality.
## COURSE OUTLINE

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Mechanics of metal cutting.</td>
</tr>
<tr>
<td>3</td>
<td>Cutting tools for machining.</td>
</tr>
<tr>
<td>4</td>
<td>Turning and related processes.</td>
</tr>
<tr>
<td>5</td>
<td>Drilling and hole making processes.</td>
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<tr>
<td>6</td>
<td>Milling.</td>
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<tr>
<td>7</td>
<td>Broaching, Shaping and Planning.</td>
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<tr>
<td>8</td>
<td>Abrasive machining processes.</td>
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<tr>
<td>9</td>
<td>Abrasive machining processes.</td>
</tr>
<tr>
<td>10</td>
<td>Work holding devices.</td>
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<tr>
<td>11</td>
<td>Thread manufacturing.</td>
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<tr>
<td>12</td>
<td>Gear manufacturing.</td>
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<tr>
<td>13</td>
<td>Non traditional machining processes.</td>
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<tr>
<td>14</td>
<td>Surface treatment and finishing.</td>
</tr>
<tr>
<td>15</td>
<td>Revision.</td>
</tr>
<tr>
<td>16</td>
<td>Final Exam.</td>
</tr>
</tbody>
</table>
**IM 314 – Metal Forming Processes**

**COURSE INFORMATION**

Course Title: Metal Forming Processes.

Code: IM 314.

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

Prerequisite: IM 213 & ME 277.

**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 concept of plastic deformation and Mechanical behaviour of materials. This includes stress, strain and different bulk deformation processes; including forging and forgeability, rolling, extrusion, rod & wire drawing. It also covers sheet metal forming and formability, deep drawing, shearing processes; blanking & piercing, and welding processes.

**TEXT BOOKS**


**REFERENCE BOOKS**


**COURSE AIM**

The course aims at providing the students with the fundamental knowledge about the bulk deformation processes of metals.

**COURSE OBJECTIVES**

Understand the fundamentals of the mechanical behaviour of materials. Define the physical fundamentals and theories of plastic deformation. Study the different forming processes. Describe the equipment, practice, and defects of forming processes. Calculate force, work, and power of forming processes.
**Course Outline**

**Week Number 1:** Introduction, Definition of plastic deformation, Classification of forming processes, the behaviour of materials under tension, compression, bending, torsion & impact.

**Week Number 2:** True stress - true strain, Instability in simple tension, Types of stress - strain curves, Effect of temperature, strain rate & work of deformation.

**Week Number 3:**Forging Processes, Definition, Open die forging, Forces and work of deformation, forging of rectangular & cylindrical specimens.

**Week Number 4:** Forging processes, closed die forging, Die design, Die material, lubrication, Forgeability, Forgeability tests, Forging equipment, Forging defects.

**Week Number 5:** Rolling processes, Definition, Rolling products, Mechanics of flat rolling, Roll force, torque, & power.

**Week Number 6:** Rolling processes. Flat rolling practice, Defects in rolling, Equipment, Miscellaneous rolling operations.

**Week Number 7:** Exam # 1.

**Week Number 8:** Extrusion processes: Principle, Types of extrusion, Metal flow in extrusion, Ideal deformation and Ideal deformation with friction.

**Week Number 9:** Extrusion Processes: Extrusion practice, Hot & Cold extrusion, Defects in extrusion.

**Week Number 10:** Rod & Wire drawing, Principle, Mechanics of rod & wire drawing, Ideal deformation, Ideal deformation with friction. Drawing forces & stresses.

**Week Number 11:** Drawing of round rods & wires, Die pressure, Optimum die angle, drawing practices, drawing of flat strip.

**Week Number 12:** Exam # 2.


**Week Number 14:** Sheet metal forming, Principle, Shearing processes, blanking & piercing processes, Shearing dies (Compound & Progressive), Shearing forces & power.

**Week Number 15:** Welding processes, Principle, Classification of welding processes, Oxy-acetylene, shielded metal arc, Gas metal arc, Gas tungsten arc, and Submerged arc welding processes.

**Week Number 16:** Final Exam.
IM 315 – Materials Technology

Course Information

Course Title: Materials Technology.
Code: IM 315.
Hours: Lecture – 2 Hrs. Laboratory – 2 Hrs. Credit – 3.
Prerequisite: ME 277.

Grading

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

Course Description

The course covers the classification of engineering materials, material selection for manufacturing, casting processes and solidification, fluid flow, melting practice and casting alloys, continuous casting of steel and die casting, die design. It also includes polymers, processing of polymers, processing of reinforced plastics, metal powders production and compaction, ceramics properties and forming processes.

Text Books


Reference Books


Course Aim

The course aim is to improve the understanding of the metallurgical and materials aspects of manufacturing processes.

Course Objectives

The objective of the course is to improve the students understanding of the different manufacturing processes through the understanding of materials properties in relation to processing.
COURSE OUTLINE

Week Number 1: Course Introduction.
Week Number 2: Properties of metals.
Week Number 3: Pure metals and single phase alloys.
Week Number 4: Iron carbon phase diagram and ferrous alloys.
Week Number 5: Melting and solidification.
Week Number 6: Heat treatment of metals and alloys.
Week Number 7: 7th Week Exam.
Week Number 8: Nonferrous metals and alloys.
Week Number 9: Metal joining processes.
Week Number 10: Polymeric materials and composites.
Week Number 11: Processing of polymeric materials and composites.
Week Number 12: 12th Week Exam.
Week Number 13: Powder metallurgy.
Week Number 14: Processing of ceramics.
Week Number 15: Review.
Week Number 16: Final Exam.
IM 316 – Advanced Manufacturing Systems

**Course Information**

Course Title: Advanced Manufacturing Systems  
Code: IM 316.  
Hours: Lecture – 2 Hrs. Laboratory – 2 Hrs. Credit – 3.  
Prerequisite: IM 314.

**Grading**

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

**Course Description**

Reflecting manufacturers’ growing need to integrate computers into their production processes, this course covers the machining fundamentals, as well as Computer Numerical Control (CNC) programming and operation. It covers the operation of Computer Numerical Control machine tools with a focus on word address (G and M code) programming for the industry standard Fanuc controllers.

**Text Book**


**Reference Books**


**Course Aim**

The course aims at providing students with a broad background on advanced manufacturing systems with a focus on computer numerical control manufacturing. Students will be able to develop their own G and M codes for the manufacturing of various parts using different machining operations. Students will also be able to use simulation software to verify and display real-time solid model animation of the machining that results from a part program.

**Course Objectives**

Upon completion of this course the student will be able to:
- Explain the terminology used to describe CNC machine tools.
- Explain the basic types of CNC machine tools and the manufacturing operations for which they are best suited.
- Describe the major factors in the development of CNC machines.
- Prepare G and M code programs and documentation for the manufacturing steps required to produce machined parts on CNC turning and machining centres.
- Verify and simulate the machining of parts that result from a part program.
- Explain the elements and advantages of computer aided manufacturing systems.

**COURSE OUTLINE**

- **Week Number 1:** Introduction to Computer Numerical Control Manufacturing.
- **Week Number 2:** Modern Machine Tool Controls.
- **Week Number 3:** Tooling for Hole and Milling Operations.
- **Week Number 4:** Exploring Features of CNC Machining Centres.
- **Week Number 5:** Review of Basic Blueprint Reading for CNC Programmers.
- **Week Number 6:** Review of Basic Geometric Dimensioning and Tolerancing for CNC Programmers.
- **Week Number 7:** Mathematics for CNC Programming.
- **Week Number 8:** Word Address Programming.
- **Week Number 9:** Programming Hole Operations.
- **Week Number 10:** Programming Linear Profiles and Circular Profiles.
- **Week Number 11:** Programming with Cutter Diameter Compensation.
- **Week Number 12:** Concepts, Techniques, and Fixed Cycles for CNC Lathe Programming.
- **Week Number 13:** Modern Computer-Aided Part Programming.
- **Week Number 14:** Elements of the Computer-Controlled Factory.
- **Week Number 15:** Verifying Part Programs.
- **Week Number 16:** Final Exam.
**IM 417 – Failure Analysis**  
**COURSE INFORMATION**

Course Title: Failure Analysis.  
Code: IM 417.  
Hours: Lecture – 2 Hrs.  
Laboratory – 2 Hrs.  
Credit – 3.  
Prerequisite: IM 315.  

**GRADING**

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

**COURSE DESCRIPTION**

The course covers different techniques for failure analysis including modes for mechanical failure, residual stresses, brittle and ductile fractures, fatigue fracture, wear, corrosion, elevated-temperature failures. It also introduces the different techniques of non-destructive testing.

**TEXT BOOKS**


**REFERENCE BOOKS**


**COURSE AIM**

The course aim is to introduce the students to the various modes of failures and understand its causes and various mechanisms.

**COURSE OBJECTIVES**

The objective of the course is to develop the student’s abilities in recognizing the various forms of failure and to carry out failure investigations to avoid such failures in the future.
<table>
<thead>
<tr>
<th>Week Number</th>
<th>Course Content</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
</tr>
<tr>
<td>2</td>
<td>Technique of failure analysis: procedure, questions to ask about fracture</td>
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<td>3</td>
<td>Distortion failure</td>
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<td>4</td>
<td>Basic single-load fracture modes</td>
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<tr>
<td>5</td>
<td>Stress systems related to single-load fracture</td>
</tr>
<tr>
<td>6</td>
<td>Review of mechanical properties</td>
</tr>
<tr>
<td>7</td>
<td>Exam # 1</td>
</tr>
<tr>
<td>8</td>
<td>Stress versus strength</td>
</tr>
<tr>
<td>9</td>
<td>Residual stress</td>
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<td>10</td>
<td>Brittle and ductile fractures</td>
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<tr>
<td>11</td>
<td>Fatigue fracture (1), (2)</td>
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<tr>
<td>12</td>
<td>Exam # 2</td>
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<tr>
<td>13</td>
<td>Wear</td>
</tr>
<tr>
<td>14</td>
<td>Corrosion</td>
</tr>
<tr>
<td>15</td>
<td>Elevated temperature failures</td>
</tr>
<tr>
<td>16</td>
<td>Final Exam</td>
</tr>
</tbody>
</table>
IM 511E – Engineering Metrology

**COURSE INFORMATION**

Course Title: Engineering Metrology.

Code: IM 511E.

Hours: Lecture – 2 Hrs. Laboratory – 2 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 covers the following topics: dimensional engineering meteorology, dimensional tolerance, error propagation and tolerance accumulation, screw thread measurements and inspection, geometrical tolerance, and verification of geometrical features.

**TEXT BOOKS**


**REFERENCE BOOKS**

- Grevc, John W., Wilson, Frank W., "American Society of Tool and Manufacturing Engineers", Prentice Hall.

**COURSE AIM**

The course aim is to give the students a clear idea about the evaluation of quality of manufactured component.

**COURSE OBJECTIVES**

The objective of the course is to study methods of specification for the dimensional and geometrical tolerance; procedures of inspection for dimensional and geometrical tolerance of engineering components.
## COURSE OUTLINE

**Week Number 1:** Dimensional tolerance limits and fits standard limit and tolerance systems.

**Week Number 2:** Principles of limit gauge design, selective assembly, gauge tolerance.

**Week Number 3:** Tolerance accumulation and error propagation, effect of measurements procedures and measuring instruments errors.

**Week Number 4:** Linear measurements slip and block gauges, block gauge calibration, length bars, block gauges calibration, principles of kinematics instrument design.

**Week Number 5:** Angular measurements, angle block gauge, calibration of angle block gauge, precision polygons, sine (bar, table, and centre), and angle measurements using optical or mechanical methods.

**Week Number 6:** Screw threads, standard types of screw threads, screw threads tolerances, measurements and inspection of screw threads (using optical, mechanical techniques).

**Week Number 7:** 7th week Exam.

**Week Number 8:** Design of limits gauges for screw thread inspection.

**Week Number 9:** Gear measurements, types of gears, gear nomenclature, gear dimensions and tolerances.

**Week Number 10:** Gear measurement and inspection, measurement techniques, static and dynamic position error.

**Week Number 11:** Principles of geometrical tolerances, types of geometrical tolerances.

**Week Number 12:** 12th week Exam.

**Week Number 13:** Techniques and procedure for measurements and inspection of geometrical features.

**Week Number 14:** Equipment and instruments used for verification of engineering geometrical components.

**Week Number 15:** Equipment and instruments used for verification of engineering geometrical components.

**Week Number 16:** Final Exam.
IM 512E – Integrated Manufacturing Systems

Course Title: Integrated Manufacturing Systems
Code: IM 512E
Hours: Lecture – 2 Hrs. Laboratory – 2 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

This course covers the technology associated with computer integrated manufacturing (CIM). Conventional manufacturing technologies are introduced, followed by computer automation and CIM. The course includes computer-aided design (CAD), product data management (PDM), computer-aided engineering (CAE), and integrated manufacturing systems.

