October University for Modern Sciences and Arts (MSA)

Faculty of Engineering

Electrical Communication and Electronic Systems Engineering Program (ECE)

Module Outlines

2014/2015
Module Outlines:

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

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

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

Aims, Syllabus, Learning Outcomes, Teaching/Learning Strategies, Learning Materials, Assessment Scheme, Assessment Pattern, Learning Unit Contact Hours, and Module Leader.
100’s LEVEL MODULES
MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

<table>
<thead>
<tr>
<th>Module Code</th>
<th>MAT151</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Calculus I</td>
</tr>
<tr>
<td>Level</td>
<td>1</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>3</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>None</td>
</tr>
</tbody>
</table>

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

SYLLABUS

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

LEARNING OUTCOMES

Knowledge
After completing this module, students will be able to:
1. Define and enumerate the basic concepts and principles of mathematics.
2. Recall the foundations of Calculus Problems and Techniques.
3. Review the various modern techniques, used in mathematical problems.

Skills
After completing this module, students will be able to:
1. Solve engineering problems by suitable mathematical techniques.
2. Recognize the various mathematical terminology.
3. Develop mathematical skills through tackling and solving engineering problems.

Teaching/Learning Strategies
- Lectures.
- Tutorials.

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

Useful Websites:
- http://www.math.ucdavis.edu
- http://www.math.nmc.edu
• http://www.math.montana.edu
• http://www.ugrad.math.ubc.ca

Reference Text:
• Thomas, Calculus-Early Transcendentals, 11th ed., Pearson-Addison Wesley, 2006, Ch. 1-4, 7, 14

Supplementary Readings:
• Salaas and Hille’s, One and Several Variables, John Wiley Inc., 9th ed., 2003.

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

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

Total 100% Learning

Unit Contact Hours Per Week
• Lectures 3 hrs / week
• Tutorials 1.5 hrs / week
• Total class contact hours 63 hrs/semester
• Total self study hours 45 hrs/semester
• Total study hours 108 hrs/semester

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

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

SYLLABUS

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

LEARNING OUTCOMES

Knowledge
After completing this module, students will be able to:
1. Define the basic concepts, principles and theories of physics.
2. Understand the relationship between theory and experimentation.
3. Classify scientific factors affecting the results.

Skills
After completing this module, students will be able to:
1. Communicate effectively, particularly to the scientific community using the language of physics and mathematics.
2. Solve problems related to real life phenomena.
3. Use laboratory equipment in a safe and effective.
4. Implement projects to emphasize concepts addressed in the course.

Teaching/Learning Strategies
- Lectures
- Tutorials
- Laboratories
- Projects

Learning Materials
Hardware Requirements:
- Mechanics, properties of matter, and thermal experiments in Physics I Lab.
Reference Texts:

Supplementary Readings:

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

Assessment Pattern
- Class Participation/Assignments          10%
- Tests and Quizzes                        10%
- Lab/Projects                             20%
- Unseen Mid-Term Exam                     20%
- Unseen Final Exam                        40%

Total                                                                 100%

Learning Unit Contact Hours Per Week
- Lectures                                 3 hrs / week
- Tutorials                                1.5 hrs / week
- Laboratories                             1.5 hrs / week
- Total class contact                      84 hrs/semester
- Total self study hours                   60 hrs/semester
- Total study hours                        144 hrs/semester

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

AIMS
This module is designed to provide students with perspective on engineering mechanics and statics, such as statics of particles, forces, vectors, rectangular components in a plane and in space. This includes vectors operations, and equilibrium of particle.

SYLLABUS

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

LEARNING OUTCOMES

Knowledge
After completing this module, students will be able to:
1. Interpret the concepts of engineering mechanics and statics, and their applications.
2. Classify the mechanical processes including the structure design and their different components.

Skills
After completing this module, students will be able to:
1. Solve engineering mechanics and statics problems.
2. Apply the theory of Mechanics to structure design.

Teaching/Learning Strategies
- Lectures
- Tutorials
- Individual/Group Projects

Learning Materials
Useful Websites:
- http://www.statics.com
Reference Text:

Supplementary Readings:

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

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

Total 100% Learning

Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

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

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

SYLLABUS

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

LEARNING OUTCOMES

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

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

After completing this module, students will be able to:
1. Develop skills in visualizing the various views of mechanical parts.
2. Apply skills in assembling various mechanical parts.
3. Learn the dimensional tolerances, fits, and surface finish.
4. Develop Constructional Drawings.

Teaching/Learning Strategies

- Design studio.
- Auto CAD Lab.

Learning Materials

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

Software Materials
- Auto CAD 2010 Program.

Useful Websites:
- http://www.ces.clemson.edu
- http://www.osu.okmulgee.edu
- http://www.ces.clemson.edu
- http://www.mhhe.com
- http://www.osu-okmulgee.edu
- http://www.ces.clemson.edu

Reference Text:

Supplementary Readings:

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

Assessment Pattern
- Studio Participation 10%
- Lab participation 10%
- Assignments (Studio and Lab) 10%
- Tests and Quizzes 10%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%
<table>
<thead>
<tr>
<th>Learning Unit Contact Hours</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studio &amp; Lab Work</td>
<td>4.5 hrs/week</td>
</tr>
<tr>
<td>Lectures</td>
<td>1.5 hrs/week</td>
</tr>
<tr>
<td>Total studio &amp; Lab contact hours</td>
<td>84 hrs/semester</td>
</tr>
<tr>
<td>Total self work hours</td>
<td>60 hrs/semester</td>
</tr>
<tr>
<td>Total work hours</td>
<td>144 hrs/semester</td>
</tr>
</tbody>
</table>

**Module Leader**

Staff
MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

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

AIMS
This module is designed to familiarize students with efficient use of computers, devices and their applications. The lecture part serves as an introduction to computer terminology, graphics and networks. The course introduces common software concepts, operating systems and programming languages. The tutorial part of this course should improve keyboarding skills. It introduces the microcomputer platform with emphasis on windows environment, popular computer application packages, such as Microsoft Office, Working with the internet, AUTOCAD and MATLAB.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computers Architecture</td>
</tr>
<tr>
<td>Central Processing Unit</td>
</tr>
<tr>
<td>Memory and Storage Devices</td>
</tr>
<tr>
<td>Input and Output Devices</td>
</tr>
<tr>
<td>Introduction to Mat lab and AutoCAD</td>
</tr>
<tr>
<td>Programming techniques including flow charts and languages</td>
</tr>
<tr>
<td>Internet and searching methods</td>
</tr>
<tr>
<td>Software operating systems and tools</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this module, students will be able to:
1. Identify the basic concepts of computers
2. Navigate, browse and search the internet.
3. Describe basic components of Autocad and Matlab.

Skill
After completing this module, students will be able to:
1. Employ software operating systems, tools, and applications
2. Organize and retrieve information on a computer.

Teaching/Learning Strategies
- Lectures.
- Computer Laboratories.
- Class Presentation.

Learning Materials
Software Requirements:
- MATLAB
- AUTOCAD
- MS-Office
- Internet Explorer
Useful Websites:
http://www.prenhall.com/~longlong
http://www.gpc.edu/
http://www.it4all.co.uk/ (ICDL Course)
http://www.howstuffworks.com/ (How stuff works)
http://www.caam.rice.edu/~timwar/MA375F03/MA375.html

Reference Text:

Supplementary Readings:

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

Assessment Pattern
- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 1.5 hrs / week
- Laboratories 3 hrs / week
- Total class contact 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader
Staff
## MSA UNIVERSITY
### FACULTY OF ENGINEERING
### MODULE OUTLINE

<table>
<thead>
<tr>
<th>Module Code</th>
<th>ENG 156</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Academic English Writing</td>
</tr>
<tr>
<td>Level</td>
<td>1</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>3</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>None</td>
</tr>
</tbody>
</table>

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

### SYLLABUS

<table>
<thead>
<tr>
<th>Writing: the Essay</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Introduction of writing correction code</td>
</tr>
<tr>
<td>• From Grammar to Writing: The Sentence</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reading: “Unit I”</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Writing: Describing a Person</td>
</tr>
<tr>
<td>• From Grammar to Writing: Subject/Verb agreement</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reading: “Unit II”</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Writing: Describing a Place</td>
</tr>
<tr>
<td>• From Grammar to Writing: Editing exercises</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reading: “Unit III”</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Writing: Describing an Event</td>
</tr>
<tr>
<td>• From Grammar to Writing: Parallelism</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reading: “Unit IV”</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Writing: Describing a Process</td>
</tr>
<tr>
<td>• From Grammar to Writing: Editing exercises</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reading: “Unit V”</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Writing: Distinguishing facts from opinions</td>
</tr>
<tr>
<td>• Specialized Vocabulary</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Writing: Directed Free Writing/Editing</th>
</tr>
</thead>
<tbody>
<tr>
<td>• From Grammar to Writing: Parallelism of Gerunds and Infinitives</td>
</tr>
<tr>
<td>• Specialized Vocabulary</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reading: “Unit VI”</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Writing: Process Writing</td>
</tr>
<tr>
<td>• From Grammar to Writing: Sentences and Fragments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reading: “Unit VII”</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Writing: Process Writing</td>
</tr>
<tr>
<td>• From Grammar to Writing: Editing exercises</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reading: “Unit VIII”</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Writing: Expository Writing (Comparison and Contrast)</td>
</tr>
<tr>
<td>• From Grammar to Writing: Punctuation of Adjective Clauses</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reading: “Unit IX”</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Writing: Expository Writing (Definition and Partition)</td>
</tr>
<tr>
<td>• From Grammar to Writing: Editing exercises</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reading: “Unit X”</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Writing: Expository Writing (Classification)</td>
</tr>
<tr>
<td>• From Grammar to Writing: Avoiding run-on sentences and comma splices</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reading: “Unit XI”</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Writing: Practice – Summary Writing</td>
</tr>
<tr>
<td>• From Grammar to Writing: Editing exercises</td>
</tr>
</tbody>
</table>
### Learning Outcomes

#### Knowledge

After completing this module, students will be able to:

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

#### Skills

After completing this module, students will be able to:

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

### Teaching/Learning Strategies

- Lectures.
- Tutorials.

### Learning Materials

#### Useful Websites

- [http://www.better.english.com](http://www.better.english.com)
- [http://www.eslcafe.com](http://www.eslcafe.com)

#### Reference Text


#### Supplementary Readings


### Assessment Scheme

- Assignments and quizzes.
- Individual term project.
- Unseen Mid-Term Exam.
- Unseen Final-Exam.

### Assessment Pattern

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments and quizzes</td>
<td>20%</td>
</tr>
<tr>
<td>Individual term project</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40%</td>
</tr>
</tbody>
</table>

| Total | 100% |

### Learning Unit Contact Hours

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

### Module Leader

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

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

SYLLABUS

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

LEARNING OUTCOMES

Knowledge
After completing this module, students will be able to:
1. Recall and enumerate the essential concepts and principles of mathematics.
2. Review the foundations of Calculus Problems and Techniques.
3. Study the various modern techniques used in mathematical problems.

Skills
After completing this module, students will be able to:
1. Solve engineering problems by suitable mathematical techniques.
2. Recognize the various mathematical terminology.
3. Perform integration in different coordinate systems.

Teaching/Learning Strategies
• Lectures.
• Tutorials.

Learning Materials

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

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

Supplementary Readings:

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

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

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

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

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

SYLLABUS

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

LEARNING OUTCOMES

Knowledge
After completing this module, students will be able to:
1. Understand the basic concepts, principles, and theories underlying electrical and magnetic phenomena.
2. Match the relationship between theory and experimentation.
3. Classify scientific factors affecting the results.

Skills
After completing this module, students will be able to:
1. Communicate effectively, particularly to the scientific community using the language of physics and mathematics.
2. Tackle practical problems scientifically.
3. Handle equipment in a safe and effective manner.
4. Implement projects to emphasize concepts addressed in the course.

Teaching/Learning Strategies
- Lectures
- Tutorials
- Laboratories
- Projects
Learning Materials

Hardware Requirements:
5. Electrical and Magnetic Experiments are performed in Physics II Lab.

Reference Texts:

Supplementary Readings:

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

Assessment Pattern
- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

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

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Laboratories 1.5 hrs / week
- Total class contact 84 hrs/semester
- Total self study hours 60 hrs/semester
- Total study hours 144 hrs/semester

Module Leader

Staff
**MSAUNIVERSITY**  
**FACULTY OF ENGINEERING**  
**MODULE OUTLINE**

<table>
<thead>
<tr>
<th>Module Code</th>
<th>GSE 163</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Engineering Mechanics II</td>
</tr>
<tr>
<td>Level</td>
<td>1</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>3</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>GSE 153</td>
</tr>
</tbody>
</table>

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

**SYLLABUS**

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

**LEARNING OUTCOMES**

**Knowledge**

After completing this module, students will be able to:
1. Outline the concepts of engineering mechanics and dynamics.
2. Develop the motion design of mechanisms.
3. Demonstrate the theory of dynamics problems and its applications.

**Skills**

After completing this module, students will be able to:
1. Solve engineering mechanics and dynamic problems.
2. Apply the theory of dynamics to motion design of mechanisms.
3. Derive the equation of motion of a dynamic system.
4. Implement a project by solving dynamic problems of engineering mechanics.
Teaching/Learning Strategies
- Lectures
- Tutorials
- Individual/Group Projects

Learning Materials

Useful Websites:
- http://www.xav.com
- http://www.eidosinteractive.com
- http://www.mdyn.com
- http://www.ams.org

Reference Text:

Supplementary Readings:

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

Assessment Pattern
- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

Total 100% Learning

Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

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

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

SYLLABUS

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

LEARNING OUTCOMES

Knowledge
After completing this module, students will be able to:
1. Analyse the chemical processes used in various industries.
2. Understand the basic principles of Petroleum, cement, polymers, glass and ceramics industries.

Skills
After completing the module, students will be able to:
1. Apply skills in various techniques for solving air and water pollution.
2. Demonstrate the electrochemistry phenomena and indicate the characteristics of corrosion.

Teaching/Learning Strategies
- Lectures  
- Tutorials  
- Laboratories  
- Projects

Learning Materials
Useful Websites:
- http://www.wiley-vch.de
- http://www.ceic.unsw.edu.au
Reference Texts:

Supplementary Readings:

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

Assessment Pattern

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

Learning Unit Contact Hours

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3 hrs / week</td>
</tr>
<tr>
<td>Tutorials/lab</td>
<td>3 hrs / week</td>
</tr>
<tr>
<td>Total class contact hours</td>
<td>84 hrs / semester</td>
</tr>
<tr>
<td>Total self study hours</td>
<td>60 hrs / semester</td>
</tr>
<tr>
<td>Total study hours</td>
<td>144 hrs / semester</td>
</tr>
</tbody>
</table>

Module Leader

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

**AIMS**

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

**SYLLABUS**

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

**LEARNING OUTCOMES**

**Knowledge**

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

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

**Skills**

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

1. operate various machines in the workshop.
2. Develop awareness of hazards, safety, and industrial hygiene at work environment is created.
Teaching/Learning Strategies
- Lectures.
- Tutorials.
- Workshops.
- Factory Visits.

Learning Materials

Hardware Requirements:
- Various machine tools in the University workshops.
- Manufacuturing Processes Video Tapes.

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

Reference Text:

Supplementary Readings:

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

Assessment Pattern
- Class Participation 10%
- Assignments (Team Reports) 10%
- Tests and Quizzes 15%
- Individual Oral Practical Test 5%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

Total 100%

Learning Unit Contact Hours
- Lectures 3 hrs / week
- Workshops 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader

Staff
MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

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

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

SYLLABUS

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

Learning Outcomes

Knowledge
After completing this module, students will be able to:
1. Analyze the texts they need to incorporate in the reports, identify graphical and visual information

Skills
After completing this module, students will be able to:
1. Paraphrase, summarize and analyse the texts they need to incorporate in the reports.
2. Write clear and effective curriculum vitae, business letters and memos.
3. Design and administer questionnaires.
4. Analyze the quantitative and qualitative data obtained from the questionnaires.
5. Integrate graphical, visual and statistical information into the reports.
6. Produce a report with an outline and a simplified “Reference” page.
7. Present the reports using slides or computer software.

Teaching/Learning Strategies
- Lectures.
- Tutorials.
Learning Materials

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

Reference Text

Assessment Scheme
- Assignments, and quizzes.
- Individual term project.
- Unseen Mid-Term Exam.
- Unseen Final-Exam.

Assessment Pattern
- Assignments and Quizzes 20%
- Individual term report 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

<table>
<thead>
<tr>
<th></th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td></td>
</tr>
</tbody>
</table>

Learning Unit Contact Hours
- Lectures 1.5 hrs / week
- Tutorials / Lab. 3 hrs / week
- Total class contact hours 63 hrs / semester
- Total self study hours 45 hrs / semester
- Total study hours 108 hrs / semester

Module Leader
Staff
200’s LEVEL MODULES
Module Code : MAT251
Title : Linear Algebra
Level : 2
Credit Hours : 3
Prerequisites : MAT161

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

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matrices – Matrices having Special Forms – Matrix Operations.</td>
</tr>
<tr>
<td>Determinates – Properties of Determinates.</td>
</tr>
<tr>
<td>Inverse of a Matrix – Inverse of a Matrix using Adjoint Matrix – Elementary row operations- Elementary matrices- Row Equivalence- Inverse of a Matrix by Elementary Row Operations.</td>
</tr>
<tr>
<td>Eigen Values and Eigen Vectors – Diagonalization - Orthogonal Diagonalization.</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this module, students will be able to:
1. Acquire the basic concepts and principles of mathematics.
2. Demonstrate the foundations of Linear Algebra Problems and Techniques.
3. Explore the various modern mathematical techniques used in Linear Algebra problems.