Text Book


Reference Books


Course Aim

The course aims to provide the most advanced, comprehensive, and balanced coverage of the subject of integrated manufacturing systems. Also, the module covers the different CAX tools and the means to their integration.
COURSE OBJECTIVES

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

- Understand the basic functional units of integrated manufacturing systems and its importance to the manufacturing enterprise.
- Identify the different design elements and production engineering.
- Understand the enabling processes and systems for modern manufacturing.
- Know the different issues in integration of manufacturing systems.

COURSE OUTLINE

Week Number 1: The Manufacturing Enterprise.
Week Number 2: Manufacturing Systems.
Week Number 3: Product Design and Production Engineering.
Week Number 4: Design Automation: CAD and PDM.
Week Number 5: Application of CAD to Manufacturing Systems.
Week Number 6: Selecting CAD Software for an Enterprise.
Week Number 7: Product Data Management.
Week Number 8: Design Automation: CAE.
Week Number 9: Design for Manufacturing and Assembly.
Week Number 10: CAE Analysis and Evaluation.
Week Number 11: Production Engineering Strategies.
Week Number 12: Design and Production Engineering Network.
Week Number 13: The Revolution in Manufacturing.
Week Number 14: Production Process Machines and Systems.
Week Number 15: Production Support Machines and Systems.
Week Number 16: Final Exam.
IM 513E – Advanced Joining Processes

COURSE INFORMATION

Course Title: Advanced Joining Processes
Code: IM 513E
Hours: Lecture – 2 Hrs. Laboratory – 2 Hrs. Credit – 3.
Prerequisite: IM 417.

GRADING

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

COURSE DESCRIPTION

This is an advanced course that covers the different joining processes; reaction of various materials to welding, brazing and soldering; distortion; process and material selection and structural engineering considerations.

TEXT BOOK


REFERENCE BOOKS


COURSE AIM

This course aims at covering the different classifications of the most recent and up-to-date joining processes. In addition, it introduces students to the techniques of joining various types of materials together. Finally, it helps the students to analyse the quality of weldments and select the most suitable processes and processing condition for joining operations.

COURSE OBJECTIVES

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

- Analyze metallurgical and mechanical aspects of joining objects made of same material by welding, brazing, soldering, and adhesive bonding.
Understand the engineering challenges in joining dissimilar materials.
- Analyze and design simple weldments.
- Select the appropriate process and processing conditions for joining operations.

**COURSE OUTLINE**

**Week Number 1:** Classifications of Joining Processes and Equipment.

**Week Number 2:** Process Variables and requirements.

**Week Number 3:** Electron Beam Welding.

**Week Number 4:** Laser Beam Welding.

**Week Number 5:** Ultrasonic Welding.

**Week Number 6:** High Frequency Resistance Welding.

**Week Number 7:** Explosion Welding.

**Week Number 8:** Diffusion Welding.

**Week Number 9:** Weldability of Engineering Materials.

**Week Number 10:** Welding Nonferrous Metals.

**Week Number 11:** Welding Special and Dissimilar Metals.

**Week Number 12:** Joinability of Engineering Materials by Brazing and Soldering.

**Week Number 13:** Adhesive Bonding.

**Week Number 14:** Failure of Joined Structures.

**Week Number 15:** Quality Control and Evaluation of Welds.

**Week Number 16:** Final Exam.
IM 514E – Polymers, Ceramics and Composite Materials

**COURSE INFORMATION**

Course Title: Polymers, Ceramics and Composite Materials  
Code: IM 514E  
Hours: Lecture – 2 Hrs.  
Laboratory – 2 Hrs.  
Credit – 3.  
Prerequisite: IM 417.

**GRADING**

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

**COURSE DESCRIPTION**

This course covers the structure-property relationships as well as the mechanical and thermo-mechanical characteristics of the different types of polymeric, ceramic and composite materials. In addition, it introduces the students to the different properties and industrial applications of these classes of materials.

**TEXT BOOK**


**REFERENCE BOOKS**


**COURSE AIM**

This course aims at covering the different classifications of advanced materials such as polymers, ceramics and composites. The course also aims at familiarizing the student with the key properties of these materials and their applications in industry.

**COURSE OBJECTIVES**

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

- Develop an understanding of the impact of ceramic and polymer technology on society, locally and internationally.
Apply materials engineering concepts in selecting or designing a process, or material to meet a specific requirement specification of a ceramic or polymeric component.

Identify practical materials engineering problems in ceramic and polymer technologies

Be familiar with the various processes to make different types of composite materials and components and the applications of different types of composites.

**COURSE OUTLINE**

*Week Number 1:* Classification of Polymeric Materials.

*Week Number 2:* Mechanical and Thermo-mechanical Characteristics.

*Week Number 3:* Elastomers: Natural & Synthetic Rubbers.

*Week Number 4:* Adhesives and Other Important Polymeric Materials.

*Week Number 5:* Wood and Related Products.

*Week Number 6:* Polymer Applications and Processing.

*Week Number 7:* Nature and Design of Ceramics.

*Week Number 8:* Ceramic Processing.

*Week Number 9:* Refractories, Cement, Concrete, Clay, Protective Coatings, and Abrasives.

*Week Number 10:* Electronic, Magnetic Ceramics, Smart Ceramics.

*Week Number 11:* Glass, Radioactive Materials and Nuclear Fuels.

*Week Number 12:* Particle Reinforced Composites.

*Week Number 13:* Fibre Structures and Properties.

*Week Number 14:* Composite Structures, Types and Processing.

*Week Number 15:* Fastening, Machining, Repair and Evaluation.

*Week Number 16:* Final Exam.
IM 515E – Selection of Engineering Materials

COURSE INFORMATION

Course Title: Selection of Engineering Materials
Code: IM 515E
Hours: Lecture – 2 Hrs. Laboratory – 2 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 helps students develop problem-solving abilities for materials evaluation and selection, materials processes selection, failure analysis, and materials testing. The course includes the study of the basics for material selection in the design of engineering systems; materials design parameters, and classes of materials. A set of case studies in material’s selections are given throughout the course to develop the materials selection knowledge and skills of the students.

TEXT BOOK


COURSE AIM

The course aims to provide the students with insights and understanding of the engineering factors to be considered in selecting and justifying materials for new or replacement applications and to provide familiarity with methods of failure analysis. It also aims to create an awareness of many other factors that enter into engineering decisions, including cost and ethics considerations.

COURSE OBJECTIVES

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

- Understand the relationships between the various stages of design and optimization and the mechanics of materials
- Apply systematic procedures to make a rational choice in selecting a material or process.
Select a process or material, which best matches the requirements of a design.
Select materials from broad information sources on materials properties through the use of charts, materials indices, available software, and other sources.

COURSE OUTLINE

Week Number 1: The Role of Materials and Design in Industrial Enterprise.
Week Number 2: Performance of Materials in Service.
Week Number 3: Fundamentals of Materials Selection.
Week Number 4: Environmental Degradation.
Week Number 5: Case Study on the Selection of Materials Liable to Environmental Degradation.
Week Number 6: Selection of Materials to Resist Failure.
Week Number 7: Case Study on the Selection of Materials to Resist Failure.
Week Number 8: Effect of Material Properties on Design.
Week Number 9: Effect of Manufacturing Processes on Design.
Week Number 10: Case Study on the Effect of Material Properties and Manufacturing Processes on Design.
Week Number 11: Economics of Materials and Processes.
Week Number 12: Case Study on the Economics of Materials and Processes.
Week Number 13: Selection of Materials based on Aesthetics and Forces for Change.
Week Number 14: The Materials Selection Process.
Week Number 15: Case Study on the Materials Selection Process.
Week Number 16: Final Exam.
IM 516E – Engineering Solid Mechanics

Course Information

Course Title: Engineering Solid Mechanics
Code: IM 516E
Hours: Lecture – 2 Hrs. Laboratory – 2 Hrs. Credit – 3.
Prerequisite: IM 417.

Grading

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

Course Description

This course presents solid modelling not just as a communication tool, but as an integral part of the design process. To this end the course explores design intent, the use of solid models in engineering analysis, and introduces techniques from manufacturing such as mould design and sheet metal patterning. The course includes the study of the basis for solid mechanics in the design of machine and product elements. A set of case studies are given throughout the course to develop the part design modelling knowledge and skills of the students.

Text Book


Reference Books


Course Aim

The course aims to provide the student insights and understanding of the engineering factors to be considered in designing and modelling part components for new or replacement applications and to provide familiarity with methods of failure analysis. To create an awareness of many other factors that enters into engineering decisions.
COURSE OBJECTIVES

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

- Understand the relationships between the various stages of stresses as related to plane and different types of loading
- Apply systematic procedures to make a rational choice in designing a part or machine components.
- Calculate stresses on parts of different materials, which best matches the requirements of a design.

COURSE OUTLINE

Week Number 1: Introductory Concepts of Solid Mechanics.

Week Number 2: Analysis of Stress.

Week Number 3: Analysis of Strain.

Week Number 4: Elastic Stress Strain Relations.

Week Number 5: Plane Stress.

Week Number 6: Plane Strain.

Week Number 7: Axisymmetric Problems.

Week Number 8: Strain Energy.

Week Number 9: Yield Criteria.

Week Number 10: Thin Wall Cylinders and Shells.

Week Number 11: Thick Wall Cylinders.

Week Number 12: Buckling of Columns.

Week Number 13: Plastic Deformation.

Week Number 14: Plastic Instability, Superplasticity and Creep.

Week Number 15: Applications to Fracture Mechanics.

Week Number 16: Final Exam.
Industrial Engineering Courses Group

IM 221 – Introduction to Industrial Engineering

Course Title: Introduction to Industrial Engineering.

Code: IM 221.


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 the fundamentals of Industrial Engineering; concepts, analysis, and design. It covers applications of the principles and problems in operations research, systems analysis, manufacturing processes, human factors, facility design, process selection, production processes, quality and operation management.

TEXT BOOKS


REFERENCE BOOKS


COURSE AIMS

- To introduce the student at an early stage of his study – to the Industrial Engineering Environment.
- Raise his awareness of the importance of this engineering field in shaping the economy and future of the country.

COURSE OBJECTIVES

- To define “Industrial Engineering” and identify its place in the Engineering and Business Fields.
To give a broad overview of the areas and functions of Industrial Engineering.

**COURSE OUTLINE**

*Week Number 1:* History of Engineering and the Evolution of Industrial Engineering.

*Week Number 2:* Industrial and Management Engineering.

*Week Number 3:* Fundamentals areas of Industrial Engineering.

*Week Number 4:* Manufacturing Processes.

*Week Number 5:* Facility Layout.

*Week Number 6:* Industrial Material Handling

*Week Number 7:* Midterm Exam # 1.

*Week Number 8:* Decision analysis.

*Week Number 9:* Operation Management.

*Week Number 10:* Quality Control.

*Week Number 11:* Cost Volume Analysis.

*Week Number 12:* Midterm Exam # 2

*Week Number 13:* Process and Material Selection.

*Week Number 14:* Resource Management.

*Week Number 15:* Project Management.

*Week Number 16:* Final Exam.
IM 422 – Work Design and Measurements

Course Title: Work Design and Measurements.
Code: IM 422.
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 introduces the students to the concept of improvement of productivity through designing and developing various work centres. It covers the detailed restudying of work centres to find better ways to produce the products and/or improve their quality, study of basic techniques required to establish an allowed time standard to perform a given task. It also includes performance rating and measurement of work content of prescribed methods with considerations for allowance for fatigue and personal unavoidable delays.

Text Books

Reference Books

Course Objectives
To emphasize the importance of
- Increasing productivity
- Improving product reliability & quality
- Lowering unit cost, through:
- Minimizing the time required to perform a task.
- Conserving resource and power consumption.
- Maximizing safety, health and well being of employees
Protecting environment
Raising job satisfaction and interest

Course Outline

Week Number 1: Introduction.
Week Number 2: The development of motion and time study.
Week Number 3: Product flow macromotion study.
Week Number 4: Micromotion study.
Week Number 5: Micromotion study.
Week Number 6: Process analysis tools.
Week Number 7: 7th Week Exam.
Week Number 8: Workstation design.
Week Number 9: Predetermined time standards.
Week Number 10: Predetermined time standards.
Week Number 11: Stopwatch time study.
Week Number 12: 12th Week Exam.
Week Number 13: Stopwatch time study.
Week Number 14: Work balancing.
Week Number 15: Wage payment systems.
Week Number 16: Revision.
IM 423 – Operations Research

COURSE INFORMATION

Course Title: Operations Research.
Code: IM 423.
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 424 – Production Planning and control

Course Information

Course Title: Production Planning and control.

Code: IM 424.

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

Prerequisite: IM 432.

Grading

Class Performance/Attendance: 10%

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

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

Final Exam: 40%

Course Description

The course covers topics related to materials management; purchasing and inventory acquisition, inventory control; including safety stocks and service levels. It also includes material and capacity requirements planning, scheduling and controlling production activities, analysis of manufacturing, service and project operations. Furthermore, it covers quality assurance, maintenance and cost control, and strategy for future production operations.

Text Books


Reference Books

- Hill, T., "Production/Operations Management", Allyn and Bacon, Inc.

Course Aim

The course aims to provide the students with an understanding of the basic theories and techniques used in the production and inventory control and in maintaining effective manufacturing and service operations and enable them to contribute to improved operation decisions.
COURSE OBJECTIVES

- Understanding that decisions made by production and operations managers can have a major impact on an organization’s competitive performance.
- Introduce quantitative methods that are integrated into the conceptual material and presented as tools for solving specific problems.

COURSE OUTLINE

Week Number 1: Introduction to Course.
Week Number 2: Overview of Operations Management.
Week Number 3: Introduction to Inventory Management.
Week Number 4: Independent Demand Inventory Models 1.
Week Number 5: Independent Demand Inventory Models 2.
Week Number 6: Independent Demand Inventory Models 3.
Week Number 7: 7th Week Exam.
Week Number 8: Material Requirements Planning 1.
Week Number 9: Material Requirements Planning 2.
Week Number 10: Aggregate Planning 1.
Week Number 11: Aggregate Planning 2.
Week Number 12: 12th Week Exam.
Week Number 13: Operations Scheduling 1.
Week Number 14: Operations Scheduling 2.
Week Number 15: Just-In-Time Systems.
Week Number 16: Final Exam.
IM 425 – Management Science

Course Information

Course Title: Management Science.
Code: IM 425.
Hours: Lecture – 2 Hrs. Laboratory – 2 Hrs. Credit – 3.
Prerequisite: IM 423.

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 designed to provide a revision of operations research for continuity, queuing theory and its applications. It includes also decision analysis, dynamic programming and its applications, and Markovian decision analysis.

Text Books


Reference Books


Course Objectives

- To raise the student capability to construct mathematical models for management and engineering problems
- To help students to bridge the gap between the theory and applications in the field of management.

Course Outline

Week Number 1: Revision of topics of operations research 1.
Week Number 2: Project planning uncertainty.
Week Number 3: Time/cost trade off resource levelling.
Week Number 4: Resource allocation.

Week Number 5: Stochastic processes and Markov chains.

Week Number 6: Queuing models (M/M/1/Θ).

Week Number 7: 7th Week Exam + Queuing models (M/M/K/N).

Week Number 8: Queuing models with non exponential distribution.

Week Number 9: Dynamic programming (deterministic).

Week Number 10: Dynamic programming (probabilistic).

Week Number 11: Decision analysis (without experimentation).

Week Number 12: 12th Week Exam + Decision analysis (with experimentation).

Week Number 13: Markov decision processes.

Week Number 14: Markov decision processes.

Week Number 15: Revision.

Week Number 16: Final Exam.
IM 426 – Industrial Facilities Planning

Course Information

Course Title: Industrial Facilities Planning.
Code: IM 426.
Hours: Lecture – 2 Hrs. Laboratory – 2 Hrs. Credit – 3.
Prerequisite: IM 423.

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 students with an introduction to types of facilities, steps in facilities design, layout planning tools and techniques, applications in manufacturing and non-manufacturing areas.

Text Books


Reference Books


Course Objectives

The objective of this course is to introduce the students to practical facilities design. Thus it bears directly on student background in Industrial and Management Engineering and the layout planning tools to develop skills in facilities design. The course covers manufacturing and other applications through a semester-long, step-by-step project.

Course Outline

Week Number 1: Introduction to Facilities design.
Week Number 2: Sources of Information for Facilities design.
Week Number 3: Time study.
Week Number 4: Process design.
Week Number 5: Flow analysis techniques.

Week Number 6: Activity relationship analysis.

Week Number 7: Class exam 1.

Week Number 8: Ergonomics and workstation design.

Week Number 9: Auxiliary services requirements space.

Week Number 10: Employees Services.

Week Number 11: Material handling Equipment.

Week Number 12: Class Exam 2.

Week Number 13: Office layout techniques.

Week Number 14: Area allocation.

Week Number 15: Facilities Design – The master layout.

Week Number 16: Final Exam.
IM 521E – Discrete Event System Simulation

Course Information

Course Title: Discrete Event System Simulation.
Code: IM 521E.
Hours: Lecture – 2 Hrs. Laboratory – 2 Hrs. Credit – 3.
Prerequisite: IM 423.

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 a basic treatment of discrete-event simulation, including the proper collection and analysis of data, the use of analytic techniques, verification and validation of models, and designing simulation experiments. Furthermore, it presents the application of simulation in manufacturing and material handling systems, and service industries.

Text Book


Reference Books


Course Aim

The aim of this course is to provide students with the basic knowledge and theoretical background related to modelling and simulation of discrete systems in addition to conducting simulations using spreadsheets.
COURSE OBJECTIVES

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

▪ Understand the broad applicability of discrete-event process simulation to industrial engineering problems.
▪ Know the steps required to undertake a successful simulation analysis.
▪ Learn analytical techniques for interpreting input data and output results pertinent to simulation models.

COURSE OUTLINE

Week Number 1: Introduction to Modelling and Simulation
Week Number 2: Monte Carlo Simulation of Queuing Models.
Week Number 3: Monte Carlo Simulation of Inventory Models.
Week Number 4: Monte Carlo Simulation – Other Applications.
Week Number 5: General Principles of Discrete Event System Simulation.
Week Number 6: Simulation Software.
Week Number 7: Queuing Models.
Week Number 8: Random-number Generation.
Week Number 9: Random-variate Generation.
Week Number 10: Input Modelling.
Week Number 11: Validation and Verification of Simulation Models.
Week Number 12: Output Analysis for a Single Model.
Week Number 13: Comparing Multiple Designs.
Week Number 14: Simulation of Manufacturing and Material Handling Systems.
Week Number 15: Simulation of Service Industries.
Week Number 16: Final Exam.
IM 522E – Industrial Systems Simulation

Course Title: Industrial Systems Simulation.

Code: IM 522E.

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

Prerequisite: IM 521E.

Grading

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

Course Description

As a continuation to the IM 521E course, this course starts with an introduction to simulation concepts, and progresses through an overview of the Arena software, basic model development, input analysis, additional modelling constructs, output analysis, and advanced modelling. Furthermore, the course includes chapters on integrating Arena simulation models with other applications, specialized statistical issues, continuous simulation, and conducting a successful simulation study.

Text Book


Reference Books


Course Aim

The aim of this course is to help the student to carry out effective simulation modelling, analysis, and projects using the Arena simulation system.
COURSE OBJECTIVES

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

- Construct conceptual models and understand the importance of model conceptualization.
- Develop their own simulation models using Arena.
- Understand the different ways of developing complex models through a set of case studies in different manufacturing and services areas.
- Gain hands-on experience related to simulation studies as they go through the development of simulation models for a real life problem (term project).

COURSE OUTLINE

Week Number 1: Fundamental Simulation Concepts.

Week Number 2: Steps in a Simulation Study and Introduction to Term Project.

Week Number 3: Model Conceptualization Techniques.

Week Number 4: An Introduction to the Arena Simulation Environment.

Week Number 5: Modelling Basic Operations.

Week Number 6: Using Input Analyzer for Input Modelling.

Week Number 7: Modelling Detailed Operations.

Week Number 8: Statistical Analysis of Output from Terminating Simulations.


Week Number 10: Continuous and Combined Discrete/Continuous Models.

Week Number 11: Further Statistical Issues.

Week Number 12: Using Arena for Modelling and Simulation of Manufacturing Systems.

Week Number 13: Using Arena for Modelling Material Handling Equipment.

Week Number 14: Using Arena for Modelling Service Systems.

Week Number 15: Final Exam.

Week Number 16: Project Submission and Final Presentation.
IM 523E – Human Factors Engineering and Design

**Course Information**

Course Title: Human Factors Engineering and Design.

Code: IM 523E.


Prerequisite: IM 422.

**Grading**

Class Performance/Attendance: 10%

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

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

Final Exam: 40%

**Course Description**

The course covers topics related to the human characteristics (capabilities, limitations, motivations and desires) in order to adapt a human made environment to the people involved. It highlights that this knowledge may affect complex technical systems workstations, or the tools used at work.

**Text Books**


**Reference Books**

- Institute of industrial engineers, "Case Studies", Industrial Ergonomics and Management press.

**Course Aim**

The course aim to introduce the student to know how to adapt human characteristics with work tasks, equipment, workstation and environmental stress.

**Course Objectives**

The objective of the course is to introduce the student to know how to adapt human characteristics with work tasks, equipment, workstation and environmental stress.
## COURSE OUTLINE

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction and Course Overview.</td>
</tr>
<tr>
<td>2</td>
<td>Introduction to define the human factors engineering (Ergonomics).</td>
</tr>
<tr>
<td>3</td>
<td>Anatomy and Mechanics of the human body.</td>
</tr>
<tr>
<td>4</td>
<td>Anthropometric statistics.</td>
</tr>
<tr>
<td>5</td>
<td>Human biomechanics.</td>
</tr>
<tr>
<td>6</td>
<td>The skeletal system.</td>
</tr>
<tr>
<td>7</td>
<td>7\textsuperscript{th} Week Exam.</td>
</tr>
<tr>
<td>8</td>
<td>Posture.</td>
</tr>
<tr>
<td>9</td>
<td>Controls.</td>
</tr>
<tr>
<td>10</td>
<td>Environmental factors.</td>
</tr>
<tr>
<td>11</td>
<td>Environmental factors.</td>
</tr>
<tr>
<td>12</td>
<td>12\textsuperscript{th} Week Exam.</td>
</tr>
<tr>
<td>13</td>
<td>Movement.</td>
</tr>
<tr>
<td>14</td>
<td>Information and operation.</td>
</tr>
<tr>
<td>15</td>
<td>Applications and case study.</td>
</tr>
<tr>
<td>16</td>
<td>Final Exam.</td>
</tr>
</tbody>
</table>
IM 524E – Industrial Safety

COURSE INFORMATION

Course Title: Industrial Safety.

Code: IM 524E.

Hours: Lecture – 2 Hrs. Laboratory – 2 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 covers accident causes, losses, and investigative techniques. It includes the role of human, task/machine, and environment in accident prevention. It introduces safety standards, codes, and laws. It also covers product liability, design, evaluation, and management of safety organizations and programs. The topics of hazard recognition, analysis, control and risk assessment, systems safety and related techniques are also included.

TEXT BOOK


REFERENCE BOOKS


COURSE AIM

Students gain an understanding of and appreciation for the hazards associated with industrial activities. The degree to which this is accomplished is assessed through a combination of written tests, a written technical report, a formal oral presentation using computer driven projection, and class participation in discussion topics.

COURSE OBJECTIVES

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

- Identify approaches to accident investigation and use appropriate techniques for identifying tangible and intangible costs associated with accidents.
Use appropriate techniques for describing benefits versus compliance costs associated with safety practices.

- Describe and categorize hazards; in addition, to the primary terms and provisions set forth by Occupational Safety and Health Act (OSHA).
- Design a simulated program for promoting safe practices at the shop/office level.
- Identify and describe use and characteristics of standard personal protective equipment.
- Describe acceptable disposal procedures for high-risk materials.
- Identify short- and long-range benefits associated with appropriate industrial housekeeping practices.
- Design a simulation program for promoting safe practices at shop or office.

**COURSE OUTLINE**

*Week Number 1:* The Industrial Safety Manager.

*Week Number 2:* Development of the Safety Function.

*Week Number 3:* Concepts of Hazard Avoidance.

*Week Number 4:* Safety Regulations.

*Week Number 5:* Hazard/Accident Communication.

*Week Number 6:* Buildings and Facilities.

*Week Number 7:* Health and Toxic Substances.

*Week Number 8:* Environmental Control and Noise.

*Week Number 9:* Flammable and Explosive Materials.

*Week Number 10:* Personal Protection and First Aid.

*Week Number 11:* Fire Protection.

*Week Number 12:* Materials Handling and Storage.

*Week Number 13:* Machine Guarding.

*Week Number 14:* Welding.

*Week Number 15:* Electrical Hazards.

*Week Number 16:* Final Exam.
IM 525E – Industrial Material Handling Systems

COURSE INFORMATION

Course Title: Industrial Material Handling Systems.
Code: IM 525E.
Hours: Lecture – 2 Hrs. Laboratory – 2 Hrs. Credit – 3.
Prerequisite: IM 426.

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 a broad understanding of materials handling engineering from a system design and application engineering point of view. It covers the topics of instruction in the engineering principles, design criteria, operating parameters, performance requirements, equipment resources, and applications of engineering practices involved in the planning, design, and operation of materials handling systems for manufacturing, physical distribution, and government operations. A materials handling system design project is a required part of the course.

TEXT BOOK


REFERENCE BOOKS


COURSE AIM

This course aims at covering the different classifications of material handling equipment. Within each of these classifications, the alternate types of equipment available and what situations are appropriate for applying the different variations will be discussed. Also, analysis of the performance these equipment is introduced so that the student can select the correct option for a given situation. A special emphasis will be on the application of material handling equipment in a warehouse environment.

COURSE OBJECTIVES

Upon completion of this course the student will be able to:
Identify the different classifications and the basic concepts of material handling systems.
Identify the different variations of these systems within each category.
Analyse the performance of each of these types.
Select the most appropriate material handling system for a given situation.