Skills
After completing this module, students will be able to:
1. Solve engineering problems by suitable mathematical techniques.
2. Recognize the various mathematical terminology.
3. Develop mathematical skills through tackling and solving engineering problems.

Teaching/Learning Strategies
- Lectures.
- Tutorials.

Learning Materials
Software Requirements:
- MAPLE, DRIVE, MATHEMATICA, MATLAB
Useful Websites:
- http://www.numbertheory.org
- http://www.math.odu.edu

Reference Text:

Supplementary Readings:

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

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

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

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader
Staff
Module Code: BSC 252
Title: Modern Physics
Level: 2
Credit Hours: 3
Prerequisites: BSC 162

AIMS
This module is designed to enable students to understand in depth the special theory of relativity, black body radiation, the photoelectric effect, the Compton Effect, wave properties of a particle, uncertainty principle, Bohr’s theory of atom and atomic spectra, quantum mechanical model of the Hydrogen atom, the atomic structure and the periodic table.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special theory of relativity – The relativity of time and length</td>
</tr>
<tr>
<td>Relativistic velocity, mass, momentum and energy</td>
</tr>
<tr>
<td>Black Body Radiation</td>
</tr>
<tr>
<td>Thermal radiation and Planck’s Postulate for energy quantization</td>
</tr>
<tr>
<td>Photoelectric effect, X-ray, and Compton effect</td>
</tr>
<tr>
<td>Particle like properties of radiation – Photons (Dual Nature of Light)</td>
</tr>
<tr>
<td>Wave properties of particles – de Broglie’s postulate (Dual Nature of Particles)</td>
</tr>
<tr>
<td>Heisenberg’s uncertainty principle</td>
</tr>
<tr>
<td>Schrödinger’s theory of quantum mechanics</td>
</tr>
<tr>
<td>Atomic Spectra and early models of atoms</td>
</tr>
<tr>
<td>Bohr’s model of the Hydrogen atom</td>
</tr>
<tr>
<td>The quantum model of the Hydrogen atom</td>
</tr>
<tr>
<td>Pauli’s Exclusion principle and the periodic table</td>
</tr>
<tr>
<td>x-ray spectra</td>
</tr>
<tr>
<td>Spontaneous and stimulated transition - Lasers</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this module, students will be able to:
1. Describe the basic concepts of the theory of relativity and quantum mechanics.
2. Illustrate methods of black body radiation and photoelectric effect.
3. List scientific factors affecting the results.

Skills
After completing this module, students will be able to:
1. Communicate effectively, particularly to the scientific community using the language of physics and mathematics.
2. Handle equipment in a safe and effective manner, to measure the wavelength of monochromatic light using Newton’s rings and single slit diffraction, the specific rotation of polarized light by sugar solution and the energy gap of a semiconductor.
3. Tackle practical problems scientifically.
4. Implement projects to emphasize concepts addressed in the course.

Teaching/Learning Strategies
- Lectures
- Tutorials
- Laboratories
- Projects
**Learning Materials**

**Hardware Requirements:**
- Modern physics experiments are performed in the modern physics Lab.

**Reference Texts:**
- MSA Laboratory Manual.

**Supplementary Readings:**

**Assessment Scheme**
- Assignments.
- Class written Tests/Quizzes.
- Lab/Projects
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

**Assessment Pattern**
- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

**Total 100%**

**Learning Unit Contact Hours Per Week**
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Laboratories 1.5 hrs / week
- Total class contact 84 hrs/semester
- Total self study hours 60 hrs/semester
- Total study hours 144 hrs/semester

**Module Leader**

Staff
Module Code : ESE 253
Title : Electric Circuit Analysis I
Level : 2
Credit Hours : 3
Prerequisites : BSC 162

AIMS
This module is designed to provide students an introductory topics in the circuit variables & elements, D.C circuits: network reduction, Ohm' Law, Kirchoff's Laws, sources & source transformation, series / parallel & delta/star combinations, Network theorems: superposition; mesh & node analysis: Thevenin’s & Norton’s Equivalent circuits, Maximum power transfer, inductors & capacitors, natural & step responses of first order RL & RC circuits.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units, Electrical Quantities, and Circuit Element: SI system of units and prefixes - the electrical quantities of charge, current, voltage, power, and energy.</td>
</tr>
<tr>
<td>Circuit theorems: Thevenin’s and Norton’s - conditions for maximum power transfer to a load</td>
</tr>
<tr>
<td>Capacitors and Inductors: the V/I equations for capacitance or inductance – their combine in series and parallel, and calculate their stored energy.</td>
</tr>
<tr>
<td>Transient Analysis in RC or RL Circuits (first and second order) : the differential equation for the voltage or current in an RC or RL circuit- find the initial conditions and then to find the step response of an RC or RL circuit</td>
</tr>
</tbody>
</table>

LAB EXPERIMENTS

- Equipment, Voltage, Current, and Resistance
- Circuit Analysis and Design with Measurements
- Circuit Theorems Explored Experiments
- Capacitors and Inductors
- 1st Order RC and RL Circuits
- 2nd Order RLC

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Describe basic linear electric circuits, theories and concepts.
2. Understand circuit theorems and laws of circuit analysis.

Skills
After completing this module, students will be able to:
1. Use circuit simulators (MULTISIM), matrix solvers (MATLAB) to verify students solutions and validate hand calculations.
2. Construct electrical circuits and Measure their parameters.
**Teaching/Learning Strategies**

- Lectures
- LaboratorieSa
- Team projects / Paper
- Tutorials
- Class Presentations

**Learning Materials**

**Software Requirements**
- MULTISIM and MATLAB.

**Useful Websites**
- [http://www.mitedu.freeserve.co.uk](http://www.mitedu.freeserve.co.uk)

**Reference Text:**

**Supplementary Readings:**
- IEEE Circuits and Systems Magazine

**Assessment Scheme**

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

**Assessment Pattern**

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

**Total** 100%

**Learning Unit Contact Hours Per Week**

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

**Module Leader**

Staff
Module Code: ECE 254
Title: Digital Logic Design I
Level: 2
Credit Hours: 3
Prerequisites: Co ESE 253

AIMS
This module enables students to understand concepts in binary numbers, number base conversion, complements and codes, definition of Boolean Algebra, Boolean functions, digital logic gates, integrated circuits, Karnaugh map methods, and combinational logic circuits. It also enables students to design, implement and analyze different types of combinational logic circuits. Programmable Logic Devices (PLD), Field Programmable Gate Array (FPGA) and Very High Speed Hardware Languages (VHDL) are also introduced.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital and Analog Concepts</td>
</tr>
<tr>
<td>Number Systems, Operations, and Codes</td>
</tr>
<tr>
<td>Logic Gates</td>
</tr>
<tr>
<td>Boolean Algebra and Logic Simplification</td>
</tr>
<tr>
<td>Combinational Logic Analysis</td>
</tr>
<tr>
<td>Adders, Subtractors, and Comparators</td>
</tr>
<tr>
<td>Decoders, Encoders, and Code Converters</td>
</tr>
<tr>
<td>Multiplexers, De Multiplexers, and Parity Generators/Checkers</td>
</tr>
<tr>
<td>Programmable Logic Devices: SPLDs and CPLDs</td>
</tr>
<tr>
<td>VHDL Programming techniques</td>
</tr>
<tr>
<td>Field Programmable Gate Array (FPGA).</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Recognize the number systems, and the conversion from a system to another
2. Identify the different types of complements and codes
3. Describe the Boolean algebra and its use in simplifying logic expression.
4. Describe the functions of the basic logic gates.
5. Identify the structure and function of different combinational logic circuits.

Skills
After completing this course students will be able to:
1. Design logic circuits using different approaches; either basic logic gates, universal logic gates or combinational logic gates
2. Realize the designed circuit using any of the available resources (basic/ universal logic gates, adders, comparators, decoders, encoders, MUXs).
3. Use Boolean Algebra and Karnaugh map methods to simplify combinational logic circuit design.
4. Develop programs for PLDs and FPGAs using VHDL.
5. Measure and test different types of combinational circuits.

### Teaching/Learning Strategies

- Lectures
- Laboratories
- Tutorials
- Individual/Group Project

### Learning Materials

**Useful Websites**

- [http://www.msstate.edu/directory](http://www.msstate.edu/directory)

**Reference Text:**


**Supplementary Readings:**

- Hwang, E.O., *Digital Logic and Microprocessor Design with VHDL*, Lecture Notes, La Sierra University, Brooks/Cole 2005

### Assessment Scheme

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

### Assessment Pattern

<table>
<thead>
<tr>
<th>Assessment Pattern</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Participation/Assignments</td>
<td>10%</td>
</tr>
<tr>
<td>Tests and Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Lab/Projects</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
<td>40%</td>
</tr>
</tbody>
</table>

**Total** 100%

### Learning Unit Contact Hours Per Week

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

### Module Leader

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

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

SYLLABUS

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

LEARNING OUTCOMES

Knowledge
After completing this module, students will be able to:
1. Design and think in computing wise to develop a program for solving problems.
2. Trace a given program and fix any logical error in the program.
3. Divide the problem into sub-problems.

Skills
After completing this module, students will be able to:
1. Use the VC++ tool professionally to convert logic and design into a computer program.
2. Debug skills using VC++ tool.
Teaching/Learning Strategies

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

Learning Materials

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

Useful Websites:

Reference Text:

Supplementary Readings:

Assessment Scheme

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

Assessment Pattern

- Class Participation 5%
- Assignments 10%
- Tests and Quizzes 10%
- Projects and Reports 15%
- Unseen Mid-term Exam 20%
- Unseen Final Exam 40%

Total 100%

Learning Unit Contact Hours

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

Module Leader
Staff
**MSA UNIVERSITY**  
**FACULTY OF ENGINEERING**  
**MODULE OUTLINE**

<table>
<thead>
<tr>
<th>Module Code</th>
<th>ENG 256</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Research English Writing</td>
</tr>
<tr>
<td>Level</td>
<td>2</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>3</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>ENG 166</td>
</tr>
</tbody>
</table>

**AIMS**

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

**SYLLABUS**

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

**Learning Outcomes**

**Knowledge**

After completing this module, students will be able to:

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

**Skills**

After completing this module, students will be able to:

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

### Teaching/Learning Strategies
- Lectures.
- Tutorials.

### Learning Materials

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

#### Reference Text

### Assessment Scheme
- Assignments and quizzes.
- Individual term project.
- Unseen Mid-Term Exam.
- Unseen Final-Exam.

### Assessment Pattern
- Assignments and quizzes 20%
- Individual term report 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

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

### Learning Unit Contact Hours
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs / semester
- Total self study hours 45 hrs / semester
- Total study hours 108 hrs / semester

### Module Leader
Staff
**Module Code**: MAT261  
**Title**: Differential Equations  
**Level**: 3  
**Credit Hours**: 3  
**Prerequisites**: MAT161

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

**SYLLABUS**

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

**LEARNING OUTCOMES**

**Knowledge**
After completing this module, students will be able to:
1. Recognize the various mathematical terminology.
2. Capture the basic concepts and principles of mathematics.
3. Apply Differential Equations Solving Techniques.
4. Employ the various modern mathematical techniques.

**Skills**
After completing this module, students will be able to:
1. Solve engineering problems by suitable mathematical techniques.
2. Develop mathematical skills through tackling and solving engineering problems.

**Teaching/Learning Strategies**
- Lectures.
- Tutorials.

**Learning Materials**

**Software Requirements:**
- MAPLE, DRIVE, MATHEMATICA, MATLAB
Useful Websites:
- www.wikipedia.org
- www.physics ohio-state.edu/edumath.odu.edu
- www.courses.cs.uiuc.edu
- www.chembio.uoguelph.ca
- www.math.montana.edu

Reference Text:

Supplementary Readings:

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

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

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader
Staff
<table>
<thead>
<tr>
<th>Module Code</th>
<th>Title</th>
<th>Level</th>
<th>Credit Hours</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESE 262</td>
<td>Physics of Electrical Materials</td>
<td>2</td>
<td>3</td>
<td>BSC 252</td>
</tr>
</tbody>
</table>

**AIMS**

This module is designed to provide introductory topics in the dielectrics, dielectric constant in DC and AC fields, local field correction, sources of polarizability, dipolar dispersion, polarizability of electrical properties, Introduction to magnetism, classification of materials, Diamagnetism and its materials, Paramagnetism and its materials, Ferromagnetism, Introduction to superconductivity and magnetic fields, Perfect diamagnetism, Electrodynamics of superconductivity.

**SYLLABUS**

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dielectric Constant in DC and AC Fields</td>
</tr>
<tr>
<td>Local Field Correction</td>
</tr>
<tr>
<td>Sources of Polarizability</td>
</tr>
<tr>
<td>Dipolar Dispersion</td>
</tr>
<tr>
<td>Polarizability of Electrical Properties</td>
</tr>
<tr>
<td>Magnetism, Classification of Materials</td>
</tr>
<tr>
<td>Diamagnetism and its Materials</td>
</tr>
<tr>
<td>Paramagnetism and its Materials</td>
</tr>
<tr>
<td>Ferromagnetism</td>
</tr>
<tr>
<td>Superconductivity and Magnetic Fields</td>
</tr>
<tr>
<td>Perfect Diamagnetism</td>
</tr>
<tr>
<td>Electrodynamics of Superconductivity</td>
</tr>
</tbody>
</table>

**LEARNING OUTCOMES**

**Knowledge**

After completing this course students well be able to:

1. Describe properties of dielectrics.
2. Identify magnetic materials.
3. Distinguish between superconductor materials at microscopic and macroscopic levels.

**Skills**

1. Select the proper material for specific application.
2. Evaluate the performance of electrical materials.
Teaching/Learning Strategies
- Lectures.
- Tutorials.
- Team projects / Paper.
- Class Presentations.

Learning Materials

Useful Websites
- http://www.motionnet.com/cgi-bin/sear

Reference Text:

Supplementary Readings:

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

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

Total: 100%

Learning Unit Contact Hours Per Week
- Lectures: 3 hrs / week
- Tutorials: 1.5 hrs / week
- Total class contact hours: 63 hrs/semester
- Total self study hours: 45 hrs/semester
- Total study hours: 108 hrs/semester

Module Leader
Staff
Module Code : ESE 263  
Title : Electrical Circuit Analysis II  
Level : 2  
Credit Hours : 3  
Prerequisites : ESE 253

This module is designed to enable students to understand concepts in Alternating Current (AC), steady-state analysis, node-voltage method, mesh-current method, Thevenin's equivalent circuit, sinusoidal steady-state power calculation, average, reactive, complex, and maximum power, power factor, resonance, filters, and balanced three-phase circuits.

**SYLLABUS**

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction to AC</strong> : AC magnitude, AC phase,</td>
</tr>
<tr>
<td><strong>Complex Numbers</strong> : Vectors and AC waveforms – complex vector operations – Polar and rectangular notation – Complex number arithmetic</td>
</tr>
<tr>
<td><strong>Reactance and impedance</strong> : AC resistor, inductor, capacitive circuits - Series and parallel impedances- Susceptance and Admittance</td>
</tr>
<tr>
<td><strong>Resonance</strong> : Simple parallel (tank circuit) resonance - Simple series resonance - Applications of resonance - Resonance in series-parallel circuits - Q and bandwidth of a resonant circuit</td>
</tr>
<tr>
<td><strong>Mixed-frequency ac signals</strong> : Square wave signals - Other waveshapes - More on spectrum analysis</td>
</tr>
<tr>
<td><strong>Filters</strong> : Low-pass filters - High-pass filters - Band-pass filters - Band-stop filters - Resonant filters</td>
</tr>
<tr>
<td><strong>Mutual inductance</strong> : circuits has magnetic coupling- T equivalent circuit for two coupled coils</td>
</tr>
<tr>
<td><strong>Polyphase ac circuits</strong> : Single-phase power systems - Three-phase power systems - Phase rotation - Three-phase Y and Δ configurations-</td>
</tr>
<tr>
<td><strong>Power factor</strong> : Power in resistive and reactive AC circuits - True, Reactive, and Apparent power - Calculating power factor</td>
</tr>
</tbody>
</table>

**LAB EXPERIMENTS**

- Measurement of the peak value and the period of periodic waveforms, using the oscilloscope.
- Resistive elements in AC circuits
- Inductive elements in AC circuits
- Capacitive elements in AC circuits
- Resonant circuits
- Filters : output voltage-time characteristic

**LEARNING OUTCOMES**

**Knowledge**

After completing this course students will be able to:

1. Understand the behavior of linear circuit elements in AC circuit
2. Recognize differences in response between inductive and capacitive circuits.