**COURSE OUTLINE**

*Week Number 1:* Introduction to Material Handling Classifications and Concepts.

*Week Number 2:* Pallets, Containers, and Packaging – Introduction.

*Week Number 3:* Conveyors – Introduction.

*Week Number 4:* Conveyors – Analysis.

*Week Number 5:* Vehicles (AGVs, Forklifts, and Hand Trucks) – Introduction.

*Week Number 6:* Vehicle systems – Analysis.

*Week Number 7:* Overhead Systems (Cranes And Hoists) – Introduction.

*Week Number 8:* Storage Equipment – Introduction.

*Week Number 9:* Storage Equipment – Analysis.

*Week Number 10:* Warehouse Operations – Introduction.

*Week Number 11:* Warehouse Management – Data Analysis.

*Week Number 12:* Warehouse Management – Storage.

*Week Number 13:* Warehouse Management – Order Picking.

*Week Number 14:* Robots and Automation.

*Week Number 15:* Automatic Identification.

*Week Number 16:* Final Exam.
**IM 526E – Factory Physics**

**COURSE INFORMATION**

Course Title: Factory Physics.

Code: IM 526E.


Prerequisite: IM 424.

**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 students’ with deep and generic insights for understanding, evaluating, and improving the performance of production lines. The course covers different topics including: advanced inventory management and control techniques, advanced materials requirements planning, basic dynamics of production lines, the different variability sources in a production line, the corrupting influence of variability, evaluating the performance of production lines, and the effect of batching on production lines’ performance.

**TEXT BOOKS**


**REFERENCE BOOKS**


**COURSE AIM**

Providing the student with an ability of analysing and understanding the underlying behaviour of most manufacturing systems

**COURSE OBJECTIVES**

- To review the elementary concepts required for describing manufacturing systems.
- To enable the student to identify the points of leverage in a plant, evaluate the impacts of the proposed changes, and coordinate improvement efforts.
To provide the student with the ability to bring together the disparate components of a system into an effective whole.

**Course Outline**

*Week Number 1*: Overview of the Factory Physics Concept.

*Week Number 2*: The Science of Manufacturing.

*Week Number 3*: Deterministic Inventory Models.

*Week Number 4*: Stochastic Inventory Models.

*Week Number 5*: Material Requirements Planning Technique.

*Week Number 6*: Lot-Sizing Techniques.

*Week Number 7*: Basic Factory Dynamics.

*Week Number 8*: Sources of Variability in Manufacturing Systems – Setups and Breakdowns.


*Week Number 10*: Sources of Variability in Manufacturing Systems – Queuing.


*Week Number 12*: Corrupting Influence of Variability – Buffering Variability.

*Week Number 13*: Corrupting Influence of Variability – Use of Batching.

*Week Number 14*: Push and Pull Production Systems.

*Week Number 15*: The use of Constant WIP in Production Systems.

*Week Number 16*: Final Exam.
Management Engineering Courses Group

IM 432 – Operations Management

COURSE INFORMATION

Course Title: Operations Management.

Code: IM 432.


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 introduces the production, operations and productivity concepts. It covers production, operation decision making, systems design, capacity and investment, facility location and layout, and planning for goods and services. It also includes the concept of process planning and selection, forecasting demand, aggregate demand, aggregate planning and master scheduling.

TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

The course aim is to provide the students with an understanding of the basic theories and techniques used in the design and planning of the production and operations system and apply these techniques to various problems.
COURSE OBJECTIVES

- Provides conceptual understanding of the area of production and operations management.
- Provides essential aspects of designing and planning, either the production system responsible for manufacturing a product, or an operational system responsible for providing service.
- Presents some case studies relevant to the issues within the course contents.

COURSE OUTLINE

Week Number 1: Introduction to Course.
Week Number 2: Introduction to Operations Management and Productivity Challenge.
Week Number 3: Qualitative Forecasting Models.
Week Number 4: Quantitative Forecasting Models 1.
Week Number 5: Quantitative Forecasting Models 2.
Week Number 6: Quantitative Forecasting Models 3.
Week Number 7: 7th Week Exam.
Week Number 8: Design of Goods and Services.
Week Number 9: Process Strategy.
Week Number 10: Capacity Planning 1.
Week Number 11: Capacity Planning 2.
Week Number 12: 12th Week Exam.
Week Number 13: Location Strategies.
Week Number 14: Layout Strategy.
Week Number 15: Introduction to Supply Chain Management.
Week Number 16: Final Exam.
IM 433 – Industrial Data Systems Management

Course Title: Industrial Data Systems Management.

Code: IM 433.


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 an introduction to Management Information Systems (MIS). It explains the importance of information systems to management, and includes: hardware, software, input/output devices, file and database, communication, decision support systems and expert systems, and MIS planning and development.

Text Books


Reference Books

- McMahon, Walter W. ,"An Efficiency-Based Management Information System," Published by UNESCO Regional Office.

Course Aim

The course aims to introduce the students to Management Information Systems as end users, and to identify the importance of MIS for different levels of Management.
COURSE OBJECTIVES

This course provides a broad overview on the important topics of Management Information Systems. The advanced technologies for MIS will be reviewed from the managerial point of view. Major technologies include hardware, software, input/output devices, file and database, communication, decision support systems and expert systems. Then students will study MIS development strategy and methodologies, database analysis and design, and advanced managerial and technical issues of MIS.

COURSE OUTLINE

Week Number 1: Introduction to MIS, Why Study MIS, Evolution of MIS systems.
Week Number 2: Technical foundation of IS, Computer H/W.
Week Number 3: Technical foundation of IS, Computer S/W.
Week Number 4: Trends and issues of IT and IS, Strategic Information Systems.
Week Number 5: Communication systems, media, tools.
Week Number 6: Database Management, elements and tools.
Week Number 7: 7th week Exam.
Week Number 8: Transaction Process Systems.
Week Number 11: Development of MIS, Software Development Methodology (1).
Week Number 12: 12th week Exam.
Week Number 13: Development of MIS, Software Development Methodology (2).
Week Number 14: ACCESS as database tool.
Week Number 15: Real world Applications.
Week Number 16: Final Exam.
IM 434 – Engineering Project Management

Course Title: Engineering Project Management.
Code: IM 434.
Prerequisite: IM 423.

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 project management including project selection within a general strategic orientation, organizing the project and the project management team, scope management, project planning and scheduling, probabilistic scheduling, budgeting and cost estimating, resource allocation and levelling, project time acceleration, project monitoring and control, and project integration management.

TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

To introduce the basic nature of managing all kinds of projects related to engineering, business, public, and information systems; covering various techniques required to carry out this procedure.

COURSE OBJECTIVES

- Understand the basic concepts of managing projects successfully
- Understanding the management of scope and time of a project
- Allocating and managing project resources, and balancing project objectives
- Monitoring and controlling project objectives
- Understanding the integration of project activities and processes
Interacting with project managers in industry and preparation of a realistic project management plan using a suitable computer software package.

**Course Outline**

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Course Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Background and introduction to project management.</td>
</tr>
<tr>
<td>2</td>
<td>Strategic management &amp; project selection.</td>
</tr>
<tr>
<td>3</td>
<td>Project manager &amp; organization.</td>
</tr>
<tr>
<td>4</td>
<td>Project scope management - WBS.</td>
</tr>
<tr>
<td>5</td>
<td>Project planning &amp; scheduling.</td>
</tr>
<tr>
<td>6</td>
<td>Project planning &amp; scheduling.</td>
</tr>
<tr>
<td>7</td>
<td>7th week exam.</td>
</tr>
<tr>
<td>8</td>
<td>Probabilistic scheduling - PERT.</td>
</tr>
<tr>
<td>9</td>
<td>Budgeting &amp; cost estimating.</td>
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<td>10</td>
<td>Resource allocation &amp; levelling</td>
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<td>11</td>
<td>Project time acceleration.</td>
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<td>12</td>
<td>12th week exam.</td>
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<td>13</td>
<td>Project monitoring &amp; control</td>
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<td>14</td>
<td>Project process and integration management</td>
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<td>15</td>
<td>Term project presentation, discussion and evaluation.</td>
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<td>16</td>
<td>Final Exam.</td>
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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 531E – Human Resource Management

COURSE INFORMATION

Course Title: Human Resource Management.

Code: IM 531E.

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 covers topics related to: Managers and their personnel concepts, personnel administration and resource policies, organizational planning and management development, managing and working in a changing world. It also includes the concepts of motivation and team work, recruitment and selection, training and appraisal, worker participation in production problems, wages, incentives and services.

TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

To enable the students "the managers of the future" to understand that effective management release human energy, stimulate personal development and encourages team work in moving towards organizational goals.

COURSE OBJECTIVES

- Recognize the need to co-ordinate activities associated with employees, and defining measures of employee effectiveness.
Recognize environmental pressures, both external and internal which contain human resource management policies and their implementation.
Model human resource requirements to meet defined organizational objectives.

**COURSE OUTLINE**

*Week Number 1:* Human Resources Management, an overview.
*Week Number 2:* The environment of human resource management.
*Week Number 3:* Job analysis and human resource planning.
*Week Number 4:* Recruitment.
*Week Number 5:* Internet Recruitment.
*Week Number 6:* Selection.
*Week Number 7:* 7th Week Exam.
*Week Number 8:* Training and development.
*Week Number 9:* Career planning and development.
*Week Number 10:* Performance appraisal.
*Week Number 11:* Compensation and benefits.
*Week Number 12:* 12th Week Exam.
*Week Number 13:* Safe and health work environment.
*Week Number 14:* Labour management relations.
*Week Number 15:* Internal employee relations.
*Week Number 16:* Final Exam.
IM 532E – Industrial Distribution Systems

Course Title: Industrial Distribution Systems.

Code: IM 532E.

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

Prerequisite: IM 432.

Grading

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

Course Description

The course covers the concepts of design and analysis of distribution systems of people, processes and technology. The focus is on distribution, warehousing, and material handling. Other topics include the role of the warehouse in the extended enterprise, warehouse planning, process design, layout, equipment selection, workforce and workplace issues, and financial performance measures.

Text Book


Reference Books


Course Aim

Students gain an understanding of planning, organizing, and controlling of such activities as transportation, inventory maintenance, facility location, order processing, purchasing, warehousing, materials handling, packaging, customer service standards, and product scheduling—is specifically designed to help students solve actual challenges that they will encounter in today's marketplace. It provides the basic decision making tools and concepts used for finding cost reduction and strategic opportunities.

Course Objectives

Upon completion of this course the student will be able to:
Understand and satisfy the customer service goals.
Develop transport, inventory, and locations strategy to satisfy these goals
Evaluate the different strategies using a computer based approach.
Understand the basics of supply chains management, organization and control.

Course Outline

Week Number 1: Business Logistics/Supply Chain—A Vital Subject.
Week Number 2: Logistics Strategy/Supply Chain and Planning.
Week Number 3: The Logistics/Supply Chain Product.
Week Number 4: Logistics/Supply Chain Customer Service.
Week Number 5: Order Processing and Information Systems.
Week Number 6: Transport Fundamentals.
Week Number 7: Transport Decisions.
Week Number 8: Forecasting Supply Chain Requirements.
Week Number 9: Inventory Policy Decisions.
Week Number 10: Purchasing and Supply Scheduling Decisions.
Week Number 11: The Storage and Handling System.
Week Number 12: Storage and Handling Decisions.
Week Number 13: Facility Location.
Week Number 14: The Network Planning Process.
Week Number 15: Logistics/Supply Chain Organization and Control.
Week Number 16: Final Exam.
IM 533E – Supply Chain Management  
**Course Information**

Course Title: Supply Chain Management.

Code: IM 533E.

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

Prerequisite: IM 432.

**Grading**

Class Performance/Attendance: 10%

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

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

Final Exam: 40%

**Course Description**

This course covers the major issues in supply chain management, including: definition of a supply chain; role of inventory; advanced production-inventory models; supply contracts; bullwhip effect and information sharing; vendor-managed inventories and other distribution strategies; third-party logistics providers; managing product variety; information technology and supply chain management; international issues.

**Text Book**


**Reference Books**


**Course Aim**

To explore the key issues associated with the design and management of industrial Supply Chains (SC). SC is concerned with the efficient integration of suppliers, factories, warehouses and stores so that products are distributed to customers in the right quantity and at the right time. One of the primary objectives of SC management is to minimize the total supply chain cost subject to various service requirements.

**Course Objectives**

Upon completion of this course the student will be able to:
Building a strategic framework to analyze supply chains.
- Develop designing the supply chain network.
- Planning demand and supply in a supply chain.
- Planning and managing inventories in a supply chain.
- Designing and planning transportation networks.
- Managing cross-functional drivers in the supply chain.

**COURSE OUTLINE**

*Week Number 1:* Understanding the Supply Chain.

*Week Number 2:* Supply Chain Performance: Achieving Strategic Fit and Scope.

*Week Number 3:* Supply Chain Drivers and Metrics.

*Week Number 4:* Designing Distribution Networks and Applications to e-Business.

*Week Number 5:* Network Design in the Supply Chain.

*Week Number 6:* Network Design in an Uncertain Environment.

*Week Number 7:* Demand Forecasting in a Supply Chain.