Skills
After completing this course students will be able to:
1. Identify relationship between conceptual understanding and problem-solving approaches.
2. Analyze electric circuits supplied by different AC sources
3. Design simple passive filters

Teaching/Learning Strategies
- Lectures
- Laboratories
- Tutorials
- Team projects

Learning Materials

Software Requirements
- P Spice & MULTISIM

Useful Websites
- http://www.analyzethat.net

Reference Text:

Supplementary Readings:
- IEEE Circuits and Systems Magazine

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

Assessment Pattern
- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Laboratorios 1.5 hrs / week
- Total class contact 84 hrs/semester
- Total self study hours 60 hrs/semester
- Total study hours 144 hrs/semester

Module Leader
Staff
MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code: ECE 264
Title: Digital Logic Design II
Level: 2
Credit Hours: 3
Prerequisites: ECE254

AIMS
This module is designed for enabling students to understand concepts in sequential logic circuits and Memory modules. Design and analysis of sequential logic circuits such as: Shift Registers, Counters, Synchronous and Asynchronous Sequential Circuits, State Diagrams, State Tables, Finite State Machines and integrated circuits technology are also introduced, Students will be able to develop, measure, and test different types of Sequential Circuits using D-type, T-type and JK-type Flip-Flops.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sequential Logic Circuits types and operation analysis</td>
</tr>
<tr>
<td>Latches and Flip Flops: S-R, D, T, J-K</td>
</tr>
<tr>
<td>Multivibrators: Mono stable, Bistable, and Astable Multivibrators</td>
</tr>
<tr>
<td>Counters: Synchronous, Asynchronous, Up and Down, Cascaded Counters.</td>
</tr>
<tr>
<td>Finite State Machines: Mealy and Moore Finite State Machines</td>
</tr>
<tr>
<td>Memory: RAM, ROM, Cash Memory, and Flash Memory</td>
</tr>
<tr>
<td>Memory Expansion</td>
</tr>
<tr>
<td>Stacks and Ques</td>
</tr>
<tr>
<td>Digital Integrated Circuits Technologies</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Recognize the structures and functions of Latches, Flip-Flops, Multivibrators, Counters, Registers, and Memories.
2. Identify the characteristics of Synchronous and Asynchronous Sequential Circuits.
3. Acquire knowledge associated with the different types of Integrated Circuits.
4. Measure and test different types of sequential logic circuits

Skills
After completing this course students will be able to:
1. Design sequential logic circuits using different approaches
2. Realize the designed circuit using any of the available resources/devices.

Teaching/Learning Strategies
- Lectures
- Tutorials
- Laboratories
- Individual/Group Project
Learning Materials

Useful Websites
- [http://www.msstate.edu/directory](http://www.msstate.edu/directory)

Reference Text:

Supplementary Readings:
- Hwang, E.O., *Digital Logic and Microprocessor Design with VHDL*, Lecture Notes, La Sierra University, Brooks/Cole 2005

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

Assessment Pattern
- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs/week
- Tutorials 1.5 hrs/week
- Laboratories 1.5 hrs/week
- Total class contact 84 hrs/semester
- Total self study hours 60 hrs/semester
- Total study hours 144 hrs/semester

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

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

SYLLABUS

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

LEARNING OUTCOMES

Knowledge
After completing this module, students will be able to:
1. Learn how to be a team member or a team-leader in a medim-size/large project.
2. Differentiate between static and dynamic allocation, and which one to choose.

Skills
After completing this module, students will be able to:
1. Use VC++ tool professionally in developing a large project.
2. Design and analyze a large problem in object-oriented methodologies (OOP).

Teaching/Learning Strategies
- Lectures.
- Tutorials.
- Computer Laboratories.
- Class Presentation.

Learning Materials

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

Useful Websites:

Reference Text:
Supplementary Readings:

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

Assessment Pattern
- Class Participation 5%
- Assignments 10%
- Tests and Quizzes 10%
- Projects and Reports 15%
- Unseen Mid-term Exam 20%
- Unseen Final Exam 40%

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

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Laboratories 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

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

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles of Project Management.</td>
</tr>
<tr>
<td>Project Planning Phase.</td>
</tr>
<tr>
<td>Structure of Networks.</td>
</tr>
<tr>
<td>Duration Time Estimates: Deterministic and Probabilistic.</td>
</tr>
<tr>
<td>Project Scheduling Phase.</td>
</tr>
<tr>
<td>Basic Scheduling Computations.</td>
</tr>
<tr>
<td>Slack Time Computation, Critical Path Identification</td>
</tr>
<tr>
<td>Project Control Phase.</td>
</tr>
<tr>
<td>Resource Constraints &amp; leveling.</td>
</tr>
<tr>
<td>Time-Cost Trade-Off &amp; Crashing.</td>
</tr>
<tr>
<td>Real Case Study.</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

A- Knowledge
After completing this module, students will be able to:
1. Review the basic concepts and principles of project management.
2. Develop an in-depth understanding of the three phases of project management: planning phase, scheduling phase, and control phase.

B- Skills
After completing this module, students will be able to:
1. Apply project management software to create project management documents such as work breakdown structures, Gantt charts, network diagram, schedules, financial reports, and status reports; as well as to complete project management analyses such as sensitivity analysis, resource allocation, leveling, and cost analysis.
2. Plan an analysis of the project management phases through real case studies.
3. Planning to communicate potentialities and strategies for resolving issues which occur during the project.
Teaching/Learning Strategies
- Lectures.
- Individual Project.
- Tutorials.
- Class Presentation.

Learning Materials

Software Requirements:
- Win QSB, MS Project 2003.

Useful Websites:
- http://www.csiwin.com
- http://www.jsaproj.com
- http://www.arch.uiuc.edu
- http://www.criticaltools.com

Reference Text:

Supplementary Readings:

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

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

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

Module Leader
Staff
300’s LEVEL MODULES
MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code : MAT351
Title : Mathematical Analysis and Numerical Methods
Level : 3
Credit Hours : 3
Prerequisites : MAT261

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

SYLLABUS

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

LEARNING OUTCOMES

Knowledge
After completing this module, students will be able to:
2. Capture various modern mathematical techniques.

Skills
After completing this module, students will be able to:
1. Apply the basic concepts and principles of Fourier and Laplace Transforms.
2. Solve engineering problems by suitable mathematical techniques.
3. Develop mathematical skills through tackling and solving engineering problems.

Teaching/Learning Strategies
- Lectures.
- Tutorials.

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

Useful Websites:
- www.cs.laurentian.ca
- www.math.jbpub.com
Reference Text:


Supplementary Readings:


Assessment Scheme

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

Assessment Pattern

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

Total: 100%

Learning Unit Contact Hours Per Week

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

Module Leader

Staff
Module Code : CSE 352
Title : Micropocessor Systems
Level : 3
Credit Hours : 3
Prerequisites : ECE 264+COM 265

AIMS
This module is designed to provide students with an in depth coverage of microprocessor systems including microprocessor internal architecture, external signals and busses, interfacing memory devices, and interfacing input and output devices. Topics also include an introduction to assembly language programming for 8-bit microprocessors, and example of simple microprocessor-based system designs.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microprocessor Architecture and Microcomputer Systems</td>
</tr>
<tr>
<td>Intel 8085 Microprocessor Architecture</td>
</tr>
<tr>
<td>Memory Interfacing</td>
</tr>
<tr>
<td>Interfacing Input/Output Devices</td>
</tr>
<tr>
<td>Assembly Programming</td>
</tr>
<tr>
<td>8085 Assembly Instructions</td>
</tr>
<tr>
<td>Programming Techniques</td>
</tr>
<tr>
<td>Counters and Time Delays</td>
</tr>
<tr>
<td>Interrupts, Interfacing Data Converters</td>
</tr>
<tr>
<td>Programmable Interface Devices</td>
</tr>
<tr>
<td>High-level Processors and Micro controllers</td>
</tr>
<tr>
<td>Microprocessor Applications</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Illustrate the basic hardware and software concepts of microprocessors.
2. Differentiate between the microprocessor-based systems.

Skills
After completing this course students will be able to:
1. Implement microprocessor-based applications.
2. Compose assembly language programs.

Teaching/Learning Strategies
- Lectures.
- Tutorials.
- Laboratories.
- Team Projects / Term Paper.

Learning Materials

Useful Websites
- http://www.lemps.ch
- http://www.swtpe.com
- http://www.chiark.greenend.org.uk
Reference Text:

Supplementary Readings:
- IEEE Computer Magazine.

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

Assessment Pattern
- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Laboratories 1.5 hrs / week
- Total class contact 84 hrs/semester
- Total self study hours 60 hrs/semester
- Total study hours 144 hrs/semester

Module Leader
Staff
MSA UNIVERSITY
FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code : ECE 353
Title : Electronic Circuits Analysis I
Level : 3
Credit Hours : 3
Prerequisites : ESE 263

AIMS
This module is designed to provide students with introductory topics in the physics. It includes theory of operation of the P-N junction, bipolar junction and field effect transistors.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction.</td>
</tr>
<tr>
<td>Basic Physics of Semiconductors.</td>
</tr>
<tr>
<td>Diode Models and Circuits.</td>
</tr>
<tr>
<td>Physics of Bipolar Junction Transistors (BJT), characteristics, operation, analysis of different configurations and applications.</td>
</tr>
<tr>
<td>Physics of Field Effect Transistors (FET) Transistors, characteristics, operation, analysis of different configurations and applications.</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Understand the basic physics of Semiconductors.
2. Illustrate diode, BJT, and FET transistors DC operations

Skills
After completing this course students will be able to:
1. Differentiate between different types of semiconductor materials.
2. Solve the DC problems for BJT and MOS transistors.
3. Measure and Test different electronic circuits.

Teaching/Learning Strategies
- Lectures.
- Tutorials.
- Laboratories.
- Group Project / Term Paper.
Learning Materials

Useful Websites
- http://www.web-ee.com

Reference Text:

Supplementary Readings:
- IEEE Circuits and Systems Magazine.

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

Assessment Pattern
- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Laboratories 1.5 hrs / week
- Total class contact 84 hrs/semester
- Total self study hours 60 hrs/semester
- Total study hours 144 hrs/semester

Module Leader
Staff
Module Code : ECE 354
Title : Electromagnetic I
Level : 3
Credit Hours : 3
Prerequisites : MAT251

AIMS
This module is designed to enable students to comprehend basic concepts of Electromagnetic fields, such as vector analysis, different coordinate systems and their operators, coulomb’s law and gauss’s law and their applications, …etc.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electromagnetic Model</td>
</tr>
<tr>
<td>Vector Analysis</td>
</tr>
<tr>
<td>Coordinate Systems and Operators</td>
</tr>
<tr>
<td>Coulomb’s Law</td>
</tr>
<tr>
<td>Gauss’s Law and Applications</td>
</tr>
<tr>
<td>Electric Potential</td>
</tr>
<tr>
<td>Electric Flux Density</td>
</tr>
<tr>
<td>Boundary Conditions for Electrostatic Fields</td>
</tr>
<tr>
<td>Capacitance and Capacitors</td>
</tr>
<tr>
<td>Electrostatic Energy and Forces</td>
</tr>
<tr>
<td>Method of Images</td>
</tr>
<tr>
<td>Boundary–Value Problems</td>
</tr>
<tr>
<td>Biot–Savart Law and Applications</td>
</tr>
<tr>
<td>Ampere’s Law and Applications</td>
</tr>
<tr>
<td>Magnetic Vector and Scalar Potential</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES
Knowledge

After completing this course students will be able to:

1. Characterize Electromagnetic models.
2. Comprehend basic concepts of Electromagnetic fields.

Skills
After completing this course students will be able to:

1. Demonstrate the various applications based on static electromagnetism.
2. Solve electromagnetic fields problems.
3. Analyze the solutions of many static problems.
## Teaching/Learning Strategies
- Lectures.
- Tutorials.

## Learning Materials

### Useful Websites
- [http://www.electromagnetics.co.uk](http://www.electromagnetics.co.uk)

### Reference Text:

### Supplementary Readings:
- IEEE Magnetics Magazine.

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

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

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

## Learning Unit Contact Hours Per Week
- Lectures: 3 hrs/week
- Tutorials: 1.5 hrs/week
- Total class contact hours: 63 hrs/semester
- Total self study hours: 45 hrs/semester
- Total study hours: 108 hrs/semester

## Module Leader
Staff
MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code: ECE 355
Title: Data Communication
Level: 3
Credit Hours: 3
Prerequisites: MAT251

AIMS
This module is designed to enable students to analyze concepts in the data communication systems including protocols and standards, network configuration and topologies, analog and digital signals, encoding and modulation techniques, interfaces and modems, guided and unguided transmission media, multiplexing, and error detection and correction methods.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Topologies , Categories , and Transmission Modes</td>
</tr>
<tr>
<td>Analog and Digital Signals</td>
</tr>
<tr>
<td>Asynchronous Transmission and UART interface</td>
</tr>
<tr>
<td>Synchronous Transmission and USRT interface</td>
</tr>
<tr>
<td>Line Coding Techniques (NRZ, RZ, Manchester, HDB3, mLnB, etc)</td>
</tr>
<tr>
<td>Digital phase locked loop (DPLL).</td>
</tr>
<tr>
<td>Error Control Methods and Automatic Repeat Request</td>
</tr>
<tr>
<td>Transmission Media (UTP, Coaxial, Optical Fiber, Wireless, etc.)</td>
</tr>
<tr>
<td>Transmission impairment and Performance</td>
</tr>
<tr>
<td>FDM, TDM, and WDM</td>
</tr>
<tr>
<td>Digital Multiplexing</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Analyze data communication and computer networks , both from theoretical and practical aspects .
2. Differentiate different protocols, standards, network configuration and topologies

Skills
After completing this course students will be able to
1. Design communication and data networks .
2. Differentiate modes of communication.

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

Useful Websites
- [http://www.sff.net/people/jeff.hecht/history.html](http://www.sff.net/people/jeff.hecht/history.html)

Reference Text:

Supplementary Readings:
- IEEE Communications magazine, releases 2000 and up.

Assessment Scheme

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

Assessment Pattern

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

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

Learning Unit Contact Hours Per Week

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

Module Leader

Staff
AIMS

This module is designed to enable students to understand concepts in electrical and electronic measurements. It introduces students to static and dynamic characteristics, accuracy and measurement error, statistical analysis of errors, electrical units, various classes of standard functions and characteristics of instruments. In addition, it presents different methods of measurements, classification of instruments, electrical measurements of basic parameters, direct current and voltage, alternating current and voltage, power, energy, power factor, and frequency. It also presents D.C and A.C Bridge measurements, Instrument transformers, current and voltage transformers, Electronic Instruments, Digital Instruments, Display devices and Recorders, Function Generators, Oscilloscopes, Calibration instruments, Sensors, and Transducers.

SYLLABUS

<table>
<thead>
<tr>
<th>TOPICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units and Standards of measures</td>
</tr>
<tr>
<td>Measurement and Instrumentation; sensing elements, signal conditioning elements, signal processing elements and data presentation elements</td>
</tr>
<tr>
<td>Static and Dynamic characteristics</td>
</tr>
<tr>
<td>Errors in measurements, Statistical analysis, average, standard deviation</td>
</tr>
<tr>
<td>Electromechanical Instruments, permanent magnet, moving coil, and moving iron</td>
</tr>
<tr>
<td>Instrument Transformers, current and voltage transformer</td>
</tr>
<tr>
<td>D.C. and A.C. Bridge Instruments; theory, operation and application</td>
</tr>
<tr>
<td>Electronic Instruments</td>
</tr>
<tr>
<td>Digital Instruments</td>
</tr>
<tr>
<td>Display devices and Recorders</td>
</tr>
<tr>
<td>Sine Wave Generators</td>
</tr>
<tr>
<td>Oscilloscopes</td>
</tr>
<tr>
<td>Calibration Instruments</td>
</tr>
<tr>
<td>Sensors and Transducers; temperature, position, force, torque, and pressure systems</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course, students will be able to:

1. Define units and standards of measures
2. Understand basic concepts and techniques of measuring physical, electrical and electronic quantities
3. Distinguish between the different types of Instruments.

Skills
After completing this course, students will be able to:
1. Utilize the basics of laboratory instrumentations
   2. Analyze errors in measurement to avoid it
   3. Measure different physical, electrical and electronic quantities

### TEACHING / LEARNING STRATEGIES

- Lectures
- Tutorials/Labs
- Team projects / paper
- Class Presentation

### LEARNING MATERIALS

**Reference Text:**
- David A. Bell “Electronic Instrumentation And Measurements” Prentice-Hall of India, New Delhi, 2005

**Supplementary Readings:**
- IEEE Electron Devices Magazine 2000 up to 2013
- J.B.Gupta “Advanced Measurements and Instrumentation” S.K.Kataria & sons, 2005
- M.M.S.Anand “Electronic Instruments and Instrumentation technology” PHI learning, 2004

**Useful Websites**
- [http://www.innstme.org.uk](http://www.innstme.org.uk)

### Assessment Scheme

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

### Assessment Pattern

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

### Learning Unit Contact Hours Per Week

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

### Module Leader

Staff
Module Code: MAT361
Title: Probability and Statistics
Level: 3
Credit Hours: 3
Prerequisites: MAT351

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

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation of Data.</td>
</tr>
<tr>
<td>Measures of Central Tendency.</td>
</tr>
<tr>
<td>Measures of Dispersion.</td>
</tr>
<tr>
<td>Fundamentals of Probability.</td>
</tr>
<tr>
<td>Discrete Probability Distributions: Binomial &amp; Poisson</td>
</tr>
<tr>
<td>Continuous Probability Distributions: Uniform, Exponential &amp; Normal.</td>
</tr>
<tr>
<td>Sampling Distribution.</td>
</tr>
<tr>
<td>Random processes and cross correlation</td>
</tr>
<tr>
<td>Confidence Limits &amp; Confidence Interval.</td>
</tr>
<tr>
<td>Significance Testing Hypotheses: $X^2$-test &amp; Goodness of Fit Test.</td>
</tr>
<tr>
<td>Correlation : Measurement, &amp; Coefficients.</td>
</tr>
<tr>
<td>Regression Analysis and Least Squares Method.</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this module, students will be able to:
1. Incorporate the role that statistics can play in the engineering problem – solving process.
2. Prescribe the importance of using statistical techniques to make decisions.
3. Rate the various probability and statistical terminology.
4. Integrate the basic rules of probabilities.
5. Assess random and stochastic processes.