*Week Number 8:* Planning Supply and Demand in the Supply Chain: Managing Predictable Variability.

*Week Number 9:* Managing Uncertainty in the Supply Chain: Safety Inventory.

*Week Number 10:* Determining Optimal Level of Product Availability.

*Week Number 11:* Transportation in the Supply Chain.

*Week Number 12:* Sourcing Decisions in a Supply Chain.

*Week Number 13:* Pricing and Revenue Management in the Supply Chain.

*Week Number 14:* Information Technology and the Supply Chain.

*Week Number 15:* Coordination in the Supply Chain.

*Week Number 16:* Final Exam.
IM 534E – Maintenance Management

Course Information

Course Title: Maintenance Management.
Code: IM 534E.
Hours: Lecture – 3 Hrs. Tutorial – 0 Hrs. Credit – 3.
Prerequisite: IM 432.

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 concepts of maintenance and the industrial organization, acquisition policy and maintenance life, cycle costs, maintenance strategy as a business centred approach. It also covers topics of reliability of plant components and systems, determining the life plan and schedule, controlling plant reliability, reliability centred maintenance, and enterprise asset management.

Text Books


Reference Books


Course Aim

It aims at providing the students with fundamental understanding of the role of maintenance management in securing, maintaining and optimizing the enterprise machining and equipment.

Course Objectives

- Formulating machinery and equipment life plans and plant maintenance schedule.
- Designing the maintenance organization and setting up appropriate systems of documentation and control.
COURSE OUTLINE

Week Number 1: The maintenance functions.
Week Number 2: Developing maintenance functions.
Week Number 3: Types of maintenance systems.
Week Number 4: Acquisition policy, maintenance life cycle costs.
Week Number 5: Maintenance strategy, a business centred approach.
Week Number 6: Computerized maintenance management systems.
Week Number 7: Midterm Exam # 1.
Week Number 8: Reliability of plant components.
Week Number 9: Reliability of plant systems.
Week Number 10: Determining life plan and schedule.
Week Number 11: Spare parts management
Week Number 12: Midterm Exam # 2.
Week Number 13: Controlling plant reliability.
Week Number 14: Reliability centred maintenance.
Week Number 15: Enterprise asset management.
Week Number 16: Final Exam.
IM 535E – Marketing Management

Course Title: Marketing Management.

Code: IM 535E.

Hours: Lecture – 3 Hrs.  Tutorial – 0 Hrs.  Credit – 3.

Prerequisite: IM 424.

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 evaluation of markets and marketing, the marketing environment, demand and market study, the buyer behaviour; consumer and organizational markets. It also covers the topics of the marketing mix, marketing information system, the development of new products and services, the product life cycle, pricing and promotional distribution systems, and development and marketing plan.

Text Books


Reference Books


Course Aim

The course aims to introduce to the students the marketing concepts and provide them with detailed guidance through marketing analysis, on how to estimate the possible degree of market penetration by a particular product.

Course Objectives

- Understanding the nature of marketing concept.
Determining the size and composition of the effective market demand; total and by segment.
Understanding the criteria for purchasing behaviour of consumer and industrial buyers.
Demonstrate the process of marketing information systems and research.
Appreciate the basics of formulating a market plan.

**Course Outline**

*Week Number 1:* Introduction and Course Overview.
*Week Number 2:* The Marketing Management Definitions.
*Week Number 3:* Market Segmentation and Targeting.
*Week Number 4:* Application of Analytical Hierarchy process to marketing problems.
*Week Number 5:* Marketing Mix.
*Week Number 6:* Product Development and Life Cycle.
*Week Number 7:* Pricing Methods and Techniques.
*Week Number 8:* 7th Week Exam.
*Week Number 9:* Pricing Methods and Techniques.
*Week Number 10:* Promotion Mix.
*Week Number 11:* Evaluation of promotion budget.
*Week Number 12:* Distribution.
*Week Number 13:* 12th week Exam.
*Week Number 14:* Supply chain management and distribution.
*Week Number 15:* Revision.
*Week Number 16:* Final Exam.
IM 536E – Engineering Cost Analysis

COURSE INFORMATION

Course Title: Engineering Cost Analysis.
Code: IM 536E.
Hours: Lecture – 2 Hrs. Laboratory – 2 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

This course provides the latest principles and techniques for the evaluation of engineering design, with an emphasis on analysis and estimation of costs. It analyzes labour, material, accounting, and forecasting; then the theme of estimating is developed, with a study of methods, operations, and products.

TEXT BOOK


REFERENCE BOOKS


COURSE AIM

This course aims at providing students with the techniques used in determining the cost of designing, developing, producing and selling a product or service. Furthermore, it helps students in analysing the different cost elements in an industrial system such as labour and material analysis, operation and product estimating...etc., through the use of a set of problems, and a case study on every topic discussed.

COURSE OBJECTIVES

It is expected that each student learns:

- Basic concepts of cost estimation,
Different types of costs and their differences,
Methods used to estimate costs,
How to gather information, compile and use a cost estimate,
Importance of having a credible, supportable, usable, accurate, achievable, competitive, complete and realistic cost estimate,
Compute labour and material components of product cost.
Understand the importance of making appropriate economic decisions.

COURSE OUTLINE

Week Number 1: Importance of Engineering Cost Analysis.
Week Number 2: Labour Analysis.
Week Number 3: Case Study – Labour Cost Analysis.
Week Number 5: Case Study – Material Cost Analysis and Policies.
Week Number 6: Accounting Analysis.
Week Number 7: Case Study – Accounting Analysis.
Week Number 10: Case Study – Estimating Methods.
Week Number 11: Operation Estimating.
Week Number 12: Product Estimating.
Week Number 13: Case Studies on Operation and Product Estimating.
Week Number 14: Cost Analysis.
Week Number 15: Case Study - Cost Analysis.
Week Number 16: Final Exam.
Quality and Design Engineering Courses Group

**IM 341 – Engineering Statistics**

**COURSE INFORMATION**

Course Title: Engineering Statistics.

Code: IM 341.


Prerequisite: BA 224.

**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 statistical sciences, descriptive statistics and inferential statistics, methods of graphical presentation of data, histogram, box plot, position parameters, mean, median, and quartiles, dispersion parameters, and variance. It covers also the fundamentals of probability, probability distributions for discrete and continuous variables, and sampling distributions.

**TEXT BOOKS**


**COURSE OBJECTIVES**

To enable students to use statistical tools to manipulate and present data, to build up student capability to construct and manipulate statistical and probability models in order to solve engineering and management problems.

**COURSE OUTLINE**

*Week Number 1*: Introduction to statistics.

*Week Number 2*: Descriptive statistical and graphical.

*Week Number 3*: Presentation of data (Histogram).

*Week Number 4*: Percentiles, Quartiles and box plots.
Week Number 5:  Introduction to probability theory.

Week Number 6:  Addition and multiplication of probability.

Week Number 7:  7th Week Exam & Conditional and total probability.

Week Number 8:  Bayes theorem.

Week Number 9:  Discrete random variables.

Week Number 10:  frequently used mass functions.

Week Number 11:  frequently used mass functions.

Week Number 12:  12th Week Exam, & continuous random variables.

Week Number 13:  Continuous random variables.

Week Number 14:  Frequently used probability density functions.

Week Number 15:  Revision.

Week Number 16:  Final Exam.
IM 342 – Statistical Analysis  
**COURSE INFORMATION**

Course Title: Statistical Analysis.  
Code: IM 342.  
Prerequisite: IM 341.

**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 a revision of engineering statistics, sampling distributions, point estimators, confidence interval estimations. It covers the testing of hypothesis, linear regression, multiple regression, and analysis of variance.

**TEXT BOOKS**


**COURSE OBJECTIVES**

- To provide students with useful tools of statistical analysis necessary for management and engineering studies and research work.  
- To introduce to students the most effective methods of robust design the factorial design of experiments.

**COURSE OUTLINE**

*Week Number 1:* Introduction and Course Overview.  
*Week Number 2:* Statistical Estimator.  
*Week Number 3:* Point Estimator.  
*Week Number 4:* Interval Estimator.  
*Week Number 5:* Sample Distributions.
Week Number 6: Test of Hypotheses.

Week Number 7: Test of Hypotheses.

Week Number 8: 7th Week Exam, & Test of goodness of fit.

Week Number 9: Test of goodness of fit.

Week Number 10: Linear Regression.

Week Number 11: Multiple Regression.

Week Number 12: Multiple Regression.

Week Number 13: 12th Week Exam, & Analysis of variance.

Week Number 14: Analysis of variance.

Week Number 15: Revision.

Week Number 16: Final Exam.
**IM 443 – Quality Engineering**  
**COURSE INFORMATION**

Course Title: Quality Engineering.  
Code: IM 443.  
Prerequisite: IM 342.

**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 principles and concepts of statistical quality control, quality improvement tools, control charts for variables, control charts for attributes, choice between attribute and variable control charts, process capability measures. It also covers the types of attribute acceptance sampling plans, characteristics of acceptance sampling plans, producer consumers’ relationships, performance of acceptance sampling plans, economics of acceptance sampling plans. The standard attribute acceptance sampling plans applications and limitation, the quality in design, reliability, product life and process design are included.

**TEXT BOOKS**

Donna C. S. Summers, “Quality, 4/E”.

**REFERENCE BOOKS**


**COURSE AIM**

The course aim is to make the student use and apply efficiently the statistical techniques in quality control.

**COURSE OBJECTIVES**

- The objective of the course is to give students a clear overview of ways and means of preventing and detecting defective products in production process.
**Course Outline**

*Week Number 1:* Introduction to Quality and Quality Cost.

*Week Number 2:* Statistics for Quality

*Week Number 3:* Quality in Design.

*Week Number 4:* Reliability and Product Life.

*Week Number 5:* Process Design.

*Week Number 6:* Measurement Control Charts.

*Week Number 7:* 7th Week Exam.

*Week Number 8:* Attributes Control Charts

*Week Number 9:* Process capability.

*Week Number 10:* Acceptance Sampling Plans-SSP and OC Curves

*Week Number 11:* Double Sampling Plans for Attributes-DSP.

*Week Number 12:* 12th Week Exam.

*Week Number 13:* MIL-STD-105E.

*Week Number 14:* Continuous Improvement of Quality.

*Week Number 15:* Quality Systems Integration.

*Week Number 16:* Final Exam.
**IM 444—Reliability Engineering**

**COURSE INFORMATION**

Course Title: Reliability Engineering.

Code: IM 444.


Prerequisite: IM 443.

**GRADING**

Class Performance/Attendance: 10%

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

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

Final Exam: 40%

**COURSE DESCRIPTION**

The course covers principles of reliability, failure rate and its relation to reliability, probability distribution of the time to failure, exponential and weibull distributions, reliability of systems, series and parallel systems, stand by redundancy, systems mean time to failure, mean residual life, reliability in design. It also includes failure mode effect analysis, failure tree analysis, reliability testing and analysis, and warranty problems.

**TEXT BOOKS**


**REFERENCE BOOKS**


**COURSE OUTLINE**

- Week Number 1: Review of probability concepts.
- Week Number 2: Failure probability distributions.
- Week Number 3: Failure probability distributions.
- Week Number 4: Systems Reliability (Classical).
- Week Number 5: Systems Reliability (Majority voting).
- Week Number 6: Application of Markov analysis to system reliability.
Week Number 7:  7th Week Exam.

Week Number 8:  Systems Reliability (Standby).

Week Number 9:  Multimodal reliability and conditional reliability.

Week Number 10:  Applying simulation modelling to systems reliability.

Week Number 11:  Applying simulation modelling to systems reliability.

Week Number 12:  12th Week Exam, Failure Mode Effect and Criticality Analysis.

Week Number 13:  Failure Tree Analysis.

Week Number 14:  Failure Tree Analysis.

Week Number 15:  Revision.

Week Number 16:  Final Exam.
IM 541E – Product Design and Development

Course Title: Product Design and Development

Code: IM 541E

Hours: Lecture – 2 Hrs. Laboratory – 2 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

This course examines the product design and development process. Topics include: organization and management issues associated with the product development process; the identification of customer needs and the translation of these needs into product performance specifications; methodologies for the generation and selection of concepts; developing the product architecture with emphasis on creating interfaces, prototyping and design for manufacturing.

Text Book


Reference Books


Course Aim

The focus of Product Design and Development is integration of the marketing, design, and manufacturing functions of the firm in creating a new product. The course is intended to provide the students with a set of tools and methods for product design and development. In addition it aims at increasing students’ confidence in their abilities to create a new product.

Course Objectives

It is expected that each student learns:
- Development of skill with tools and methods for product design.
- Understanding of multiple functional roles (e.g., marketing, industrial design, engineering) in creating a new product.
- Development of confidence in own abilities to create a new product.
- Awareness of the role of multiple functions in creating a new product (e.g. marketing, finance, industrial design, engineering, production).
- Ability to coordinate multiple, interdisciplinary tasks in order to achieve a common objective.