Skills
After completing this module, students will be able to:
1. Determine probabilities from Cumulative Distribution Functions (CDF) and CDF from Probability Density Functions (PDF), and the reverse.
2. Develop statistical skills through tackling and solving engineering problems.
3. Calculate probabilities means, and variances for each discrete and continuous probability distributions.
4. Gain statistical skills in the presentation of data, analysis of data, and testing the hypothesis.
### Teaching/Learning Strategies
- Lectures
- Tutorials
- Projects

### Learning Materials

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

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

#### Reference Text:

#### Supplementary Readings:

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

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

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

### Learning Unit Contact Hours Per Week
- Lectures: 3 hrs/week
- Tutorials: 1.5 hrs/week
- Total class contact hours: 63 hrs/semester
- Total self study hours: 45 hrs/semester
- Total study hours: 108 hrs/semester

### Module Leader
Staff
**Module Outline**

<table>
<thead>
<tr>
<th>Module Code</th>
<th>CSE362</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Digital System Interface</td>
</tr>
<tr>
<td>Level</td>
<td>3</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>3</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>CSE352 + COM265</td>
</tr>
</tbody>
</table>

**AIMS**

This module is designed to enable students to understand the hardware and software features of the Digital System Interfacing. It helps students to differentiate between Microcontrollers and Microprocessors architectures, functions, and applications. It introduces students to the different types and technologies of microcontrollers and their peripherals; characteristics and operations of different interfacing types, standard communication specifications and design techniques; control of communication interfaces and related peripherals, Instruction sets, assembly language, and finally some microcontroller-based-system applications.

**SYLLABUS**

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Microcontrollers</td>
</tr>
<tr>
<td>Microprocessors vs. Microcontrollers</td>
</tr>
<tr>
<td>Internal Structure of Microcontrollers</td>
</tr>
<tr>
<td>Interfacing Techniques: Serial and parallel interfaces</td>
</tr>
<tr>
<td>Instruction set and Assembly Language Programming</td>
</tr>
<tr>
<td>Timer Operations and Interrupts</td>
</tr>
<tr>
<td>Microcontroller Programming using: Assembly language, C-Language, Basic-Language</td>
</tr>
<tr>
<td>Design and Interface Examples</td>
</tr>
<tr>
<td>Microcontroller-based system projects</td>
</tr>
</tbody>
</table>

**LEARNING OUTCOMES**

**Knowledge**

*After completing this course students will be able to:*

1. Acquire data and knowledge needed for Digital System Interfacing
2. Understand different types of interfacing and microcontrollers
3. Differentiate between microprocessor-based systems and microcontroller-based systems.
4. Identify the need to develop an embedded software system.

**Skills**

*After completing this course students will be able to:*

1. Design and implement Microcontroller-based systems needed for real life applications.
2. Design and conduct experiments to validate and verify the functionality of the developed systems.
3. Gather and evaluate the experimental results.
4. Propose enhancements for the designed systems

**Teaching/Learning Strategies**

- Lectures
- Tutorials
- Laboratories
- Individual/Group Project

**Learning Materials**

**Useful Websites**

**Reference Text:**

**Supplementary Readings:**

**Assessment Scheme**

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

**Assessment Pattern**

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

**Total** 100%

**Learning Unit Contact Hours Per Week**

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

**Module Leader**

Staff

69
Module Code: ECE 363
Title: Electronic Circuits Analysis II
Level: 3
Credit Hours: 3
Prerequisites: ECE353

AIMS
This module is designed to enable students to understand, design, and analyze electronic circuits that contain diodes, bipolar junction transistors (BJT) and field effect transistors (FET). The introduced circuits include: BJT single stage Amplifiers, MOS single stage Amplifiers, and Multistage Amplifiers.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction.</td>
</tr>
<tr>
<td>BJT Frequency Response.</td>
</tr>
<tr>
<td>BJT Singal Stage Amplifiers.</td>
</tr>
<tr>
<td>MOS Frequency Response</td>
</tr>
<tr>
<td>MOS Single Stage Amplifiers.</td>
</tr>
<tr>
<td>Current Mirror</td>
</tr>
<tr>
<td>Multistage Amplifiers.</td>
</tr>
</tbody>
</table>

Lab Experiments
1-BJT amplifiers Common Emitter, Common Collector and Common Base.
2-MOS amplifiers Common Source, Common Drin and Common Gate.
3-Current Mirror.

LEARNING OUTCOMES

Knowledge

After completing this course students well be able to:

1. Understand the basic characteristics and operating points of different solid state components.
2. Illustrate the structures and functions of solid state circuits

Skills

After completing this course students well be able to:

1. Design and implement electronic circuits with different solid state components.
2. Measure and test various electronic circuits.
3. Draw and analyze the frequency response of various electronic circuits.

### Teaching/Learning Strategies
- Lectures.
- Tutorials.
- Laboratories.
- Team Projects / Term Paper.

### Learning Materials

#### Useful Websites
- [http://www.web-ee.com](http://www.web-ee.com)

#### Reference Text:

#### Supplementary Readings:
- IEEE Circuits and Systems Magazine.

### Assessment Scheme
- Assignments.
- Class written Tests/Quizzes.
- Lab/Projects
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

### Assessment Pattern
- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

**Total 100%**

### Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Laboratories 1.5 hrs / week
- Total class contact 84 hrs/semester
- Total self study hours 60 hrs/semester
- Total study hours 144 hrs/semester

### Module Leader
Staff
# MSAUNIVERSITY

## FACULTY OF ENGINEERING

## MODULE OUTLINE

<table>
<thead>
<tr>
<th>Module Code</th>
<th>ECE 364</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Electromagnetics II</td>
</tr>
<tr>
<td>Level</td>
<td>3</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>3</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>ECE 354</td>
</tr>
</tbody>
</table>

**AIMS**

This module is designed to give students an in depth coverage of the electromagnetic concepts and theories, such as critical angle of incidence and surface waves, different forms of Maxwell’s Equations, boundary conditions,…etc.

**SYLLABUS**

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faraday’s Law of Electromagnetic Induction</td>
</tr>
<tr>
<td>Maxwell’s Equations: Integral and differential forms</td>
</tr>
<tr>
<td>Electromagnetic boundary condition</td>
</tr>
<tr>
<td>Time harmonic fields</td>
</tr>
<tr>
<td>Propagation of Electromagnetic Waves</td>
</tr>
<tr>
<td>Uniform plane waves and Non-uniform plane waves</td>
</tr>
<tr>
<td>Transverse electromagnetic waves</td>
</tr>
<tr>
<td>Electromagnetic power and pointing vector</td>
</tr>
<tr>
<td>Polarization of TEM Waves</td>
</tr>
<tr>
<td>Wave Propagation in Different Media</td>
</tr>
<tr>
<td>Reflection and Refraction of Plane Waves</td>
</tr>
<tr>
<td>Normal incidence of plane waves</td>
</tr>
<tr>
<td>Oblique incidence of plane waves</td>
</tr>
<tr>
<td>Brewster angle of incidence</td>
</tr>
<tr>
<td>Critical angle of incidence and Surface waves</td>
</tr>
<tr>
<td>Types of Transmission lines, Wave Propagation in Transmission Lines.</td>
</tr>
<tr>
<td>Waves on an Ideal Transmission Line</td>
</tr>
<tr>
<td>Terminated Transmission Lines: Resistive Load</td>
</tr>
<tr>
<td>Terminated Transmission Lines: Capacitive Load</td>
</tr>
<tr>
<td>Waves on a Lossy Transmission Line</td>
</tr>
<tr>
<td>Classification of Wave Solution</td>
</tr>
<tr>
<td>Smith Chart</td>
</tr>
<tr>
<td>Impedance Matching</td>
</tr>
<tr>
<td>Single – Stub Matching/ Double-Stub Matching</td>
</tr>
</tbody>
</table>

**LEARNING OUTCOMES**

**Knowledge**

After completing this course students well be able to:

1. Differentiate between different propagating media.
2. Apply Maxwell’s equations to find the electric and magnetic field components in different media.
Skills
After completing this course students well be able to:
1. Analyze the optimum performance for transmission lines.
2. Determine the perfect communication link

Teaching/Learning Strategies
- Lectures.
- Tutorials.

Learning Materials

Useful Websites
- http://www.ccem.uiuc.edu

Reference Text:

Supplementary Readings:
- IEEE electromagnetic compatibility magazine, 2002-2009

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

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

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs/week
- Tutorials 1.5 hrs/week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader
Staff
Module Code : ECE 365
Title : Linear Systems
Level : 3
Credit Hours : 3
Prerequisites : ESE 263+MAT 351

AIMS
This module is designed to enable students to understand concepts in linear continuous-time systems and perform signal operations. It also introduces Laplace transform, convolution, system functions, frequency response, Fourier series and Fourier transforms.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification of signals and systems</td>
</tr>
<tr>
<td>Signal operations</td>
</tr>
<tr>
<td>Properties of linear systems</td>
</tr>
<tr>
<td>System response</td>
</tr>
<tr>
<td>Classical solutions of differential equations</td>
</tr>
<tr>
<td>Continuous and discrete convolution</td>
</tr>
<tr>
<td>Time-domain model of systems: differential equations-transfer function – state space equations</td>
</tr>
<tr>
<td>Fourier series and Fourier transforms: trigonometric – exponential-spectral contents-properties-application to modulation and demodulation</td>
</tr>
<tr>
<td>Fourier analysis of continuous-time systems: response of periodic and aperiodic inputs-analysis of ideal filters</td>
</tr>
<tr>
<td>The Laplace transform and transfer function representation: properties-Computation of the Inverse Laplace Transform - Transform of the Input/Output Differential Equation- response to step and sinusoidal inputs - Causal Filters</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Understand the main concepts of signals and linear systems.
2. Know the useful analysis tools used with linear systems.

Skills
After completing this course students will be able to:
1. Apply the concepts of signals and systems in the fields of circuit analysis and communication.
2. Use Matlab to solve linear systems problems.

Teaching/Learning Strategies
- Lectures.
- Tutorials.
- Software practice.
- Team Paper.

Learning Materials
Useful Websites
- http://www.links.math.rpi.edu
Reference Text:
- B.P. Lathi, Signal processing and linear systems, Berkeley Cambridge Press, 2000

Supplementary Readings:

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

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

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
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- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader
Staff
Module Code : ECE 366
Title : Communication Networks
Level : 3
Credit Hours : 3
Prerequisites : ECE 355

AIMS
This course is designed to introduce students to the basics of computer networks. Topics include network hardware and software, OSI reference model, TCP/IP protocol stack, physical layer, data link layer and medium access control sub-layer, routing layer, transport layer, and application layer. Key concepts and technologies will be studied in this class include network architecture, protocol stack, protocol design and performance evaluation, Internet, Optical network, PSTN, cellular network, and wireless PAN/LAN/MAN/WAN.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction to Networks</strong>: Network Services, Network Topologies, Circuit Switching and Packet Switching.</td>
</tr>
<tr>
<td><strong>Computer Networks</strong>: Layered Architecture- Concept of Layering, OSI Model.</td>
</tr>
<tr>
<td><strong>The Data Link Layer (DLC)</strong>: Error Control, ARQ, Framing - Medium Access Control Protocols - ALOHA, CSMA, LANs.</td>
</tr>
<tr>
<td><strong>Packet Switching &amp; the Network Layer</strong>: Datagram and Virtual Circuit Switching, Network Layer Functions, Routing Algorithms</td>
</tr>
<tr>
<td><strong>ATM and TCP/IP Networks</strong></td>
</tr>
<tr>
<td><strong>Telephone Networks</strong>: Network Elements, Multiplexing, Switching, Signaling, Traffic Analysis, Cellular Networks</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

**Knowledge**

After completing this course students will be able to:
1. Acquire all basic characteristics of computer networks.
2. Illustrate the organization and structure of modern-day computer networks.

**Skills**

After completing this course students will be able to:
1. Design an efficient network protocol and compare between line and “air” technologies
2. Practice critical thinking and problem solving in computer networks.
3. Practice in technical writing skills.

**Teaching/Learning Strategies**

- Lectures
- Laboratories
- Tutorials
- Individual/Group Project

**Learning Materials**

**Useful Websites**

- [http://www.engr.wisc.edu/](http://www.engr.wisc.edu/)
Reference Text:

Supplementary Readings:

3. Design an efficient network protocol and compare between line and “air” technologies

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

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

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader
Staff
400’s LEVEL MODULES
Module Code: ECE 451
Title: Electronic Circuits Analysis III
Level: 4
Credit Hours: 3
Prerequisites: ECE363

AIMS
This module is designed to enable students to understand concepts in the electronic amplifier theory, MOSFET amplifiers, frequency response, power amplifiers, tuned voltage amplifiers, feed back amplifiers, sinusoidal oscillators, and operational amplifiers.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction To Analog Design.</td>
</tr>
<tr>
<td>Differential Amplifiers.</td>
</tr>
<tr>
<td>Noise Types Analysis In MOS Amplifier .</td>
</tr>
<tr>
<td>Power/Voltage Amplifiers.</td>
</tr>
<tr>
<td>Feedback.</td>
</tr>
<tr>
<td>Operational Amplifiers</td>
</tr>
<tr>
<td>Sinusoidal Oscillators.</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Illustrate the modern analog design techniques
2. Examine the noise analysis in MOS amplifiers.
3. Understand the characteristics and operating conditions of solid state amplifiers and oscillators.

Skills
After completing this course students will be able to
1. Design and implement different amplifier and oscillators circuits.
2. Test different amplifier and oscillators circuits.
3. Measure and analyze analog signals
4. 

Lab Experiments
1- Frequency response of the differential amplifier
2- MOS Amplifiers
3- RC oscillator (Wien Bridge).

Teaching/Learning Strategies
- Lectures.
- Tutorials.
- Laboratories.
- Team projects/Term paper.
Learning Materials

Useful Websites
- http://www.aeri.com/ics

Reference Text:

Supplementary Readings:
- IEEE consumer electronics magazine.

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

Assessment Pattern
- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Laboratories 1.5 hrs / week
- Total class contact 84 hrs/semester
- Total self study hours 60 hrs/semester
- Total study hours 144 hrs/semester

Module Leader
Staff
Module Outline

Module Code: ECE 452
Title: Communication Systems I
Level: 4
Credit Hours: 3
Prerequisites: ECE 365

AIMS
This module is designed to enable students to utilize the Fourier analysis of signals, analysis of the continuous wave (CW) modulation techniques (AM, DSB-SC, QAM, SSB, VSB, FM and PM) and their applications, mathematical description and spectral analysis of AM, FM, and PM signals. This module also introduces the basics of digital transmission using PCM and Delta modulation.

SYLLABUS

Topics
Analysis of signals: Analysis of power and energy signals - Principles of signals orthogonality- Fourier series of periodic signals - Parsevals theorem, power and energy spectral densities - Fourier transform of non-periodic signals and its properties
Signal transmission and distortion through linear systems - Analysis of system frequency response


Angle Modulation and other modulation methods: Vestigial side band Modulation (VSB) and FDM - Angle Modulation FM and PM - FM narrow band and wide band - Generation of FM

Sampling theorem, PCM system and Delta modulation.

LAB EXPERIMENTS
- RF oscillators
- Second – order filter
- AM Modulators
- AM Demodulators

LEARNING OUTCOMES
Knowledge
After completing this course students will be able to:
1. Identify spectral attributes of electrical signals
2. Understand the basic fundamentals of the amplitude modulation
3. Distinguish the basic fundamentals of the phase and frequency modulation

Skills
After completing this course students will be able to:
1. Analyze electrical signals in time and frequency domain
2. Examine the analog modulation techniques
3. Analyze analog modulation schemes.
4. Operate basic transmitter and receiver equipment.

**Teaching/Learning Strategies**
Lectures. Tutorials.

**Learning Materials**

**Useful Websites**
- [http://www.dcs.lancs.ac.uk](http://www.dcs.lancs.ac.uk)
- [http://www.1-3com.com](http://www.1-3com.com)

**Reference Text:**

**Supplementary Readings:**
- IEEE communications magazine.

**Assessment Scheme**
- Assignments.
- Class written Tests/Quizzes.
- Lab/Projects
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

**Assessment Pattern**
- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

| Total | 100% |

**Learning Unit Contact Hours Per Week**
- Lectures 3 hrs/week
- Tutorials 1.5 hrs/week
- Laboratories 1.5 hrs/week
- Total class contact 84 hrs/semester
- Total self study hours 60 hrs/semester
- Total study hours 144 hrs/semester

**Module Leader**
Staff
Module Code: ECE4531  
Title: Satellite Communication Systems  
Level: 4  
Credit Hours: 3  
Pre or Corequisites: ECE 462 + ECE 464

**AIMS**
This module is designed to provide students with global view of satellite systems, its missions, frequency allocation and orbits specification, the link budget calculation for both the uplink, and the downlink, the communication system of the satellite and earth stations, digital modulation, satellite access, and satellite services.

**SYLLABUS**

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satellite systems and Orbits</td>
</tr>
<tr>
<td>Losses in space links</td>
</tr>
<tr>
<td>Satellite system noise temperature</td>
</tr>
<tr>
<td>Link budget calculation</td>
</tr>
<tr>
<td>Up and down links</td>
</tr>
<tr>
<td>Digital signals</td>
</tr>
<tr>
<td>Satellite access</td>
</tr>
<tr>
<td>Satellite and earth station communication system</td>
</tr>
<tr>
<td>Satellite services</td>
</tr>
</tbody>
</table>

**LEARNING OUTCOMES**

**Knowledge**
After completing this course students will be able to:
1. Synthesize the satellite orbits and the earth stations.
2. Differentiate satellite subsystems.

**Skills**
After completing this course students will be able to:
1. Design the up and down links.
2. Analyze the digital signals and satellite access and services.
3. Perform uplink and down link budget calculation.