**Course Outline**

**Week Number 1:** Introduction to the Process of Product Design and Development.

**Week Number 2:** Development Processes and Organizations.

**Week Number 3:** Product Planning.

**Week Number 4:** QFD Technique (House of Quality).

**Week Number 5:** Identifying Customer Needs – Planning Matrix.

**Week Number 6:** Product Specifications (Substitute Quality Characteristics).

**Week Number 7:** Correlation between Customer Needs and Technical Requirements.

**Week Number 8:** Concept Generation/Selection/Testing.

**Week Number 9:** Product Architecture.

**Week Number 10:** Industrial Design.

**Week Number 11:** Design for Manufacturing.

**Week Number 12:** Prototyping.

**Week Number 13:** Robust Design.

**Week Number 14:** Patents and Intellectual Property.

**Week Number 15:** Product Development Economics.

**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**

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 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.
IM 543E – Design of Experiments

COURSE INFORMATION

Course Title: Design of Experiments.
Code: IM 543E.
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 includes a revision of models for statistical analysis, the objectives of design of experiments, single factor designs, several factors designs, 2^k factorial design, fractional factorial design, orthogonal array and Taguchi methods, and robust design.

TEXT BOOKS


REFERENCE BOOKS


COURSE OBJECTIVES

To introduce to students the most effective methods of robust design the factorial design of experiments.

COURSE OUTLINE

Week Number 1: Introduction and Course Overview.
Week Number 2: Review of statistical analysis models.
Week Number 3: Single factor designs (Fixed effect).
Week Number 4: Single factor designs (Fixed effect).
Week Number 5: Single factor designs (Random effect).

Week Number 6: Several factors design.

Week Number 7: Several factors design.

Week Number 8: 7th Week Exam.

Week Number 9: $2^k$ factorial designs.

Week Number 10: $2^k$ factorial designs.

Week Number 11: Fractional factorial design.

Week Number 12: Fractional factorial design.

Week Number 13: 12th Week Exam, Orthogonal arrays and Taguchi methods.

Week Number 14: Robust design.

Week Number 15: Revision.

Week Number 16: Final Exam.
IM 544E – Quality Assurance Systems

COURSE INFORMATION

Course Title: Quality Function Deployment.
Code: IM 544E.
Prerequisite: IM 443.

GRADING

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

COURSE DESCRIPTION

The course covers the quality management and quality assurance vocabulary, the development of quality assurance standards; complaint, myths and advantages of quality assurance certification. It includes the structure of quality assurance standards, the procedure of implementation of quality assurance standards, certification and accreditation bodies, clauses of quality assurance standards, selection of appropriate quality management standards, quality management, and quality systems guidelines. It also covers the structure of quality manual, internal and external auditing, auditor qualification, reporting the audit, and the standards strongly related to quality assurance standard.

TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

The course aim is to give the student a good background of the quality assurance systems and standards.
COURSE OBJECTIVES

The objective of the course is to understand the family of quality assurance standards, awareness of the domains of its implementation, methods of its auditing students by the end of the course should have appropriate skills to write quality manual and practice the internal auditing procedure.

COURSE OUTLINE

Week Number 1: The Background to Quality System Standards.
Week Number 7: 7th Week Exam.
Week Number 8: Quality Systems Documentation – Procedures.
Week Number 12: 12th Week Exam.
Week Number 14: Quality Management Systems Auditing – Corrective Actions.
Week Number 15: Quality Management Systems Auditing – Follow-up.
Week Number 16: Final Exam.
IM 545E – Total Quality in Industrial Management

Course Information

Course Title: Total Quality in Industrial Management.
Code: IM 545E
Prerequisite: IM 443.

Grading

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

Course Description

This course introduces the history and evolution of quality, definition of quality, basic concept of total quality management, philosophies of leading sages of quality Deming, Juran, Ichikawa, Crosby, Taguchi, Chigo Chingo. It also covers the characteristics of quality distribution parameters, the relationships between quality parameters, some statistical process control tools, and quality cost.

Text Books


Course Aim

The course aim is to make the student familiar with modern trends and techniques that handle the quality improvement.

Course Objectives

The objective of the course is to study the history of quality evolution, support the students to understand the reliable, relevant new techniques; strategies and philosophies that have improved the quality drastically in the international arena.

Course Outline

Week Number 1: TQM Introduced.
Week Number 2: What is TQM.
Week Number 3: Continuous improvement tools 1
Week Number 4: Continuous improvement tools 2
Week Number 5: Continuous improvement advanced tools
Week Number 6: Customer obsessions.
Week Number 7: 7th Week Exam.
Week Number 8: Customer satisfaction measurements 1
Week Number 9: Customer satisfaction measurements 2
Week Number 10: Employee practices in TQM organizations.
Week Number 11: Benchmarking.
Week Number 12: 12th Week Exam.
Week Number 13: Reengineering and TQM.
Week Number 14: Conducting TQM audits and reviews.
Week Number 15: Six Sigma.
Week Number 16: Final Exam.
IM 546E – Machinery Condition Monitoring

Course Title: Machinery Condition Monitoring.

Code: IM 546E


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 covers maintenance types, maintenance philosophy, the role of vibration in Machinery Condition Monitoring (MCM), damage in machines, vibrational techniques, and vibration analysis. It also covers unbalance detection, bent shaft, misalignment, mechanical looseness, bearing faults, gear faults, pump cavitations, and electrical motor faults.

Text Books


Reference Books

Victor Wowk, “Machinery Vibration (Measurement and Analysis)”.

Course Aim

To introduce Engineering students to methods used to monitor machine behaviour through measurements taken while machine in operation e.g. vibration, noise, oil analysis, temperature (Thermography) analysis, and motor current analysis.

Course Objectives

By the end of this course students are expected to gain knowledge and understanding in addition to different skills related to:

- Vibrations and how they are related to machine status.
- Fault detection from vibration analysis.
- Predictive maintenance application.
- Vibration measurements and analysis.
Machinery fault diagnosis.
Predictive maintenance principals.
Fault diagnosis skills.
Machinery monitoring skills.
Maintenance scheduling skills.
General condition monitoring techniques.
Specific faults and how to detect them.
Use of noise and vibration to monitor machine health.

COURSE OUTLINE

Week Number 1: Introduction and Course Overview.
Week Number 2: Types of Maintenance.
Week Number 3: Maintenance Philosophy.
Week Number 4: The role of vibration in MCM.
Week Number 5: Damage in Machines.
Week Number 6: Vibrational techniques.
Week Number 7: Vibrational analysis.
Week Number 8: 7th Week Exam, & Unbalance detection
Week Number 9: Bent shaft.
Week Number 10: Misalignment.
Week Number 11: Mechanical looseness.
Week Number 12: Bearing faults.
Week Number 13: 12th Week Exam & Gear faults.
Week Number 14: Pump capitation.
Week Number 15: Electrical motor faults.
Week Number 16: Final Exam
Mechanical Engineering Courses – ME

ME151 – Engineering Drawings & Projection

Course Title: Engineering Drawings & Projection.
Code: ME 151.
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.

COURSE 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 Exam.
ME 231- Thermodynamics

COURSE INFORMATION

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

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

M. David,” Engineering Thermodynamics with Application “, Collage Publication , Latest Edition,

COURSE AIM

The course is designed to identify various aspects and area of thermo dynamics 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 Exam.
ME 241 – Experimental Methods

COURSE INFORMATION

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

GRADING

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Class Performance/Attendance</td>
<td>10%</td>
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<tr>
<td>Midterm # 1/Assignments – (7th Week)</td>
<td>30%</td>
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<tr>
<td>Midterm # 2/Assignments – (12th Week)</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>40%</td>
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</tbody>
</table>

COURSE DESCRIPTION

Introduction to experimental methods, sensors, and computer-aided data acquisition. Survey of transducers and measurement methods for a broad range of phenomena. 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 gain hands-on experience with modern instrumentation and systems-level experimentation.
- To understand how to quantify error and uncertainty in physical measurements.
- 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

Week Number 1: Introduction
Week Number 2: Generalized Measuring System, Significant Digits, Rounding, Truncation
Week Number 3: Data Acquisition, Signals, Signal Conditioning, Sampling
Week Number 4: Lab View – Lab View Tutorial
Week Number 5: Background and Introduction to thermal experiments
Week Number 6: Background and Introduction Fluid mechanics experiments
Week Number 7: Background and introduction to Material experiments
Week Number 8: Background and Introduction to solid mechanics experiments
Week Number 9: Presentation & communication skills
Week Number 10: Accuracy, Precision, Error in Measurement, Calibration - Lab Work
Week Number 11: Uncertainty Analysis – Exercise
Week Number 12: Displacement and Dimensional Measurement – Lab work
Week Number 13: Library Exercise
Week Number 14: Oral Presentation for Selected Topic
Week Number 15: Oral Presentation for Selected Topic
Week Number 16: Final Exam.
ME 252 - Mechanical Engineering Drawing

Course Title: Mechanical Engineering Drawing.

Code: ME 256.

Hours: Lecture – 2Hrs. Tutorial – 4Hrs. 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


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 modelling, primitives and Boolean operations.

Week Number 7: Creating solid models from 2D polylines – Quiz.

Week Number 8: Viewing, modifying and editing solids, solid modelling 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.

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 Exam.
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>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Atomic Bonding in Solids.</td>
</tr>
<tr>
<td>3</td>
<td>The Crystalline Structure of Materials.</td>
</tr>
<tr>
<td>4</td>
<td>The Crystalline Structure of Materials.</td>
</tr>
<tr>
<td>5</td>
<td>The Crystalline Structure of 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 Exam.</td>
</tr>
</tbody>
</table>
ME 277- Strength of Materials

**COURSE INFORMATION**

Course Title: Strength of Materials.

Code: ME 277.

Hours: Lecture: 2 Hrs. Tutorial: 2 Hrs. 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**

- Gere & Timoshenko “Mechanics of Materials” (1997), PWS. Publisher, 4th edition,

**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 Exam.
ME 355 - Theory of Machines
COURSE INFORMATION

Course Title: Theory of Machines.
Code: ME 355.
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 centre 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 Exam.
ME 361 - Fluid Mechanics  
COURSE INFORMATION

Course Title: Fluid Mechanics.

Code: ME 361.  

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

Prerequisites: 72 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


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, values & 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 1.</td>
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<tr>
<td>3</td>
<td>Fluid Static 2.</td>
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<tr>
<td>4</td>
<td>Concepts of Fluid Flow.</td>
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<tr>
<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>
</tr>
<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 1.</td>
</tr>
<tr>
<td>10</td>
<td>Hydraulic Pumps 2.</td>
</tr>
<tr>
<td>11</td>
<td>Hydraulic Control Valves.</td>
</tr>
<tr>
<td>12</td>
<td>Hydraulic Control Valves – Quiz.</td>
</tr>
<tr>
<td>13</td>
<td>Hydraulic Cylinder Motor 1.</td>
</tr>
<tr>
<td>14</td>
<td>Hydraulic Cylinder Motor 2.</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 454 - Machine Design
COURSE INFORMATION

Course Title: Machine Design.
Code: ME 454.
Hours: Lecture: 2Hrs. Tutorial: 2Hrs. 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

Introduction & simple stresses and strain- Stresses in machine parts- Complex stress and strain-
Threaded fasteners- Flexible mechanical elements- welded and adhesive joints- Gears- Shafts-
Power screws.

TEXT BOOKS


REFERENCE BOOKS


COURSE AIM

The aim of this course is to:

- To impart an appreciation of basic design considerations
- To give the students an awareness of the factors effecting design in relation to problems in
  engineering applications

COURSE OBJECTIVES

To provide sufficiently advanced understanding of machine design concept and to enable students

to be creative in mechanical, marine and industrial applications
COURSE OUTLINE

Week Number 1: Introduction & simple stresses and strain.

Week Number 2: Stresses in machine parts.

Week Number 3: Stresses in machine parts (continued).

Week Number 4: Complex stress and strain.

Week Number 5: Complex stress and strain (continued).

Week Number 6: Threaded fasteners.

Week Number 7: Threaded fasteners (cont.) – Quiz.

Week Number 8: Power screws.

Week Number 9: Flexible mechanical elements.

Week Number 10: Flexible mechanical elements – welded joints.

Week Number 11: Welded and adhesive joints.

Week Number 12: Gears (introduction) – Quiz.

Week Number 13: Gears (spur gears & helical gears).

Week Number 14: Gears (bevel gears & worm gears).

Week Number 15: Shafts.

Week Number 16: Final Exam.
ME 455 - Computer Aided Design

COURSE INFORMATION

Course Title: Computer aided design.

Code: ME 455.

Hours: Lecture – 2Hrs. Tutorial – 4Hrs. Credit – 3.

Prerequisites: ME 456

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 modelling) – Introduction to the software "Solid Edge" – 2D and 3D parametric modelling – 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

Week Number 1: Introduction to computer aided drafting and analysis.

Week Number 2: Introduction to the software "Solid Edge".

Week Number 3: Basics of solid 2D and 3D parametric modelling using Solid Edge.

Week Number 4: Solid Edge profile environment.

Week Number 5: Primary and treatment features with Solid Edge.

Week Number 6: Introduction to finite element analysis.

Week Number 7: The finite element software "FEMAP" – Quiz.

Week Number 8: "FEMAP" model and mesh generation.

Week Number 9: Application to different machine element problems.

Week Number 10: MATLAB analysis and graphics.

Week Number 11: MATLAB analysis and graphics (Cont.)

Week Number 12: Simulation of dynamic systems – Quiz.

Week Number 13: Application to different Mechanical, Hydraulic and Thermal systems (MATLAB 'Simulink').

Week Number 14: Introduction to Optimization.

Week Number 15: System and element optimum design problems.

Week Number 16: Final Exam.
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 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

- Introduction 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 365 – Accounting and Finance

COURSE INFORMATION

Course Title: Accounting and Finance.
Code: NE 365.
Hours: Lecture – 2 Hrs. Laboratory – 2 Hrs. Credit – 3.
Prerequisite: NE 364.

GRADING

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

COURSE DESCRIPTION

To learn about: Accounting, the language of business, users and use of accounting information in economic decision. In addition, this course will focus on recording, measuring and reporting business transactions in different types of organizations.

TEXT BOOKS


COURSE AIM

This introducing course in financial accounting reviews the accounting cycle and the preparation of financial statements. In addition, to the fundamental concepts of accounting, measuring, recording and reporting business transactions.

COURSE OBJECTIVES

- Explain the meaning of accounting as a language of business.
- Identify the economic events (financial transactions).
- Measure the economic events.
- Recording and reporting the financial transactions.

COURSE OUTLINE

Week Number 1: Accounting: The language of business.
Week Number 2: Changes in Financial Position.
Week Number 3: Measuring business income.

Week Number 4: Adjustment at the end of the year.

Week Number 5: Exam # 1.

Week Number 6: Accounting for merchandising activities.

Week Number 7: Accounting for merchandising activities.

Week Number 8: Accounting for merchandising activities.

Week Number 9: Forms of business organizations.

Week Number 10: Exam # 2.


Week Number 12: Financial Assets.

Week Number 13: Inventories and the cost of goods sold.

Week Number 14: Inventories and the cost of goods sold.

Week Number 15: Revision.

Week Number 16: Final Exam.
NE 465 – Aesthetic Education and Art Appreciation

**Course Information**

Course Title: Aesthetic Education and Art Appreciation.

Code: NE 465.

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**

Aesthetic training and appreciation on a wide range of types of arts, including Music, Drawing, Painting, Sculpture and Engraving; Applied art (major and minor arts); The Ancient world, Classical world and Christian world (Christianity); Islamic and oriental arts; Medieval Western world; Renaissance in the 17th, 18th and 19th Centuries; Modern arts in the 20th Century.

**Text Books**

Naema El-Shishiny, Aesthetic education & Art appreciation (Arabic and English).

**Reference Books**

- Largesse Encyclopedia of Modern Art (1800 to present).
- A course history of arts (Herbert Read).
- The McMillan encyclopaedia of Art.

**Course Aim**

A work of art produces an agreeable impression as processing aesthetic beauty which is the result of the satisfaction of the mind and the stimulation of our senses.

**Course Objectives**

Student to be acquainted with different forms of arts (fine arts and applied arts) their techniques and main elements. An output over the ages of man’s creativity, thus the appreciation of art’s essence and permanent values.
COURSE OUTLINE

Week Number 1:  Introduction to Aesthetic Education.

Week Number 2:  Drawing.

Week Number 3:  Painting.

Week Number 4:  Sculpture.

Week Number 5:  Engraving.

Week Number 6:  Applied Art; Introduction to art appreciation.

Week Number 7:  The Ancient world & 7th week exam.

Week Number 8:  The ancient world.

Week Number 9:  Classical world (Christianity).

Week Number 10:  Christian work;

Week Number 11:  Islamic & oriental arts.

Week Number 12:  Medieval world.

Week Number 13:  Renaissance + 17th C.

Week Number 14:  18th C + 19th C.

Week Number 15:  20th C + modern arts.

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 limitless 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.
NE 467 – Management of Energy Resources

**Course Information**

Course Title: Management of energy resources.

Code: NE 467.

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**

Energy for sustainable development; Metal and corrosive Environments; Strategic components of sustainable energy; Renewable energy technologies; Energy audit process and maintenance management; Lighting; Power factor correction; Control system and computers; Combustion processes and the use of industrial wastes; Heating, ventilating and air conditioning (HVAC).

**Text Books**

- Energy resources and Environmental management (Handouts and ppt).

**Reference Books**

- Available in the Academy library.

**Course Aim**

The main goal of this course is to let the student able to manage available energy and resources and reach sustainability.

**Course Objectives**

The objectives of the course are: energy sustainability, strategic components of sustainable energy, energy audit processes & Maintenance management and control systems and computers.
## COURSE OUTLINE

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Energy for sustainable development (1).</td>
</tr>
<tr>
<td>2</td>
<td>Energy for sustainable development (2).</td>
</tr>
<tr>
<td>3</td>
<td>Metal and corrosive Environments.</td>
</tr>
<tr>
<td>4</td>
<td>Strategic components of sustainable energy.</td>
</tr>
<tr>
<td>5</td>
<td>Renewable energy technologies (1).</td>
</tr>
<tr>
<td>6</td>
<td>Renewable energy technologies (2).</td>
</tr>
<tr>
<td>7</td>
<td>Exam + Introduction to Energy audit process.</td>
</tr>
<tr>
<td>8</td>
<td>Introduction to Energy maintenance management.</td>
</tr>
<tr>
<td>9</td>
<td>Energy audit process &amp; maintenance management (1).</td>
</tr>
<tr>
<td>10</td>
<td>Energy audit process &amp; maintenance management (2).</td>
</tr>
<tr>
<td>11</td>
<td>Lightning.</td>
</tr>
<tr>
<td>12</td>
<td>Exam + Power factor correction.</td>
</tr>
<tr>
<td>13</td>
<td>Control system and computers.</td>
</tr>
<tr>
<td>14</td>
<td>Combustion processes &amp; the use of industrial wastes.</td>
</tr>
<tr>
<td>15</td>
<td>Heating, ventilating and air conditioning (HVAC).</td>
</tr>
<tr>
<td>16</td>
<td>Final Exam.</td>
</tr>
</tbody>
</table>
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 MONEIM, AHMED FAROUK (EMERITUS)**

Ph. D. 1970, Odessa University, USSR.

**Specialization**
System Engineering and Analysis.

**Experience in Industry**


**Research Activities**

**EL-KILANY, KHALED SAID**

Ph. D. 2004, Dublin City University, Ireland

**Specialization**

**Experience in Industry**

- Unilever, Lipton Tea Factory – Downtime Reduction.
**Research Activities**

**EL-SAYED, AZIZ EZZAT (DEAN)**

*Ph.D. 1983, Alexandria University, Egypt.*

**Specialization**

**Experience in Industry**
- Three weeks comprehensive Training program on LCA and environmental valuation using KCL-ECO package- Finnish technical Research Institute (VTT), Helsinki, Finland, 1998.
- Consultant, and Report Editor Abu-Qir Fertilizers and chemical Industries, Alexandria, Egypt. (Among a research team), EIA studies, Auditing and valuation for the AQ3 project, 1996.
- Consultant, El-Nasr Company for Leather Production, Production Planning and Management Systems, Egypt 1987.

**Research Activities**

**HASSAN, K. MOHAMED**

*Ph. D. 2004, University of Akron, OH, U.S.A.*

**Specialization**
Industrial Engineering

**Experience in Industry**
10 years in Quality and Materials fields in multinational companies:
B. SC. PROGRAM STATUS REPORT 2009

- Pirelli Italy (1994-2000)
- Cooper Tire (2004-2008)

Research Activities
Petrochemicals, Recycling, QA of Software & Project Management.

HELLALY, MUSTAFA AHMED (VISITING)


Specialization
Manufacturing Engineering, Design, Dynamics.

Experience in Industry
Predictive Maintenance and Machine Fault Diagnosis Consultation.

Research Activities
Machine Dynamics, Maintenance Engineering.

KANDEIL, ABD EL RAZEK Y.

Ph. D. 1979, Carleton University, Canada

Specialization
Materials Engineering.

Experience in Industry
Technical Assistance to Zinc Die Casting Industry in North America.

Research Activities
Advanced Composite Materials, Powder Metallurgy, Metal Forming, Die Casting.

RASHED, A. OSSAMA (VISITING)

Ph.D. 1983, Birmingham University, Birmingham, U.K.

Specialization
Production Engineering.

Experience in Industry
- Executive Director of Production Engineering Centre 1995-1998
- Consultant for various Industrial Companies and Inspection Agencies in Egypt and U.K.

Research Activities
Industrial Inspection, Product Measurement, Quality Control.

YOUSEF, M. YEHIA

Ph. D. 2003 The Imperial College London, UK.
Specialization
Materials Engineering.

Experience in Industry

Research Activities

Part Time Staff

ABDEL SALAM, MAHMOUD IBRAHIM

Ph. D. 1981, Zakazik University, Zakazik, Egypt.

Specialization
Accounting

BADAWI, M. WAGIH (CONSULTANT)

Ph. D. 1964, the Victoria University of Manchester, U.K.

Specialization:
Industrial Engineering.

Experience in Industry

• Executive Director of Production Engineering Centre 1986-1991.

Research Activities:
Feasibility Studies, Ergonomics and Human Factors, Project Planning and Management.

FORS, MOHAMED NASHAAT


Specialization
Industrial Engineering

Experience in Industry


Research Activities

MEDANI, OMAR AHMED

Ph. D. 2005, University of Nottingham, U.K.
Specialization
Data Modelling and Systems Architecture.

Experience in Industry
Training at Wacks Co., USA, 1998.

Research Activities
Xml Data Representation and How That Affects the Ease of Data Integration.

Assistant Lecturer, M. Sc. 2006, AASTMT, Alexandria, Egypt.

Specialization
Industrial Engineering

Research activities
Simulation of material handling systems in wafer fabrication facilities.

Assistant Lecturer, M.Sc. 2004, AASTMT, Alexandria, Egypt

Specialization
Manufacturing Technology, Materials Engineering

Experience in Industry
- Welding Applications.
- Macroscopic and Microscopic Examination.
- Non-Destructive and Destructive Testing.
- Casting of Aluminium Alloys.

Research Activities
- Repair Welding of Low-Weldability Steels using the knowledge-base systems in welding application.
- Acoustic emission applications.
- Effect of oxide film defects on the reliability of aluminium castings.

Assistant Lecturer, BSc. 2006, AASTMT, Alexandria, Egypt.

Specialization
Industrial Engineering.

Experience in Industry
None
Research Activities
Operations Scheduling, Optimization, Simulation, Semi-conductor Manufacturing.

GHAZY, MOOTAZ MAMDOUNH

Assistant Lecturer, M.Sc. 2005, AASTMT, Alexandria, Egypt

Specialization
Industrial Engineering

Experience in Industry
CNC Machining, CAD / CAM

Research Activities
Rapid Prototyping, Project Management, Optimization, Genetic Algorithm, Production Planning, Operations Research

SHARARAH, MOHAMED A.

Teaching Assistant, BSc. 2007, AASTMT, Alexandria, Egypt

Specialization
Industrial Engineering

Experience in Industry
None

Research Activities
Lean Manufacturing, Production Planning, Simulation.

GHEITH, BASMA A.

Teaching Assistant, BSc. 2007, AASTMT, Alexandria, Egypt

Specialization
Industrial Engineering

Experience in Industry
None

Research Activities
Assessing the need for third party logistics to manage the reverse logistics in medicine industry.

ELKASHOUTY, MENNA F.

Teaching Assistant, B.Sc.2008, AASTMT, Alexandria, Egypt
Specialization
Industrial Engineering

Experience in Industry
None

Research Activities
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. Computer Integrated Manufacturing (CIM) Laboratory.
2. Work Analysis and Ergonomics Laboratory.
3. Reverse Engineering Laboratory.
4. Engineering Workshop (Metal Cutting, casting and Welding)
5. Testing of Materials Laboratory.
6. Non-destructive Testing Laboratory.
7. Electrical Circuits Laboratory.
8. Analogue Automatic Control Laboratory.
9. Digital Automatic Control Laboratory.
10. Computer Laboratory.
11. Physics Laboratory.
12. Chemistry Laboratory.
13. Mechatronics Laboratory.
14. Advanced Manufacturing Laboratory.
Computer Integrated Manufacturing (CIM) Laboratory

LABORATORY INFORMATION

An up-to-date Laboratory with facilities that contain contemporary educational computer numerical control (CNC) machine tools microcomputers and control devices to support experimentation and research in industrial automation and solving problems arising in integrated and flexible manufacturing, material handling, assembly and production systems.

Room no.: Industrial services centre (ISC) - 213
Capacity: 15 students.

MAJOR EQUIPMENT

- CNC (Triac PC) Milling Machine.
- Flexible Manufacturing System Equipment (conveyor, robot,).
- Programmable Control Training Equipment.
- Mill Cam Software.
- Lathe Cam Software.
- Virtual Reality Software.