**Teaching/Learning Strategies**
- Lectures.
- Tutorials
- Individual / Group Project.
- Class Presentations.

**Learning Materials**

**Useful Websites**
- [http://www.movingbutterflies.com](http://www.movingbutterflies.com)
- http://www.itri.loyola.edu

**Reference Text:**

**Supplementary Readings:**

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

**Assessment Pattern**

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

**Learning Unit Contact Hours Per Week**
- Lectures                          | 3 hrs/week |
- Tutorials                          | 1.5 hrs/week|
- Total class contact hours          | 63 hrs/semester |
- Total self study hours             | 45 hrs/semester |
- Total study hours                  | 108 hrs/semester |

**Module Leader**
- Staff
Module Code: ECE 4532
Title: Microwave Devices
Level: 4
Credit Hours: 3
Prerequisites: Co ECE 454

AIMS
This module is designed to provide students with an in depth coverage of the Two–cavity Klystron, Reflex Klystron, TWT amplifiers, Cylindrical magnetron oscillator, Tunnel diode amplifier/oscillator, Gunn–effect diode A/O, Read / IMPAT diode, and TRAPATT diode.

SYLLABUS
<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two–cavity Klystron</td>
</tr>
<tr>
<td>Reflex Klystron</td>
</tr>
<tr>
<td>Magnetron</td>
</tr>
<tr>
<td>TWT amplifiers</td>
</tr>
<tr>
<td>Cylindrical magnetron oscillator</td>
</tr>
<tr>
<td>Tunnel diode amplifier/oscillator</td>
</tr>
<tr>
<td>Gunn–effect diode A/O</td>
</tr>
<tr>
<td>Read / IMPAT diode</td>
</tr>
<tr>
<td>TRAPATT diodes</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES
Knowledge
After completing this course students will be able to:

1. Examine various microwave devices.
2. Compare the performance of different microwave devices.

Skills
After completing this course students will be able to:

1. Synthesize the performance and applications of different microwave devices such as Klystron, TWT amplifiers, and Gunn–effect diode.
2. Design various microwave devices.
3. Construct an experiment to characterize active microwave devices.

Teaching/Learning Strategies
- Lectures.
- Tutorials.
- Laboratories.

Learning Materials
Useful Websites
- http://www.tmd.co.uk
- http://www.mwdevices.com
Reference Text:

Supplementary Readings:
- IEEE microwave theory and techniques magazine.

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

Assessment Pattern
- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%
Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Laboratories 1.5 hrs / week
- Total class contact 84 hrs/semester
- Total self study hours 60 hrs/semester
- Total study hours 144 hrs/semester

Module Leader
Staff
Module Code : ECE 4533
Title : Process Control
Level : 4
Credit Hours : 3
Prerequisites : ECE455

AIMS
This module is designed to provide students with the necessary knowledge about instrumentations and controllers used in industrial process control. It introduces process characteristics, modeling of simple systems, controller tuning, and designing closed feed back control.

SYLLABUS
<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Process Control System</strong>: Terms and objectives, piping and Instrumentation diagram, instrument terms - and symbols. Regulator and servo control, classification of variables.</td>
</tr>
<tr>
<td><strong>Advanced control system</strong>: Cascade control, ratio control, feed forward control. Override, split range and selective control. Multivariable process control, interaction of control loops.</td>
</tr>
<tr>
<td><strong>Case Studies</strong></td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES
Knowledge
After completing this course students will be able to:
1. Define common elements used in process control system
2. Describe the operation of controller and final control elements.

Skills
After completing this course students will be able to:
1. Tune PID controller
2. Design a feedback control for simple industrial control system

Teaching/Learning Strategies
- Lectures
- Tutorials
- Laboratories
- Individual/Group Project
## Learning Materials

### Useful Websites
- http://www.engr.wisc.edu/

### Reference Text:

### Supplementary Readings:

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

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

| Total | 100% |

## Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

## Module Leader
Staff
MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

<table>
<thead>
<tr>
<th>Module Code</th>
<th>: ECE 4534</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>: Industrial Electronics in Practice</td>
</tr>
<tr>
<td>Level</td>
<td>: 4</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>: 3</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>: ECE 363</td>
</tr>
</tbody>
</table>

AIMS
This module is designed to provide students with the necessary practical skills to design and build electronic projects, improve their practical background in control systems, use engineering software as MATLAB and SIMULINK, strengthen their practical skills in different electronic areas, and to improve their technical writing style. Lectures designed according to the need of the projects.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical circuits including: Analog electronics, Digital electronic, and Control systems</td>
</tr>
</tbody>
</table>

| Software application: MATLAB, MULTISIM |

LEARNING OUTCOMES

Knowledge
After completing this module, students will be:
1. Review many different electronic circuit applications.
2. Choose the appropriate circuit for special applications.

Skills
After completing this course students will be able to:
1. Design complete electronic system.
2. Apply different software to check the functionality of electronic circuits.
3. Use data sheets for different electronic components.
4. Write conclusions in technical reports provided with experimental verification.

Teaching/Learning Strategies
- Presentations
- Review and discussion sessions
- Write Reports.
- Laboratories
- Individual/Group Project

Learning Materials

Useful Websites • [http://www.engr.wisc.edu/](http://www.engr.wisc.edu/)
Reference Text: • No specific reference book

Supplementary Readings:
- Scientific papers
- Engineering manuals
- Technical catalogues
Assessment Scheme

- Students organized into groups of maximum three students per group.
- Each group will choose one project from the list given to them by the instructor.
- Each group may modify the project but in the boundary defined by the instructor.
- Each group will break the project into parts such that each part has a special function.
- The duties distributed among the group members.
- Each member will design; test it using software, then hardware.
- Each member will record the results of his practical part.
- Each group will submit the final dissertation by the end of the semester.
- Each group will present his project in class to answer his colleague question.

Assessment Pattern

- Circuit design: 10%
- Software utilization: 10%
- Experimental check: 10%
- Project functionality: 30%
- Project finishing: 5%
- Project report: 25%
- Project presentation: 10%

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

Learning Unit Contact Hours

- Sessions: 4.5 hrs/week
- Total class contact hours: 63 hrs/semester
- Total self study hours: 45 hrs/semester
- Total study hours: 108 hrs/semester

Module Leader:
Staff
Module Code : ECE 4535  
Title : Special Topics in Electronics  
Level : 4  
Credit Hours : 3  
Prerequisites : Consents of Instructor & Advisor

AIMS
This module is designed to enable students to cope up with new advances in research in electronics.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review of Electronics available today</td>
</tr>
<tr>
<td>Advances in Electronics research.</td>
</tr>
<tr>
<td>Concentration on a specific research topic in Electronics.</td>
</tr>
</tbody>
</table>

Learning Outcomes

Knowledge
After completing this module, engineering students will be able to:
1. Use research methods and techniques to contribute to a solution of an advanced problem in Electronics.
2. Ability to pursue further research in Electronics.

Skills
After completing this module, engineering students will be able to:
1. Acquire research methodology tools in Electronics.
2. Evaluate the new research ideas with respect to available technology.
3. Provide good presentation on a new subject in Electronics.

Teaching/Learning Strategies
- Orientation Sessions.
- Review and discussion Sessions.
- Team projects.
- Presentations.

Learning Materials

Reference Text:
- Will be provided by instructor if any.

Supplementary Reading:
- Scientific Papers.
- Research Reports.
- Engineering Manuals.
- Technical Catalogues.

Assessment Scheme
- Weekly Lectures.
- Mid- Written and Final written reports.
- Mid and Final oral presentations.

Assessment Pattern
- Course work 40 %
- Mid Term Exam 20%
- Final Exam 40%

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

**Leaning Unit Contact Hours**
- Sessions 3 hrs / week
- Total class contact hours 42 hrs / semester
- Total other study hours 66 hrs / semester
- Total other study hours 108 hrs / semester

**Module Leader**
Staff
AIMS
This module is designed to enable students to cope up with new advances in research in electronics.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review of Electronics available today</td>
</tr>
<tr>
<td>New Trends in Electronics research.</td>
</tr>
<tr>
<td>Concentration on a specific advanced topic in Electronics.</td>
</tr>
</tbody>
</table>

Learning Outcomes

Knowledge
After completing this module, engineering students will be able to:
1. Use research methods and techniques to contribute to a solution of an advanced problem in Electronics.
2. Ability to pursue further research in Electronics.

Skills
After completing this module, engineering students will be able to:
1. Acquire research methodology tools in Electronics.
2. Evaluate the new research ideas with respect to available technology.
3. Provide good presentation on a new subject in Electronics.

Teaching/Learning Strategies
- Orientation Sessions.
- Review and discussion Sessions.
- Team projects.
- Presentations.

Learning Materials

Reference Text:
- Will be provided by instructor if any.

Supplementary Reading:
- Scientific Papers.
- Research Reports
- Engineering Manuals.
- Technical Catalogues.
Assessment Scheme
- Weekly Lectures.
- Mid- Written and Final written reports.
- Mid and Final oral presentations.

Assessment Pattern
- Course work 40%
- Mid Term Exam 20%
- Final Exam 40%

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>

Leaning Unit Contact Hours
- Sessions 3 hrs / week
- Total class contact hours 42 hrs / semester
- Total other study hours 66 hrs / semester
- Total other study hours 108 hrs / semester

Module Leader
Staff
Module Code: ECE 454
Title: Microwave Engineering
Level: 4
Credit Hours: 3
Prerequisites: ECE 364

AIMS
This module is designed to enable students to study in depth the analysis of the Microwave Systems, transmission lines, and matching techniques. Waveguides, planar transmission lines and cavity resonators are presented with the relevant design techniques, and modes of excitation. Description of microwave networks using different methods such as S-matrix, Y and Z matrices and ABCD matrix are also presented. Finally, Some microwave components are studied.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microwave Systems</td>
</tr>
<tr>
<td>Waves on an Ideal Transmission Line</td>
</tr>
<tr>
<td>Smith Chart Impedance</td>
</tr>
<tr>
<td>Matching Single – Stub</td>
</tr>
<tr>
<td>Matching Double – Stub</td>
</tr>
<tr>
<td>Matching Quarter – Wave Transformer</td>
</tr>
<tr>
<td>Rectangular Wave guides</td>
</tr>
<tr>
<td>Circular Wave guides</td>
</tr>
<tr>
<td>Cavity Resonators</td>
</tr>
<tr>
<td>Analysis of Microwave Network</td>
</tr>
<tr>
<td>Impedance matrix</td>
</tr>
<tr>
<td>Scattering matrix</td>
</tr>
<tr>
<td>Examples of Microwave passive devices</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge

After completing this course students will be able to:

1. Acquire knowledge of the Microwave Systems
2. Classify the wave solution and its applications
3. Classify Microwave components

Skills

After completing this course students will be able to:

1. Design transmission lines for different applications.
2. Analyze rectangular and circular waveguides and cavity resonators
3. Synthesize microwave systems.
4. Implement microwave experiments using klystron, and matching different equipments like the source and SWR meter, and different microwave passive equipments like slotted line measurements to get unknown frequencies, fixed and variable attenuators, 3,4 port directional coupler, and maject tee.

Teaching/Learning Strategies
- Lecture. - Tutorials - Laboratory - Field Trips

Learning Materials

Useful Websites

Reference Text:

Supplementary Readings:
- IEEE microwave theory and techniques .

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

Assessment Pattern
- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Laboratories 1.5 hrs / week
- Total class contact 84 hrs/semester
- Total self study hours 60 hrs/semester
- Total study hours 144 hrs/semester

Module Leader
Staff
AIMS
This module is designed to enable students to understand concepts of dynamic systems that include electrical, mechanical, and hydraulic components. In addition, it introduces automatic control description, modeling, different control design techniques, analyzing the performance of control systems either in open loop or closed loop, transient-response analysis and steady state error analysis, basic control actions, and Lead and Lag compensators. The frequency response methods using polar plot, bode diagram and Nichol chart, the root locus methods, State space analysis of multivariable control systems, and feedback controllers are also presented.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Control Systems: Practical issues and control system design, open loop and closed loop with advantages and disadvantages</td>
</tr>
<tr>
<td>System modeling: Electronic, electric, mechanical, and hydraulic systems - Transfer function representation - State space representation of dynamic systems - Electromechanical Systems - Transfer function and block diagram reduction - Signal flow graph</td>
</tr>
<tr>
<td>Time response specifications and analysis: Transient response analysis and design, Error analysis and design.</td>
</tr>
<tr>
<td>Control system stability analysis: Routh criterion and design, Root locus.</td>
</tr>
<tr>
<td>Frequency Response Analysis and design: Polar plot “Nyquist diagram” Bode diagram – gain margin and phase margin. Nichols chart</td>
</tr>
<tr>
<td>Stat Space Design and Analysis with Compensation: Pole placement design</td>
</tr>
</tbody>
</table>
LAB EXPERIMENTS
Using of MATLAB and SIMULINK to simulate, analyze and design control problems utilizing simple example as DC motors.

Learning Outcomes

Knowledge

After completing this course students will be able to:

1. Comprehend the fundamental concepts of feedback control systems theory
2. Illustrate the behavior and the stability of simple control systems using time domain and frequency domain methods.

Skills

After completing this course students will be able to:

1. Link the industrial real systems with the control theory:
   - Formulate the control problem
   - Derive the mathematical model
   - Analyze the open loop performance
2. Design, implement, and evaluate the controller using MATLAB® and Simlink.

Teaching/Learning Strategies

- Lectures
- Tutorials
- Laboratories
- Individual/ Group Project/Term paper

Learning Materials

Useful Websites

- http://www.engr.wisc.edu/

Reference Text:


Supplementary Readings:


Assessment Scheme

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

Assessment Pattern

- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

**Total** 100%

### Learning Unit Contact Hours Per Week

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>3 hrs/week</td>
</tr>
<tr>
<td>Tutorials</td>
<td>1.5 hrs/week</td>
</tr>
<tr>
<td>Laboratories</td>
<td>1.5 hrs/week</td>
</tr>
<tr>
<td>Total class contact</td>
<td>84 hrs/semester</td>
</tr>
<tr>
<td>Total self study hours</td>
<td>60 hrs/semester</td>
</tr>
<tr>
<td>Total study hours</td>
<td><strong>144 hrs/semester</strong></td>
</tr>
</tbody>
</table>

**Module Leader**

Staff
AIMS
This module is designed to enable students to understand concepts in computer organization and architecture. Register transfer statements, and micro operations are studied. Design of arithmetic logic unit, central processing unit, input/output and memory interfaces are illustrated. Basic operating system concepts including input/output management and memory management are also presented.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review of Digital Logic Circuits</td>
</tr>
<tr>
<td>Register Transfer and Micro Operations</td>
</tr>
<tr>
<td>Basic Computer Organization and Design</td>
</tr>
<tr>
<td>Arithmetic Logic Unit</td>
</tr>
<tr>
<td>Hardwired Control Unit</td>
</tr>
<tr>
<td>Assembly Language of the Basic Computer</td>
</tr>
<tr>
<td>Microprogrammed Control Unit</td>
</tr>
<tr>
<td>Central Processing Unit</td>
</tr>
<tr>
<td>Operating Systems</td>
</tr>
<tr>
<td>Input/Output Organization</td>
</tr>
<tr>
<td>Memory Organization</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Introduce the structure and function of computer modules.
2. Understand the modern computer organization, architecture, and operating systems.

Skills
After completing this course students will be able to:
1. Utilize computer-based systems.
2. Design and build Arithmetic Logic units, Control units, and Central Processing Units.
3. Develop and test computer-based systems.

Teaching/Learning Strategies
- Lectures.
- Tutorials.
- Class Presentations.
- Team projects / Term Paper.
Learning Materials

Useful Websites
- http://www.bizrate.com
- http://www.dell.com

Reference Text:
- Supplementary Readings:
- IEEE computer magazine.

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

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

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader
Staff
AIMS
This module is designed to enable students to focus on the design and analysis of the active circuits, active filters, multiple feedback operational amplifiers, and multiple feedback filters.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational Amplifier circuits and compensation methods for finite gain amplifier.</td>
</tr>
<tr>
<td>Active Circuits Based on Passive Lader Structure.</td>
</tr>
<tr>
<td>Active Filters using Finite Gain amplifiers.</td>
</tr>
<tr>
<td>Multiple Feedback Signal Op-Amp Filters.</td>
</tr>
<tr>
<td>Multiple Feedback Biquad Filters.</td>
</tr>
<tr>
<td>Approximation Problem and Frequency Transformations.</td>
</tr>
<tr>
<td>Current Conveyor and its applications.</td>
</tr>
</tbody>
</table>

LAB EXPERIMENTS
- Op-Amp filters applications

LEARNING OUTCOMES

Knowledge

After completing this course students will be able to:

1. Differentiate between various types of Active filters
2. Understand the principles of active circuits design techniques.

Skills

After completing this course students will be able to:

1. Design active filters.
2. Synthesise different types of active filters.
3. Design, implement, test, and analyze Active circuits.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Laboratories.
- Team projects / Term Paper.

Learning Materials

Software Requirements

- Multisim, P Spice, ADS.

Reference Text:
1- S. Franco: Design with operational Amplifiers and Analog Integrated Circuits.
2- L. Huelsman: Active and Passive Analog Filter Design  

- Supplementary Readings:  
  1- H. Lam: analog and digital Filters, Design and Realization.

**Assessment Scheme**
- Assignments.  
- Class written Tests/Quizzes.  
- Lab/Projects  
- Unseen written Mid-Term Exam (1.5-hr. Exam).  
- Unseen written Final-Exam (3-hr. Exam).