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>IM 316</td>
<td>Advanced Manufacturing Systems</td>
<td>7</td>
</tr>
<tr>
<td>IM 433</td>
<td>Industrial Data Systems Management</td>
<td>7</td>
</tr>
<tr>
<td>IM 418</td>
<td>Automated Industrial Systems</td>
<td>8</td>
</tr>
<tr>
<td>IM 501</td>
<td>Senior Project Part (1)</td>
<td>9</td>
</tr>
<tr>
<td>IM 502</td>
<td>Senior Project Part (2)</td>
<td>10</td>
</tr>
</tbody>
</table>
Work Analysis and Ergonomics Laboratory

LABORATORY INFORMATION

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

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

Room no.: 424
Capacity: 15 students

LABORATORY EQUIPMENT

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

- Vocational evaluation.
- Fitness evaluation.
- Range of motion measurements.
- Sensibility analysis.
- Reaction time measurement.
- Physical work capacity evaluation.
- Manual dexterity.
- Pre-employment evaluation.
- Muscular stresses measurement.
- Analysis of lifting activities and labour posture.
- Task analysis.
- Workstation assessment.
- Hand Eye Coordination

THE LABORATORY SERVES THE FOLLOWING COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM 422</td>
<td>Work Design and Measurements</td>
<td>7</td>
</tr>
<tr>
<td>IM 523E</td>
<td>Human Factors Engineering and Design</td>
<td>9, 10</td>
</tr>
<tr>
<td>IM 501</td>
<td>Senior Project Part (1)</td>
<td>9</td>
</tr>
<tr>
<td>IM 502</td>
<td>Senior Project Part (2)</td>
<td>10</td>
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</tbody>
</table>
Reverse Engineering Laboratory

LABORATORY INFORMATION

A completely equipped laboratory that contains precision measurement equipment and gauges for use in experimental machining investigations and studies in quality control and to provide measurements and services to other disciplines. The laboratory houses a collection of equipment used for the following functions:

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

Room no.: Industrial services centre (ISC) - 005

Capacity: 15 students

LABORATORY EQUIPMENT

- Profile projection
- Granite surface plate.
- Precision bench centres.
- Coordinate measuring machine (CMM).
- Toolmaker’s microscope.
- 3-D CNC –Vision Measuring.
- Profile, roundness and roughness measuring machine.
- Measuring hand tools, instruments and accessories: Block gauge sets, vernier callipers and height gauges, micrometers, sine bars, sine plates, digital bevels... etc.

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>IM 112</td>
<td>Manufacturing Technology</td>
<td>2</td>
</tr>
<tr>
<td>IM 213</td>
<td>Material Removal Processes</td>
<td>4</td>
</tr>
<tr>
<td>IM 314</td>
<td>Material Forming Processes</td>
<td>5</td>
</tr>
<tr>
<td>IM 418</td>
<td>Automated Industrial Systems</td>
<td>8</td>
</tr>
<tr>
<td>IM 511E</td>
<td>Engineering Metrology</td>
<td>9, 10</td>
</tr>
<tr>
<td>IM 501</td>
<td>Senior Project Part (1)</td>
<td>9</td>
</tr>
<tr>
<td>IM 502</td>
<td>Senior Project Part (2)</td>
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</tr>
</tbody>
</table>
Engineering Workshop

LABORATORY INFORMATION

The workshop comprises a representative sample of most of the basic machine tools, welding and casting equipment. Its functions include the following:

- Teaching experimental manufacturing courses.
- Supporting students’ senior project work.
- Fabricating specialized apparatus and equipment.
- Training purposes and imparting of skills.
- Extending services to other departments within the college.
- Serve maintaining the various technical units within the Academy.

Room no.: Industrial services centre (ISC)

Capacity: 50 students

WORKSHOP EQUIPMENT

- Turning machines (engine lathes)
- Milling machines.
- Drilling machines.
- Grinding machines.
- Tool grinder.
- Shaper.
- Sawing machines.
- Broaching machine.
- Honing machine.
- Welding equipment (Arc, Gas, Mig)
- Hand tools and measuring equipment.
- Educational casting kits.
- Lathe dynamometers and twist drill dynamometer.

THE LABORATORY SERVES THE FOLLOWING COURSES

<table>
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<tr>
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<th>Course Title</th>
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</tr>
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<tbody>
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<td>IM 112</td>
<td>Manufacturing Technology</td>
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<tr>
<td>IM 502</td>
<td>Senior Project Part (2)</td>
<td>10</td>
</tr>
</tbody>
</table>
Testing of Materials Laboratory

LABORATORY INFORMATION

Room No.: 011
Capacity: 25

MAJOR EQUIPMENT

- Universal testing machines
- Torsion testing machine
- Impact testing machine
- Hardness testing machine
- Heat treatment furnace

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 274</td>
<td>Material Science</td>
<td>3</td>
</tr>
<tr>
<td>ME 277</td>
<td>Strength of Material</td>
<td>4</td>
</tr>
<tr>
<td>IM 315</td>
<td>Material Technology</td>
<td>5</td>
</tr>
</tbody>
</table>
Non-Destructive Testing Laboratory

LABORATORY INFORMATION

Room No.: 103
Capacity: 25

MAJOR EQUIPMENT

- 3 Ultrasonic Thick Gauge
- Magnetic particles
- Magnetic Yoke
- 2 Coating Thick Gauge
- 3 Ultrasonic flow detector
- 2 Eddy Current

LABORATORY SERVES THE FOLLOWING COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM 417</td>
<td>Failure Analysis</td>
<td>7</td>
</tr>
<tr>
<td>IM 514E</td>
<td>Polymers, Ceramics and Composite Materials</td>
<td>10</td>
</tr>
<tr>
<td>IM 515E</td>
<td>Selection of Engineering Materials</td>
<td>10</td>
</tr>
</tbody>
</table>
Electrical Circuits Laboratory

LABORATORY INFORMATION

The lab provides various tests and runs numerous experiments to out the following research activities:

- Making basic measurements with the HP8590 E-Series and L-Series spectrum Analyzer.
- Decreasing the frequency span using the marker.
- Tracking unstable signals using marker track and the max. hold and min. hold function.
- Tracing of the output of some power electronic circuits using the storage oscilloscope.
- Transferring of output data of different circuits is done using a system of storage oscilloscope and Computer PC.
- Studying of different shapes available in the function generation and comparison between their average root mean square value and instantaneous values.

Room no.: 034
Capacity: 25 students

LABORATORY EQUIPMENT

- Spectrum Analyzers.
- Digital Oscilloscopes.
- Analogue Oscilloscopes.
- Multiplexer.
- Wattmeter.
- Digital power Supply.
- Analogue power Supply.
- Function Generator.
- Digital LCR Meter.
- Digital Multimeter.
- Analogue Multimeter.
- Test Boards.

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>EE 238</td>
<td>Electrical Eng. Fundamentals</td>
<td>3, 4</td>
</tr>
<tr>
<td>EE 231</td>
<td>Electrical Circuits 1</td>
<td>3</td>
</tr>
<tr>
<td>EE 236</td>
<td>Electrical engineering 1</td>
<td>4</td>
</tr>
<tr>
<td>EE 232</td>
<td>Electrical Circuits 2</td>
<td>4</td>
</tr>
<tr>
<td>EE 312</td>
<td>Electric Measure. &amp; Inst. 2</td>
<td>5</td>
</tr>
</tbody>
</table>
Digital Automatic Control Laboratory

LABORATORY INFORMATION

Room No.: 105
Capacity: 20 students

MAJOR EQUIPMENT

- Programmable Logic Controller “OMRON”
- Programmable Logic Controller “SIEMENS S5-115U”
- Programmable Logic Controller Trainer.
- Lab-Volt 32 Bit Microprocessor Trainer
- Heat Kd-ETW 3800 Microprocessor Trainer.
- DC Motor Control Simulator.
- Rotary Transfer Unit Simulator.
- Traffic Control Simulator.
- Washing Machine Simulator.
- Mentor Robot Arm.
- Digital Multimeter.
- 7 Dell OptiPlex 760, Intel Core2Duo 3.0Ghz desktop computer with USB keyboard an, optical mouse and LCD 19” monitor

LABORATORY SERVES THE FOLLOWING COURSES

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 236</td>
<td>Electrical Engineering (1)</td>
<td>4</td>
</tr>
<tr>
<td>EE 326</td>
<td>Electrical Engineering (2)</td>
<td>6</td>
</tr>
<tr>
<td>EE 441</td>
<td>Power Systems (1)</td>
<td>6</td>
</tr>
</tbody>
</table>
Analogue Automatic Control Laboratory

LABORATORY INFORMATION

Room No. : 103

Capacity: 20 students

MAJOR EQUIPMENT

- Speed & Position Control Process.
- Induction Motor 3-pH Speed Control Trainer.
- Process Control Simulator.
- Light Control process Simulator.
- Temperature Process Trainer T-3.
- Level & Flow Trainer LF-1.
- Computer Control Process Trainer.
- Valve Calibration Trainer.
- Analogue training System.
- F.B. Modular Servo System.
- 3 Oscilloscopes.
- 3 Function Generators.
- Frequency Sweeper.
- Dead Weight Tester.
- Programmable logic Controller “Siemens S-5 100U”.
- 3 Digital Multimeters.
- 4 Air Compressors.
- Mini Workshop.

LABORATORY SERVES THE FOLLOWING COURSES

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 236</td>
<td>Electrical Engineering (1)</td>
<td>4</td>
</tr>
<tr>
<td>EE 326</td>
<td>Electrical Engineering (2)</td>
<td>6</td>
</tr>
</tbody>
</table>
Computer Laboratory

Laboratory Information

Lab Name: lab 328
Room No.: 328
Capacity: 25

Major Equipment

- 25 Computers.
- 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>
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<tbody>
<tr>
<td>IM 433</td>
<td>Industrial Data Systems Management</td>
<td>7</td>
</tr>
<tr>
<td>IM 521E</td>
<td>Discrete Event System Simulation</td>
<td>9</td>
</tr>
<tr>
<td>ME255</td>
<td>Computer Aided Drafting</td>
<td>4</td>
</tr>
</tbody>
</table>
Physics Laboratory

LABORATORY INFORMATION

Lab Name: Physics Lab I
Room No.: 114
Capacity: 25

MAJOR EQUIPMENT

- Power Supplies
- Electronic Components
- Boards
- Laser Tubes
- Function generators
- Heaters
- Photo Electric System
- Cathode Ray Oscilloscopes

LABORATORY SERVES THE FOLLOWING COURSES

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Courses Title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA 114</td>
<td>Physics I</td>
<td>1</td>
</tr>
</tbody>
</table>
Physics Laboratory

LABORATORY INFORMATION

Lab Name: Physics Lab II
Room No.: 116
Capacity: 25

MAJOR EQUIPMENT

- Power Supplies
- Heaters
- Thermopiles
- Boil’s Apparatus
- Function Generators

LABORATORY SERVES THE FOLLOWING COURSES

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Courses Title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA 114</td>
<td>Physics II</td>
<td>2</td>
</tr>
</tbody>
</table>
Chemistry Laboratory

LABORATORY INFORMATION

Lab Name: Chemistry
Room No.: 214,150
Capacity: 25

MAJOR EQUIPMENT

- Chemicals and Reagents
- Pipettes, Burettes, Conical Flasks, Beakers, Funnels, Measuring Cylinders, Measuring Flasks.
- Projector
- Spectrophotometers
- pH meter
- Water analysis
- Test Oil Sets
- Sensitive Balances
- Oven
- Distell Water System

LABORATORY SERVES THE FOLLOWING COURSES

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Courses Title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA 118</td>
<td>Chemistry</td>
<td>1st and 2nd</td>
</tr>
</tbody>
</table>
Mechatronics Laboratory

LABORATORY INFORMATION

Room No.: 009
Capacity: 15

MAJOR EQUIPMENT

- ProLight 3000 Turning Centre, versatile 2-axis CNC lathe for training, engineering and light-duty industrial turning applications.
- The proLIGHT 1000 machining centre is a tabletop CNC milling machine.
- 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 COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM 418</td>
<td>Automated Industrial Systems</td>
<td>8</td>
</tr>
<tr>
<td>IM 512E</td>
<td>Integrated Manufacturing Systems</td>
<td>9</td>
</tr>
</tbody>
</table>
Advanced Manufacturing Laboratory

LABORATORY INFORMATION

Room No.: 026
Capacity: 15

MAJOR EQUIPMENT

- Computerized Laser Engraving Machine
- AutoCAD 2009 software
- CorelDraw software
- 1 PC
- Rapid Manufacturing (3D printer)²

LABORATORY SERVES THE FOLLOWING COURSES

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<tr>
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<th>Semester</th>
</tr>
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<tr>
<td>IM 512E</td>
<td>Integrated Manufacturing Systems</td>
<td>9</td>
</tr>
<tr>
<td>IM 541E</td>
<td>Product Design</td>
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<tr>
<td>IM 501</td>
<td>Senior Project Part (1)</td>
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</tr>
<tr>
<td>IM 502</td>
<td>Senior Project Part (2)</td>
<td>10</td>
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</tbody>
</table>

² Planned lab extension.