**Assessment Pattern**
- Class Participation/Assignments 10%  
- Tests and Quizzes 10%  
- Lab/Projects 20%  
- Unseen Mid-Term Exam 20%  
- Unseen Final Exam 40%  

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

**Learning Unit Contact Hours Per Week**
- Lectures 3 hrs / week  
- Tutorials 1.5 hrs / week  
- Laboratories 1.5 hrs / week  
- Total class contact 84 hrs/semester  
- Total self study hours 60 hrs/semester  
- Total study hours 144 hrs/semester

**Module Leader**

Staff
**Module Outline**

**Module Code**: ECE 462  
**Title**: Communication Systems II  
**Level**: 4  
**Credit Hours**: 3  
**Prerequisites**: ECE 452 + MAT 361

**AIMS**
This module is designed to enable students to focus on the analysis of the DPCM – errors. It presents AWGN definition, Noise in CW modulation schemes, ISI – M-array, Nyquist channel, Eye pattern diagram, Pass band transmission signal space, and channel model. In addition, max. likelihood decoding- probability of error, Correlation Rx, PSK, PSK signal space, probability of error/ generation and detection, FSK signal space, probability of error/ generation and detection, MSK phase tree and trellis, GPSK generation and detection, M-array systems, combined amplitude and phase, prob. Error, Spread spectrum, direct sequence, and frequency hopping are also introduced.

**SYLLABUS**

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass Band Transmission Signal Space.</td>
</tr>
<tr>
<td>Inter-Symbol Interference ISI</td>
</tr>
<tr>
<td>Noise Analysis in Continuous Modulation Schemes</td>
</tr>
<tr>
<td>Channel Model, Max. Likelihood Decoding- Probability of Error</td>
</tr>
<tr>
<td>ASK Signal Space, Probability of Error/ Generation and Detection</td>
</tr>
<tr>
<td>PSK Signal Space, Probability of Error/ Generation and Detection</td>
</tr>
<tr>
<td>FSK Signal Space, Probability of Error/ Generation and Detection</td>
</tr>
<tr>
<td>MSK Phase tree and Trellis, GPSK Generation and Detection</td>
</tr>
<tr>
<td>M-array Systems, Combined Amp, and Phase, Prob. Error</td>
</tr>
<tr>
<td>Spread spectrum, direct sequence, Frequency Hopping</td>
</tr>
</tbody>
</table>

**LAB EXPERIMENTS**
- Sampling  
- Pulse amplitude modulation  
- Pulse width and phase modulation  
- Delta modulation

**LEARNING OUTCOMES**

**Knowledge**  
After completing this course students will be able to:  
1. Distinguish various communication systems.  
2. Illustrate system performance in noisy and inter symbol interference environment.

**Skills**  
After completing this course students will be able to:  
1. Evaluate Communication systems performance.  
2. Synthesize the ASK, PSK and FSK signal space.
3. Analyze communication channels.

### Teaching/Learning Strategies
- Lectures
- Tutorials
- Class Presentations
- Team Projects / Paper

### Learning Materials

#### Useful Websites
- http://www.dctl.com
- http://www.dealtime.com/advanced_digital_communication

#### Reference Text:

#### Supplementary Readings:
- IEEE communication magazines.

### Assessment Scheme
- Assignments
- Class written Tests/Quizzes
- Lab/Projects
- Unseen written Mid-Term Exam (1.5-hr. Exam)
- Unseen written Final-Exam (3-hr. Exam)

#### Assessment Pattern
- Class Participation/Assignments: 10%
- Tests and Quizzes: 10%
- Lab/Projects: 20%
- Unseen Mid-Term Exam: 20%
- Unseen Final Exam: 40%

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

### Learning Unit Contact Hours Per Week
- Lectures: 3 hrs / week
- Tutorials: 1.5 hrs / week
- Laboratories: 1.5 hrs / week
- Total class contact: 84 hrs / semester
- Total self study hours: 60 hrs / semester
- Total study hours: 144 hrs / semester

### Module Leader
- Staff
**AIMS**

This module is designed to provide students with the necessary knowledge about communication, transmission and systems, and how all relate to what we do everyday. The students will examine source, encoder (transmitter), channel, and receiver functions in communication transmissions of all types. Emphasis will be placed on principles of line (wired) and air (wireless) communication, a study of various systems, and future developments in communication transmission systems.

**SYLLABUS**

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Model</td>
</tr>
<tr>
<td>Electronic Communication</td>
</tr>
<tr>
<td>Phone Systems/RFP/Proposal Process</td>
</tr>
<tr>
<td>The Telephone, Telephone Network Digital and Analog Signals</td>
</tr>
<tr>
<td>Voice and Data Applications</td>
</tr>
<tr>
<td>Making a Plan</td>
</tr>
<tr>
<td>Telephony; Cabling</td>
</tr>
<tr>
<td>Computer Telephony Integration</td>
</tr>
<tr>
<td>Telecommunications Funding</td>
</tr>
<tr>
<td>PBX Systems and VoIP</td>
</tr>
<tr>
<td>Cellular and Wireless Technology</td>
</tr>
<tr>
<td>DSL vs. Cable</td>
</tr>
</tbody>
</table>

**LEARNING OUTCOMES**

**Knowledge**

After completing this course students well be able to:

1. Describe the difference between line and “air” technologies
2. Discuss the impact of the digital revolution in transmission systems

**Skills**

After completing this course students well be able to:

1. Identify methods of transferring messages through various types of channels
2. Utilize resources to research communication transmission systems and make informed recommendations/decisions given a set of requirements.

**Teaching/Learning Strategies**

- Lectures
- Tutorials
- Laboratories
- Individual/Group Project
**Learning Materials**

- [http://www.ala.org/ACRL](http://www.ala.org/ACRL)

**Reference Text:**


**Supplementary Readings:**


**Assessment Scheme**

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

**Assessment Pattern**

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

**Learning Unit Contact Hours Per Week**

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

**Module Leader**

Staff
MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code  : ECE 4632
Title        : Digital Image Processing
Level        : 4
Credit Hours : 3
Prerequisites : ESE 466

AIMS
This module is designed to introduce students to analytical tools and methods that are currently used in digital image processing. It introduces human visual system and image model. Digital image processing tools are used in the laboratory for image restoration, enhancement and compression.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview, Computer Imaging Systems</td>
</tr>
<tr>
<td>Image Analysis, Preprocessing, CVIPlab</td>
</tr>
<tr>
<td>Human Visual System, Image Model</td>
</tr>
<tr>
<td>Discrete Transforms, Fourier</td>
</tr>
<tr>
<td>Discrete Cosine, Walsh-hadamard, Haar, PCT, filtering</td>
</tr>
<tr>
<td>Filtering, Wavelet Transform, Pseudocolor</td>
</tr>
<tr>
<td>Image Enhancement, Sharpening, Smoothing</td>
</tr>
<tr>
<td>Image Restoration, Overview, System Model, Noise</td>
</tr>
<tr>
<td>Image Restoration: noise removal, degradation model, inverse filter</td>
</tr>
<tr>
<td>Freq. filters, geometric transforms</td>
</tr>
<tr>
<td>Image Compression: system model, lossless methods</td>
</tr>
<tr>
<td>Image Compression: lossy methods, work on project</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:

1. Understand digital image processing techniques
2. Explain fundamentals of image acquisition, representation, compression, and frequency and spatial domain transformations

Skills
After completing this course students will be able to:

1. Apply techniques for image compression, analysis and segmentation.
2. Implement hands-on projects involving processing of images.

Teaching/Learning Strategies
- Lectures
- Tutorials
- Laboratories
- Individual/Group Project
Learning Materials

- http://www.engr.wisc.edu/

Reference Text:

Supplementary Readings:
- IEEE Transactions on Pattern Analysis and Machine Intelligence
- IEEE Transactions on Computers

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

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

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader
Staff
Module Code: ECE 4633  
Title: Programmable Logic Controller  
Level: 4  
Credit Hours: 3  
Prerequisites: ECE 356

AIMS
This module is designed to provide students with the necessary knowledge and skills about fundamental concepts of programmable logic controllers, principles of operation, and numbering systems as applied to electrical controls. It also provides the student with tools to design PLC systems.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro Programmable Logic Controllers</td>
</tr>
<tr>
<td>Programming a Programmable Controller</td>
</tr>
<tr>
<td>Number Systems</td>
</tr>
<tr>
<td>Introduction to PLC Operation</td>
</tr>
<tr>
<td>Introduction to Logic</td>
</tr>
<tr>
<td>Input and output Modules</td>
</tr>
<tr>
<td>PLC Processors</td>
</tr>
<tr>
<td>Processor Data Organization</td>
</tr>
<tr>
<td>The Basic Relay Instructions</td>
</tr>
<tr>
<td>Understanding Relay Instructions and the Programmable Controller Input Modules</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Design the various parts of a programmable logic controller
2. Evaluate how the parts of PLC function together

Skills
After completing this course students will be able to:
1. Convert with hands on experience the ladder diagrams into programs.
2. Incorporate timers and counters utilizing programmable logic controllers.
3. Execute and evaluate programs.
4. Design conditioning circuits required to operate sensors correctly.

Teaching/Learning Strategies
- Lectures  
- Laboratories  
- Tutorials  
- Individual/Group Project

Learning Materials

Useful Websites
- http://www.engr.wisc.edu/

Reference Text:
Supplementary Readings:
- Petruzella, Frank D.; Programmable Logic Controllers, McGraw-Hill.

<table>
<thead>
<tr>
<th>Assessment Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments.</td>
</tr>
<tr>
<td>Class written Tests/Quizzes.</td>
</tr>
<tr>
<td>Unseen written Mid-Term Exam (1.5-hr. Exam).</td>
</tr>
<tr>
<td>Unseen written Final-Exam (3-hr. Exam).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Participation/Assignments</td>
</tr>
<tr>
<td>Tests and Quizzes</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
</tr>
</tbody>
</table>

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

Learning Unit Contact Hours Per Week

<table>
<thead>
<tr>
<th>Contact Hours Per Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
</tr>
<tr>
<td>Tutorials</td>
</tr>
<tr>
<td>Total class contact hours</td>
</tr>
<tr>
<td>Total self study hours</td>
</tr>
<tr>
<td>Total study hours</td>
</tr>
</tbody>
</table>

Module Leader

Staff
AIMS
This module is designed to provide students with the necessary knowledge about power semiconductor devices and the most common types of power converters used in real applications. It also enables students to evaluate and analyze basic power electronic circuits.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to power electronics</td>
</tr>
<tr>
<td>Power semiconductor devices and driving circuits</td>
</tr>
<tr>
<td>DC-DC converters</td>
</tr>
<tr>
<td>Pulse-width modulated inverters</td>
</tr>
<tr>
<td>Controlled rectifiers</td>
</tr>
<tr>
<td>AC voltage controllers</td>
</tr>
<tr>
<td>Applications of power electronics</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students well be able to:
1. Select the appropriate converter type for specified application.
2. Interface power electronic circuits with other systems.

Skills
After completing this course students well be able to:
1. Evaluate and analyze power electronic circuits.
2. Choose appropriate driving circuits for semiconductor devices used in power converters.
3. Design switching DC-DC converters.

Teaching/Learning Strategies
- Lectures
- Tutorials
- Laboratories
- Individual/Group Project

Learning Materials

Useful Websites
- http://www.engr.wisc.edu/

Reference Text:
- Rashid, Muhammad H., Power Electronics Circuits, Devices, and Applications, Pearson Education, Inc.

Supplementary Readings:
### Assessment Scheme

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

### Assessment Pattern

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Class Participation/Assignments</td>
<td>20%</td>
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<tr>
<td>Tests and Quizzes</td>
<td>20%</td>
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<tr>
<td>Unseen Mid-Term Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
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</table>

**Total 100%**

### Learning Unit Contact Hours Per Week

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

### Module Leader

Staff
Module Code: ECE 4635
Title: Avionics Navigation Systems
Level: 4
Credit Hours: 3
Prerequisites: ECE 462

AIMS
This module is designed to provide students with an in-depth overview of the Avionics Navigation systems. It covers the growth of Integrated Avionics concepts as well as various types of Avionics Navigation systems.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Introduction to Avionics Navigation Systems</td>
</tr>
<tr>
<td>Navigation Equations</td>
</tr>
<tr>
<td>Multisensors Navigation Systems</td>
</tr>
<tr>
<td>Terrestrial Radio Navigation Systems</td>
</tr>
<tr>
<td>Satellite Radio Navigation Systems</td>
</tr>
<tr>
<td>Inertial Navigation</td>
</tr>
<tr>
<td>Landing Systems</td>
</tr>
<tr>
<td>Air Traffic Management</td>
</tr>
<tr>
<td>Radio Altemeter</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Understand the concept of Integrated Avionics Navigation systems.
2. Recognize the various Avionics Navigation applications.

Skills
After completing this course students will be able to:
1. Analyse different Avionics Navigation systems.
2. Design Avionics Navigation applications.
3. Select between various integrated Avionics approaches

Teaching/Learning Strategies
- Lectures
- Tutorials
- Individual/Group Project/Term Paper

Learning Materials

Reference Text:

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

**Assessment Pattern**

<table>
<thead>
<tr>
<th>Assessment Item</th>
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<td>Class Participation/Assignments</td>
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<tr>
<td>Tests and Quizzes</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Mid-Term Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Unseen Final Exam</td>
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</table>

**Total** 100%

**Learning Unit Contact Hours Per Week**

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

**Module Leader**

Staff
Module Code : ECE 464  
Title : Antenna Theory and Design  
Level : 4  
Credit Hours : 3  
Prerequisites : ECE 454

**AIMS**

This module is designed to provide students with an in depth coverage of the antenna types and radiation mechanism. Antenna fundamentals such as patterns, directivity, and radiation power density, directivity, gain, efficiency, half-power beam width, beam efficiency, bandwidth, polarization, input impedance are presented.

**SYLLABUS**

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antenna Types and radiation mechanism</td>
</tr>
<tr>
<td>Far field approximation and power transmitted</td>
</tr>
<tr>
<td>Antenna fundamentals (pattern, directivity, radiation)</td>
</tr>
<tr>
<td>Antenna fundamentals (directivity, gain, efficiency)</td>
</tr>
<tr>
<td>Microstrip Antennes</td>
</tr>
<tr>
<td>Infinitésimal dipôle</td>
</tr>
<tr>
<td>Small dipole</td>
</tr>
<tr>
<td>Half-Wavelength dipole</td>
</tr>
<tr>
<td>Ground effects</td>
</tr>
<tr>
<td>Types of arrays</td>
</tr>
<tr>
<td>Two-Element array</td>
</tr>
<tr>
<td>N-Element linear array</td>
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</tbody>
</table>

**LEARNING OUTCOMES**

**Knowledge**

After completing this course students will be able to:

1. Identify the basic fundamentals of antenna.
2. Recognize antennas used for different frequency applications.

**Skills**

After completing this course students will be able to:

1. Design microstrip and wire antennas for different frequency applications.
2. Analyze the performance of microstrip and wire antennas through mathematical manipulations.
3. Analyze the effect of the antenna arrays on performance.
4. Test antennas performance using a test bed by using various transmitter antennas; drawing their radiation pattern and calculating its input impedance

Teaching/Learning Strategies

- Lectures.
- Tutorials.

Learning Materials

Useful Websites

- http://www.walmart.com
- http://www.josseybass.com

Reference Text:

Supplementary Readings:
- IEEE Antennas and Propagation Magazine.

Assessment Scheme

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

Assessment Pattern

- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

Total 100%

Learning Unit Contact Hours Per Week

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

Module Leader

Staff
MSA UNIVERSITY
FACULTY OF ENGINEERING

MODULE OUTLINE

<table>
<thead>
<tr>
<th>Module Code</th>
<th>ECE 465</th>
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</thead>
<tbody>
<tr>
<td>Title</td>
<td>Information Theory &amp; Coding</td>
</tr>
<tr>
<td>Level</td>
<td>4</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>3</td>
</tr>
<tr>
<td>Pre or Co-requisites</td>
<td>ECE 462</td>
</tr>
</tbody>
</table>

AIMS
This module is designed to enable students to focus on the analysis of the source coding, optimal codes, entropy, information channels, using an unreliable channel, error correcting codes, linear codes, and convolution codes.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Coding</td>
</tr>
<tr>
<td>Optimal Codes</td>
</tr>
<tr>
<td>Entropy</td>
</tr>
<tr>
<td>Information Channels</td>
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<tr>
<td>Using an Unreliable Channel</td>
</tr>
<tr>
<td>Error Correcting Codes</td>
</tr>
<tr>
<td>Linear Codes – Block Coding – Convolutional Coding – Turbo Codes</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Categorize the various codes, and compare between them.
2. Illustrate different error correcting codes.

Analyze and design different source and channel Skills
After completing this course students will be able to:
1. Formulate the coding theory.
2. Apply the concept of Hamming distance and Shannon’s theorem.

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

Learning Materials

Useful Websites
- http://www.inference.phy.cam.ac.uk/mackway/info-theory/course.html

Reference Text:

Supplementary Readings:
- IEEE Information Theory Magazine.
**Assessment Scheme**
- Assignments.
- Class written Tests/Quizzes.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

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

**Total** 100%

**Learning Unit Contact Hours Per Week**
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

**Module Leader**
Staff
MSA UNIVERSITY
FACULTY OF ENGINEERING

MODULE OUTLINE

Module Code : ECE 466
Title : Digital Signal processing
Level : 4
Credit Hours : 3
Prerequisites : ECE 365

AIMS
This module is designed to provide students with the mathematical tools and intuition for processing digital signals in the time, frequency and z domains. Students will learn how to filter, modify, analyze, and extract information from digital signals.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signals and Systems, and Representation of Signals in Time Domain</td>
</tr>
<tr>
<td>Linear, Time-Invariant Systems, Impulse Response and Convolution Sum</td>
</tr>
<tr>
<td>Linear Constant-Coefficient Difference Equation, Fourier Transform and Frequency Response</td>
</tr>
<tr>
<td>Z-Transform and Inverse Z- Transform and its properties</td>
</tr>
<tr>
<td>More about Properties of z-transform and inverse z-transform</td>
</tr>
<tr>
<td>Discrete Fourier Transform (DFT)</td>
</tr>
<tr>
<td>Signal Analysis and Synthesis based on DFT</td>
</tr>
<tr>
<td>Fundamental Structures of Digital Filters</td>
</tr>
<tr>
<td>Internal Representation of LTIS systems</td>
</tr>
<tr>
<td>Digital Filter Design</td>
</tr>
</tbody>
</table>

EARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Know the mathematical tools used with digital signals.
2. Extract information from digital signals

Skills
After completing this course students will be able to:
1. Apply z-transform properties and theorems and DFT to digital signals.
2. Design digital FIR filters to meet specific filtering criteria.
3. Analyze and synthesize signals based on DFT.

Teaching/Learning Strategies
- Lectures.
- Tutorials.
- Laboratories.
- Team Projects / Term Paper.
Learning Materials

Software
MATLAB

Useful Websites
- http://www.web-ee.com

Reference Text:

Supplementary Readings:
- IEEE Circuits and Systems Magazine.

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

Assessment Pattern
- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
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- Unseen Final Exam 40%

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Laboratories 1.5 hrs / week
- Total class contact 84 hrs/semester
- Total self study hours 60 hrs/semester
- Total study hours 144 hrs/semester

Module Leader
Staff
500’s LEVEL MODULES
AIMS

This module is designed to enable students understand the concept of energy conversion, structure and function of power stations, and environmental effects of energy resources. In addition, the principles of magnetic circuits, excitation in single phase transformer, voltage regulation, losses and efficiency, auto-transformation are introduced. It also presents the principles of electromechanical energy conversion, DC generators, DC motors, three phase transformers, polarity, and standard terminal marking, parallel operation, and all-day efficiency. It also addresses the principles of AC machines, Synchronous machine, electro motive force (emf) equivalent circuit, power equation, and distribution of electric power.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Energy Conversion</td>
</tr>
<tr>
<td>Types of Power Stations</td>
</tr>
<tr>
<td>Principle of Magnetic Circuits:</td>
</tr>
<tr>
<td>Single Phase Transformer</td>
</tr>
<tr>
<td>Electromechanical Energy Conversion</td>
</tr>
<tr>
<td>Principles of DC Machines:</td>
</tr>
<tr>
<td>Three Phase Transformer</td>
</tr>
<tr>
<td>Principles of AC Machines</td>
</tr>
<tr>
<td>Distribution of Electric Power</td>
</tr>
<tr>
<td>Environmental Effects of Energy Resources</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge

After completing this course students will be able to:

1. Understand both Direct Current and Alternating Current machines including D.C. Motors, Generators, A.C. Induction Motors A.C. Alternators, Transformers, and Power Stations.
2. Recognize the principles of high voltages and high currents.
Skills
After completing this module, students will be able to:
1. Experiment the basic Electromechanical Energy Conversion devices.
2. Analyze the performance of electrical motors and transformers.
3. Solve problems in high power sources

Teaching/Learning Strategies
- Lectures
- Laboratories
- Tutorials
- Class Presentations
- Team projects / Paper

Learning Materials

Reference Text:

Software Requirements: MATLAB
Supplementary Readings: IEEE Magazine

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

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

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader
Staff
Module Code : ECE 552
Title : Mobile Communication Systems
Level : 5
Credit Hours : 3
Prerequisites : ECE 464

AIMS
This module is designed to introduce students to wireless personal communications, one of the fastest growing fields in the engineering world. Technical concepts which are at core of design, implementation, research, and history of wireless communication systems are presented followed by current and evolving wireless communication systems and standards.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to wireless communication systems</td>
</tr>
<tr>
<td>Modern wireless communication systems</td>
</tr>
<tr>
<td>Second Generation (2G) Cellular Networks</td>
</tr>
<tr>
<td>Third Generation (3G) Wireless Networks</td>
</tr>
<tr>
<td>The Cellular Concept—System Design Fundamentals</td>
</tr>
<tr>
<td>Frequency Reuse</td>
</tr>
<tr>
<td>Channel Assignments Strategies</td>
</tr>
<tr>
<td>Handoff Strategies</td>
</tr>
<tr>
<td>Interference and system Capacity</td>
</tr>
<tr>
<td>Trunking and Grade of service</td>
</tr>
<tr>
<td>Improving Coverage and Capacity in Cellular Systems</td>
</tr>
<tr>
<td>Mobile Radio Propagation: Large-Scale Path Loss</td>
</tr>
<tr>
<td>Mobile Radio Propagation: Small-Scale Fading and Multipath</td>
</tr>
<tr>
<td>Wireless Systems and Standards</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students well be able to:

1. Explain technical aspects, and operations.
2. Compare different generations of cellular mobile and personal communication technologies.
3. Differentiate among wireless communication systems and their standards.

Skills
After completing this course students well be able to:

1. Compare different generations of cellular systems
2. Solve problems encountering design and capacity improvement
3. Analyze a cellular system performance
4. Discuss and explain the operation of wireless mobile Radio Channel
Teaching/Learning Strategies
- Lectures
- Tutorials
- Individual/Group Project

Learning Materials

Useful Websites
- [Http://www.engr.wisc.edu/](http://www.engr.wisc.edu/)

Reference Text:

Supplementary Readings:
- T. S. Rappaport, Wireless Communications Principles and Practice, Prentice Hall
- Proakis, John, Digital Communications, McGraw Hill.

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

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

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

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs / semester
- Total self study hours 45 hrs / semester
- Total study hours 108 hrs / semester

Module Leader
Staff
Module Code : ECE 5531
Title : Global Positioning Systems
Level : 5
Credit Hours : 3
Prerequisites : ECE 462, ECE 464

AIMS
This module is designed to provide students with an in-depth overview of the global positioning system. It covers the growth of GPS and its applications. In addition, various types of GPS systems, GPS Space segments, Control segment, and user segment are presented.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Introduction to the Global Positioning System</td>
</tr>
<tr>
<td>GPS System Architecture</td>
</tr>
<tr>
<td>Satellite Signal Structure</td>
</tr>
<tr>
<td>Receivers, Measurements, and Performance</td>
</tr>
<tr>
<td>GPS Coordinate Frames, Time Reference, and Orbits</td>
</tr>
<tr>
<td>Error sources in GPS</td>
</tr>
<tr>
<td>Differential GPS Systems</td>
</tr>
<tr>
<td>GPS signal and Timing</td>
</tr>
<tr>
<td>Tracking Systems using GPS</td>
</tr>
<tr>
<td>GPS Receivers</td>
</tr>
<tr>
<td>Power calculation and noise analysis</td>
</tr>
<tr>
<td>GPS Applications</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Identify different GPS segments and understand the theory of operation of each segment.
2. Read and interpret the GPS data format.
3. Understand the different applications of the GPS system.

Skills
After completing this course students will be able to:
1. Design a GPS data collection project, using GPS data collection tool to collect and process GPS data.
2. Design and implement real life GPS applications.
3. Evaluate the GPS measurements accuracy and assess various methods to improve accuracy.

Teaching/Learning Strategies
- Lectures
- Tutorials
- Individual/Group Project/Term Paper
Learning Materials

Useful Websites
- IEEE Transcation Microwave Theory, Tech.
- IEEE Antenna and Propagations Magazine
- http://www.eu.wiley.com

Reference Text:

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

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

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader
Staff
Module Code: ECE 5532
Title: Fiber Optics and Laser Technology
Level: 5
Credit Hours: 3
Prerequisites: ECE 363

AIMS
This module is designed to introduce students to the materials of optoelectronics, light propagation in media, light propagation in waveguides, optical properties of semiconductors, light detection and imaging, light emitting diodes, and laser diodes.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview Of Optical Fiber.</td>
</tr>
<tr>
<td>Optical Fibers: Structures, Waveguiding, And Fabrication.</td>
</tr>
<tr>
<td>Signal Degradation In Optical Fibers.</td>
</tr>
<tr>
<td>Optical Sources From Light To Laser.</td>
</tr>
<tr>
<td>Power Launching And Coupling.</td>
</tr>
<tr>
<td>Photodetectors</td>
</tr>
<tr>
<td>Optical Receiver Operation.</td>
</tr>
<tr>
<td>Advanced Laser System And Technology.</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Recognize the basic characteristics and operation theory of optoelectronics.
2. Identify the components of optical receivers and transmitters.
3. Illustrate the performance of optical systems

Skills
After completing this course students will be able to:
1. Analyze the light propagation in media and in waveguides.
2. Design and implement optical communication systems.
3. Test and evaluate the performance of optical communication systems.
Teaching/Learning Strategies
- Lectures.
- Tutorials.
- Team projects / Term Paper.

Learning Materials

Useful Websites
- http://www.gtopto.com
- http://www.optoelectronics.org.uk

Reference Text:

Supplementary Readings:

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

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

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader
Staff
Module Code : ECE 5533
Title : Digital Control
Level : 5
Credit Hours : 3
Prerequisites : ECE 362 – ECE 365– ECE455

AIMS
This module is designed to provide students with the necessary insight on the computer control. It includes introduction to computer control and discrete system, analysis of discrete time systems, transfer function, transient response, stability analysis jury methods, root locus method, state space approach, and observable and canonical forms.

SYLLABUS
<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to computer control and discrete system</td>
</tr>
<tr>
<td>Sampling process</td>
</tr>
<tr>
<td>Analysis of discrete time systems</td>
</tr>
<tr>
<td>The transfer function</td>
</tr>
<tr>
<td>The block diagram and the signal flow graph</td>
</tr>
<tr>
<td>Transient response “the impulse response and the unit step response” and steady state errors</td>
</tr>
<tr>
<td>The stability analysis jury methods</td>
</tr>
<tr>
<td>The root locus methods</td>
</tr>
<tr>
<td>The state space approach ; Matrix representation, state transition matrix, state transition equation and transfer function.</td>
</tr>
<tr>
<td>The observable and controllable canonical forms</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Identify the fundamental concepts of digital control systems.
2. Acquire the basic control design procedures.
3. Illustrate performance analysis steps of digital control systems.

Skills
After completing this course students will be able to:
1. Analyze digital control systems.
2. Design, implement, and evaluate digital control system, using design packages such as MATLAB® and Simulink.

Teaching/Learning Strategies
- Lectures
- Tutorials
- Laboratories
- Individual/Group Project

Learning Materials
Useful Websites
- http://www.engr.wisc.edu/
Reference Text:

Supplementary Readings:

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

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

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader
Staff
AIMS
This module is designed to introduce students to Biomedical and Clinical Instrumentation. Through lectures and laboratories, students will be taught how to build devices to measure ECG, blood pressure and respiration parameters. Circuit models of physiological system are demonstrated with electrical models. Students are introduced to the principles of physiological sensors. Visits to hospital, clinical, and laboratories allow students to see actual devices and meet with clinicians who use them. Students are expected to write reports on clinical Instruments or on projects to build biomedical devices.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electro physiology:</strong> Review of physiology and anatomy, resting potential, action potential, bioelectric potentials, cardiovascular dynamics, electrode theory, bipolar and unipolar electrodes, surface electrodes, physiological transducers. Systems approach to biological systems.</td>
</tr>
<tr>
<td><strong>Bioelectric potential and cardiovascular measurements:</strong> EMG - Evoked potential response, EEG, foetal monitor. ECG phonocardiography, vector cardiograph, BP, blood flow cardiac output, plethysmography, impedance cardiology, cardiac arrhythmia’s, pacemakers, defibrillators.</td>
</tr>
<tr>
<td><strong>Respirator and pulmonary measurements and rehabilitation:</strong> Physiology of respiratory system, respiratory rate measurement, artificial respirator, oximeter, hearing aids, functional neuromuscular simulation, physiotherapy, diathermy, nerve stimulator, artificial kidney machine.</td>
</tr>
<tr>
<td><strong>Patient monitoring systems:</strong> Intensive cardiac care, bedside and central monitoring systems, patient monitoring through bio-telemetry, implanted transmitters, telemetering multiple information. Sources of electrical hazards and safety techniques.</td>
</tr>
<tr>
<td><strong>Recent trends:</strong> Medical imaging, X-rays, laser applications, ultrasound scanner, echo cardiography, CT Scan MRI/NMR, cine angiogram, colour doppler systems, Holter monitoring, endoscopy.</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Describe the principles of medical imaging.
2. Recognize various bio-medical instruments.

Skills
After completing this course students will be able to:
1. Apply digital signal processing to biomedical engineering.
2. Design and implement biomedical instruments.

Teaching/Learning Strategies
- Lectures
- Tutorials
- Laboratories
- Individual/Group Project
Learning Materials

Useful Websites
- http://www.engr.wisc.edu/

Reference Text:
- Rangan, Sharma, Mani-Tata, "Instrumentation Devices and Systems"- McGrawhill-Second Edition

Supplementary Readings:
- Webster, Medical Instrumentation: Applications and Design

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

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

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader
Staff
AIMS
This module is designed to provide students with an in-depth overview of the Radar systems and covers the growth of Radar Technology and applications. Basics Radar Equation, Radar theory of operation, Radar types, Radar Operating modes and different Radar modules are also introduced.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Introduction to RADAR</td>
</tr>
<tr>
<td>Radar Equation</td>
</tr>
<tr>
<td>CW and Frequency Modulated RADARs</td>
</tr>
<tr>
<td>MTI and Pulse Doppler RADAR</td>
</tr>
<tr>
<td>Tracking RADAR</td>
</tr>
<tr>
<td>RADAR Transmitters</td>
</tr>
<tr>
<td>RADAR Antennae</td>
</tr>
<tr>
<td>RADAR Receivers</td>
</tr>
<tr>
<td>Modes of Operation: Search, Tracking, and Lock on modes.</td>
</tr>
<tr>
<td>Detection of RADAR's signal in noise.</td>
</tr>
<tr>
<td>Extraction of Information from RADAR signal.</td>
</tr>
<tr>
<td>Propagation of RADAR waves</td>
</tr>
<tr>
<td>Examples of RADAR systems: Search Radar, Weather Radar, Fire Control</td>
</tr>
<tr>
<td>RADAR, and Imaging RADAR.</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Discuss the basic concept of RADAR.
2. Identify the different parameters of the RADAR equation.
3. Recognize the structure and function of the RADAR modules.
4. Differentiate between different Radar types and different Radar Modes.

Skills
After completing this course students will be able to:
1. Solve Radar Equation for different ranges of parameters
2. Analyse the different operating modes of the RADAR systems.
3. Explain the structure and function of RADAR modules.
4. Design RADAR Receiver, Transmitter, and Antenna.

Teaching/Learning Strategies

- Lectures
- Tutorials
- Individual/Group Project/Term Paper
Learning Materials

Useful Websites
- IEEE Transaction Microwave Theory, Tech.
- IEEE Antenna and Propagations Magazine
- http://www.eu.wiley.com

Reference Text:
- Merrill Ivan Skolnik, Introduction to Radar Systems.

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

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

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader
Staff
MSAUNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code: ECE 554
Title: Graduation Project (Part I)
Level: 5
Credit Hours: 3
Prerequisites: Min. Credits 138 and Min. Cum. GPA 2

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

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define the problem.</td>
</tr>
<tr>
<td>Develop a research plan.</td>
</tr>
<tr>
<td>Conduct background research.</td>
</tr>
<tr>
<td>Evaluate different options of problem solutions</td>
</tr>
<tr>
<td>Decide and Justify a specific solution</td>
</tr>
<tr>
<td>Prepare mid-term oral Presentations.</td>
</tr>
<tr>
<td>Submit mid-term written Reports</td>
</tr>
<tr>
<td>Prepare final oral Presentations.</td>
</tr>
<tr>
<td>Submit final written Reports</td>
</tr>
</tbody>
</table>

Learning Outcomes

Knowledge

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

1. Recommend research methods and techniques to contribute to a solution of an engineering problem.
2. Determine how to deal with real-life engineering, industrial or service system.

Skills

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

1. Contact a company sponsor, if any, to recognize its needs.
2. Construct appropriate scientific research, and apply relevant engineering standards to develop formal requirements for the solution of a problem or the design of a system.
3. Compare alternative approaches and designs, on the basis of engineering principles to meet these requirements.
4. Implement and operate the designated model, prototype, or method to satisfy those requirements.
5. Evaluate the results against the requirements, using performance measures.
6. Compose a variety of research documents including professional communications, letters and sketches in a student portfolio.
7. Produce collaboratively appropriate written reports, taking into consideration the format and citation.
8. Prepare oral presentations for supervisors and senior students during several seminars.

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

<table>
<thead>
<tr>
<th>Learning Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Software Requirements</strong></td>
</tr>
<tr>
<td>• Suitable software packages and/or.</td>
</tr>
<tr>
<td>• Building own codes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reference Text:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Suitable textbooks and scientific journals in the field of the project.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Supplementary Reading:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Scientific Papers.</td>
</tr>
<tr>
<td>• Research Reports</td>
</tr>
<tr>
<td>• Engineering Manuals.</td>
</tr>
<tr>
<td>• Technical Catalogues.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Weekly contacts with supervisor.</td>
</tr>
<tr>
<td>• Mid- Written and Final written reports.</td>
</tr>
<tr>
<td>• Mid and Final oral presentations.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Supervisor Evaluation 40%</td>
</tr>
<tr>
<td>• Mid Term Evaluation 20%</td>
</tr>
<tr>
<td>• Examiners' Staff Evaluation 40%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Leaning Unit Contact Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sessions 3 hrs / week</td>
</tr>
<tr>
<td>• Total class contact hours 42 hrs / semester</td>
</tr>
<tr>
<td>• Total other study hours 66 hrs / semester</td>
</tr>
<tr>
<td>• Total other study hours 108 hrs / semester</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff</td>
</tr>
</tbody>
</table>
# Module Outline

**Module Code:** ECE 561  
**Title:** VLSI Design  
**Level:** 5  
**Credit Hours:** 3  
**Prerequisites:** ECE 363, ECE 264

## Aims

This module is designed to provide students with an in-depth coverage of the design of VLSI digital circuits. Design both combinational and sequential circuits using CMOS - VHDL language are introduced. In addition, Design of digital systems using FPGA is also presented.

## Syllabus

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction to CMOS Circuits:</strong> CMOS transistor theory - CMOS process - MOS layout - characterization - dynamic logic</td>
</tr>
<tr>
<td><strong>Combinational Circuit Design:</strong> Circuit families, low power circuit design, Silicon on Insulator circuit design</td>
</tr>
<tr>
<td><strong>Sequential Circuit Design:</strong> Sequencing static circuit, circuit design of latch and DFF static sequencing element methodology, Sequency dynamic circuits.</td>
</tr>
</tbody>
</table>

## Learning Outcomes

### Knowledge

After completing this course students will be able to:

1. Organize the basic principles of designing a VLSI chip.
2. Illustrate how to use CAD tools to layout CMOS circuits.

### Skills

After completing this course students will be able to:

1. Synthesize the digital VLSI design.
2. Simulate the design of logic operations.
3. Implement FPGA in different applications.

## Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Laboratories.
- Computer Laboratories.
- Team projects.
- Class Presentations.

## Learning Materials

### Useful Websites

- [http://www.ece.umd.edu](http://www.ece.umd.edu)
- [http://www.seas.upenn.edu](http://www.seas.upenn.edu)

### Reference Text:


### Supplementary Readings:

- IEEE consumer electronics magazine.

**Assessment Scheme**
- Assignments.
- Class written Tests/Quizzes.
- Lab/Projects
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

**Assessment Pattern**
- Class Participation/Assignments 10%
- Tests and Quizzes 10%
- Lab/Projects 20%
- Unseen Mid-Term Exam 20%
- Unseen Final Exam 40%

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

**Learning Unit Contact Hours Per Week**
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Laboratories 1.5 hrs / week
- Total class contact 84 hrs/semester
- Total self study hours 60 hrs/semester
- Total study hours 144 hrs/semester

**Module Leader**
Staff
Module Code : GSE 562
Title : Ethics, Safety and Health
Level : 5
Credit Hours : 3
Prerequisites : None

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

SYLLABUS

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

Learning Outcomes

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

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

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

1. Gain skills in the analysis of safety program effectiveness.
2. Develop the hazard communication.
3. Enhance capabilities in risk assessment.
4. Develop a better understanding of the rationale for all relevant ethical codes.
5. Act in such a manner as to enhance the honor, integrity and dignity of the profession.
6. Design their own instant check list for any facility assigned to them.

Teaching/Learning Strategies

- Lectures.
- Tutorials.
- Field trips

Learning Materials

Software Requirements

- None

Useful Websites

- chemlabs.uoregon.edu/Safety/GeneralInstructions.htm.
- www.batesville.k12.in.us/physics/phynet/lab%20rules/lab_rules.html.

Reference Text


Supplementary Readings


Assessment Scheme

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

Assessment Pattern

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

Total 100%

Learning Unit Contact Hours

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

Module Leader

Staff
Module Code: ECE 5631
Title: Spread Spectrum Techniques
Level: 5
Credit Hours: 3
Prerequisites: ECE 462

AIMS
This module is designed to provide students with the necessary knowledge about Direct sequence Code division multiple access (DS-CDMA), Multicarrier techniques: Orthogonal Frequency division multiple access (OFDM) and Multicarrier CDMA (MC-CDMA), Miscellaneous Current and New Technologies: Wideband CDMA (W-CDMA), Ultra Wideband (UWB) communications, Wireless Fidelity (Wi-Fi), and Radio Frequency Identification (RFID).

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple Access and Wi-Fi Signals (CDMA &amp; OFDM)</td>
</tr>
<tr>
<td>Wireless Channel, Spread Spectrum and Random Variable</td>
</tr>
<tr>
<td>Direct Sequence and Spreading Codes</td>
</tr>
<tr>
<td>Synchronous CDMA</td>
</tr>
<tr>
<td>Asynchronous CDMA</td>
</tr>
<tr>
<td>Rake Receiver, Capacity Analysis &amp; Power Control</td>
</tr>
<tr>
<td>Orthogonal Frequency Division Multiplexing (OFDM) Basics</td>
</tr>
<tr>
<td>Multipath Effects on OFDM</td>
</tr>
<tr>
<td>Fading &amp; MC-CDMA</td>
</tr>
<tr>
<td>Channel Estimation</td>
</tr>
<tr>
<td>Intercarrier Interference</td>
</tr>
<tr>
<td>Ultra Wideband (UWB) &amp; Others</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Describe the basic principles of CDMA & OFDM systems
2. Recognize practical limits on CDMA & OFDM

Skills
After completing this course students will be able to:
1. Perform analysis of CDMA & OFDM systems
2. Hands on real CDMA & OFDM systems and protocols

Teaching/Learning Strategies
- Lectures
- Tutorials
- Laboratories
- Individual/Group Project

Learning Materials
Useful Websites
- http://www.engr.wisc.edu/
Reference Text:
- Don Torrieri, "Principles of Spread-Spectrum Communication Systems",

Supplementary Readings:
- Ipatov, Valeri P., "Spread Spectrum and CDMA: Principles and Applications",
  Wiley; 1st ed.

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

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

Total 100%

Learning Unit Contact Hours Per Week
- Lectures 3 hrs / week
- Tutorials 1.5 hrs / week
- Total class contact hours 63 hrs/semester
- Total self study hours 45 hrs/semester
- Total study hours 108 hrs/semester

Module Leader
Staff
AIMS
The objective of this course is to provide a foundation of cryptography in an applied manner so that students can grasp its importance in relation to the field of information security. The course covers principles of number theory, cryptographic algorithms and cryptanalysis. Topics include: steganography, block and stream ciphers, secret key encryption (DES, AES, RC-n), primes, random numbers, factoring, and discrete logarithms; Public key encryption (RSA, Diffie-Hellman, Elliptic curve cryptography); Key management, hash functions (MD5, SHA-1, RIPEMD-160, HMAC), digital signatures, certificates and authentication protocols, and Cryptanalytic methods (known, chosen plaintext etc.) for secret and public key schemes.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction; History of Cryptography; Steganography.</td>
</tr>
<tr>
<td>Cryptology and simple cryptosystems; Shift, Affine, Hill Ciphers; Enigma</td>
</tr>
<tr>
<td>Conventional encryption techniques; Stream and block ciphers; DES;</td>
</tr>
<tr>
<td>DES continued; Linear and Differential Cryptanalysis; Hash functions;</td>
</tr>
<tr>
<td>More on Block Ciphers; The Advanced Encryption Standard</td>
</tr>
<tr>
<td>Hash Functions and their Implementation</td>
</tr>
<tr>
<td>Number Theory and Algorithm Complexity; Public Key Encryption - RSA</td>
</tr>
<tr>
<td>Public key Encryption using Discrete Logarithms</td>
</tr>
<tr>
<td>Elliptic Curve Cryptography</td>
</tr>
<tr>
<td>Digital signatures and the digital signature standard</td>
</tr>
<tr>
<td>Key Management Schemes</td>
</tr>
<tr>
<td>Identification Schemes and Biometrics</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Grasp the importance of cryptography in relation to the field of information security.
2. Understand principles of number theory, cryptographic algorithms and cryptanalysis.
3. Learn how various cryptographic schemes work.

Skills
After completing this course students will be able to:
1. Measure the running time of an algorithm and understand the notion of reducing one problem to another.
2. Analyze security of a cryptographic scheme and determine whether or not it is secure.

Teaching/Learning Strategies
- Lectures
- Laboratories
Learning Materials

Useful Websites
- http://www.engr.wisc.edu/

Reference Text:

Supplementary Readings:

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

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

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

Module Leader
Staff
Module Code: ECE 5633  
Title: Robot Dynamics & Control  
Level: 5  
Credit Hours: 3  
Prerequisites: ECE 362

AIMS
This module is designed to provide students with the necessary fundamentals of robotics including kinematics, dynamics, motion planning, computer vision, and control.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid motions and homogeneous transformations</td>
</tr>
<tr>
<td>Forward and inverse kinematics</td>
</tr>
<tr>
<td>Velocity kinematics</td>
</tr>
<tr>
<td>Path and trajectory planning</td>
</tr>
<tr>
<td>Dynamics</td>
</tr>
<tr>
<td>Independent joint control</td>
</tr>
<tr>
<td>Multivariable control force control</td>
</tr>
<tr>
<td>Geometric nonlinear control</td>
</tr>
<tr>
<td>Computer vision</td>
</tr>
<tr>
<td>Vision-based control</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Identify the most important concepts of robotic systems.
2. Address the basic problems confronted in sensor-based robotic manipulation.
3. Understand the trajectory control of the manipulators.

Skills
After completing this course students will be able to:
1. Derive a control law for each joint of a manipulator.
2. Perform rigorous analysis of the performance of control

Teaching/Learning Strategies

- Lectures
- Laboratories
- Tutorials
- Individual/Group Project

Learning Materials

Useful Websites
- http://www.engr.wisc.edu/

Reference Text:

Supplementary Readings:
### Assessment Scheme
- Assignments.
- Class written Tests/Quizzes.
- Unseen written Mid-Term Exam (1.5-hr. Exam).
- Unseen written Final-Exam (3-hr. Exam).

### Assessment Pattern

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

**Total** 100%

### Learning Unit Contact Hours Per Week

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

### Module Leader

Staff
AIMS
Nano – science and nanotechnology are broad, interdisciplinary areas, encompassing not just materials science but everything from biochemistry to electrical engineering and more. This module is designed to provide students with the necessary knowledge about the field of nanotechnology which related to electrical engineering. It will also introduce students to the rapidly developing field of nano – engineered materials with special focus on their electronic properties. Therefore, fundamental aspects of the electronic properties of these materials, as well as fabrication processes and applications will be discussed in this course.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Why nano – technology</td>
<td></td>
</tr>
<tr>
<td>Electronic transport in 1,2 and 3 dimensions</td>
<td></td>
</tr>
<tr>
<td>Quantum confinement, energy sub – bands</td>
<td></td>
</tr>
<tr>
<td>quantum wells, quantum wires, quantum dots</td>
<td></td>
</tr>
<tr>
<td>Effective mass, mean free path in 3D, ballistic conduction</td>
<td></td>
</tr>
<tr>
<td>Compound semiconductor nanostructures: growth of compound</td>
<td></td>
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<tr>
<td>Silicon nano - wires</td>
<td></td>
</tr>
<tr>
<td>Applications of silicon nano – wires</td>
<td></td>
</tr>
<tr>
<td>Silicon nano – wires based batteries</td>
<td></td>
</tr>
<tr>
<td>Silicon nano – wires based solar cells</td>
<td></td>
</tr>
<tr>
<td>Silicon nano – wires based energy scavenging systems</td>
<td></td>
</tr>
<tr>
<td>Techniques for fabricating silicon nano – wires</td>
<td></td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES

Knowledge
After completing this course students will be able to:
1. Discuss the concept and context of nanotechnology.
2. Describe top-down and bottom-up approaches of nanotechnology
3. Explain the different applications of nano – technology which related to electrical engineering.

Skills
After completing this course students will be able to:

1. Describe methods by which nano scale manufacturing can be enabled.
2. Define a concept for a nano scale electronic devices.
3. Identify the terminology, equipments and techniques that are used in the fabrication, and characterization of nano – structures.

Teaching/Learning Strategies
- Lectures
- Tutorials
- (Individual/Group) Project / Report
Learning Materials

Reference Text:

Supplementary Readings:

Assessment Scheme

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

Assessment Pattern

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

Learning Unit Contact Hours Per Week

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

Module Leader

Staff
MSA UNIVERSITY
FACULTY OF ENGINEERING
MODULE OUTLINE

Module Code : ECE 5635
Title : Special Topics in Communication
Level : 5
Credit Hours : 3
Prerequisites : Consents of Instructor & Advisor

AIMS
This module is designed to enable students to cope up with new advances in research in Communication.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review of Communications available today</td>
</tr>
<tr>
<td>Advances in Communications research.</td>
</tr>
<tr>
<td>Concentration on a specific research topic</td>
</tr>
</tbody>
</table>

Learning Outcomes

Knowledge
After completing this module, engineering students will be able to:
1. Use research methods and techniques to contribute to a solution of an advanced problem in Communications.
2. Ability to pursue further research in Communications.

Skills
After completing this module, engineering students will be able to:
1. Acquire research methodology tools in Communications.
2. Evaluate the new research ideas with respect to available technology.
3. Provide good presentation on a new subject in Communications.

Teaching/Learning Strategies
- Orientation Sessions.
- Review and discussion Sessions.
- Team projects.
- Presentations.

Learning Materials

Reference Text:
- Will be provided by instructor if any.

Supplementary Reading:
- Scientific Papers.
- Research Reports.
- Engineering Manuals.
- Technical Catalogues.

Assessment Scheme
- Weekly Lectures.
- Mid- Written and Final written reports.
- Mid and Final oral presentations.

Assessment Pattern
- Course work 40 %
- Mid Term Exam 20%
- Final Exam 40%

<table>
<thead>
<tr>
<th>Total</th>
<th>100 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaning Unit Contact Hours</td>
<td></td>
</tr>
<tr>
<td>Sessions</td>
<td>3 hrs / week</td>
</tr>
<tr>
<td>Total class contact hours</td>
<td>42 hrs / semester</td>
</tr>
<tr>
<td>Total other study hours</td>
<td>66 hrs / semester</td>
</tr>
<tr>
<td>Total other study hours</td>
<td>108 hrs / semester</td>
</tr>
</tbody>
</table>

**Module Leader**

Staff
Module Code: ECE 5636
Title: Advanced Topics in Communication
Level: 5
Credit Hours: 3
Prerequisites: Consents of Instructor & Advisor

AIMS
This module is designed to enable students to cope up with new advances in research in Communication.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review of Communications available today</td>
</tr>
<tr>
<td>New Trends in Communications research</td>
</tr>
<tr>
<td>Concentration on a specific advanced topic in Communications</td>
</tr>
</tbody>
</table>

Learning Outcomes

Knowledge
After completing these module, engineering students will be able to:
1. Use research methods and techniques to contribute to a solution of an advanced problem in Communications.
2. Ability to pursue further research in Communications.

Skills
After completing this module, engineering students will be able to:
1. Acquire research methodology tools in Communications.
2. Evaluate the new research ideas with respect to available technology.
3. Provide good presentation on a new subject in Communications.

Teaching/Learning Strategies
- Orientation Sessions.
- Review and discussion Sessions.
- Team projects.
- Presentations.

Learning Materials
Reference Text:
- Will be provided by instructor if any.

Supplementary Reading:
- Scientific Papers.
- Research Reports
- Engineering Manuals.
- Technical Catalogues.

Assessment Scheme
- Weekly Lectures.
- Mid- Written and Final written reports.
- Mid and Final oral presentations.

Assessment Pattern
- Course work                                                     40 %
- Mid Term Exam 20%
- Final Exam 40%

<table>
<thead>
<tr>
<th>Total</th>
<th>100 %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Leaning Unit Contact Hours</strong></td>
<td></td>
</tr>
<tr>
<td>Sessions</td>
<td>3 hrs / week</td>
</tr>
<tr>
<td>Total class contact hours</td>
<td>42 hrs / semester</td>
</tr>
<tr>
<td>Total other study hours</td>
<td>66 hrs / semester</td>
</tr>
<tr>
<td>Total other study hours</td>
<td>108 hrs / semester</td>
</tr>
</tbody>
</table>

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

AIMS
This module is designed to enable senior students, who successfully completed ECE554, to analyze, design, implement, test, and/or operate the designated model, prototype, or method to satisfy the company sponsor's requirements. Students should utilize the fundamental principles and skills gained through their academic studies.

SYLLABUS

<table>
<thead>
<tr>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilize computer software and / or develop own computer programs.</td>
</tr>
<tr>
<td>Choose an appropriate design satisfying the sponsor's requirements.</td>
</tr>
<tr>
<td>Implement/operate the designated model or prototype.</td>
</tr>
<tr>
<td>Analyze and Interpret the results.</td>
</tr>
<tr>
<td>Present recommendations and forward suggestion for further research.</td>
</tr>
<tr>
<td>Submit a mid – and final – written report.</td>
</tr>
<tr>
<td>Prepare a mid – and final – oral Presentations.</td>
</tr>
<tr>
<td>Defend the work done in a committee of external examiners.</td>
</tr>
</tbody>
</table>

Learning Outcomes

Knowledge
After completing these two modules, engineering students will be able to:
1. Use research methods and techniques to contribute to a solution of an engineering problem.
2. Recommend solutions to deal with real life engineering, industrial or service systems.

Skills
After completing this module, engineering students will be able to:
1. Consider alternative approaches and designs, on the basis of engineering principles to meet those requirements.
2. Implement or operate the designated model, prototype, or method to satisfy those requirements.
3. Evaluate the results against the requirements, using performance measures.
4. Compose a variety of research documents including professional communications, letters and sketches in a student portfolio.
5. Produce collaboratively appropriate written reports, taking in consideration the format and citation.
6. Prepare oral presentations for supervisors and senior students during several seminars.
### Teaching/Learning Strategies

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

### Learning Materials

#### Software Requirements

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

#### Reference Text:

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

#### Supplementary Reading:

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

### Assessment Scheme

- Weekly contacts with supervisor.
- Mid- Written and Final written reports.
- Mid and Final oral presentations.

### Assessment Pattern

- Supervisor's Evaluation: 40%
- Mid Term Evaluation: 20%
- Examiners' Staff Evaluation: 40%

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

### Contact Hours

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

### Module Leader

Staff