SYLLABUS (COURSE SPECIFICATION)

INSTITUTION	Yanbu Industrial College	Date	30-03-2015
DEPARTMENT	Electrical Power Engineering Technology		

A. Course Identification and General Information

Course Title	Computer Applications in Electrical Systems.					
Course Code	EEET 324			**Credit hours**		3
Program(s) in which the course is offered	Bachelor of Science in Electrical Power Engineering Technology					
Faculty members responsible for the course	**Name**			**Role**		
	Dr. M Mosaad			X	Course Coordinator	
	Dr. Suresh Khalida			X	Program Coordinator	
	Dr. Mohamed Mostafa			X	Head of Department	
Level at which this course is offered	☐	Associate	☐	Vocational	☐	Certificate
	x	Bachelor	☐	Professional	☐	
	☐	Masters	☐	Special Program	☐	
Year at which this course is offered	☐	Foundation Year	☐	Second Year	☐	Third Year
	x	Fourth Year	☐	Fifth Year		
Pre-requisites for this course (if any)	EEET 321					
Co-requisites for this course (if any)	EEET 322					
Location (if not on main campus)						

Course Description

In this course the main computer package for electrical engineering applications (MATLAB-SIMULINK) is introduced. The common engineering analysis and calculations such as complex numbers, matrices, solving ordinary and differential equation are treated using the package. Moreover, plotting results and graphics to illustrate results are explained. In addition, modeling equations and running simulation for DC motor, power electronics and electrical systems applications using Simulink blocks is demonstrated.

B. Course Objectives and Learning Outcomes

Course's Contribution to Program and College/Institute Goals

Course Objectives and Course Learning Outcomes (CLOs) are developed by considering the program and College Goals. The CLOs are consistent with the Program Student Outcomes (SO). The SOs are mapped with Program Educational Objectives (PEO), which are consistent with college mission to prepare its graduates for a profession ready employment. The course mapping is given in the matrix.

Mapping Matrix (Curriculum Matrix)

Course Learning Outcomes (CLOs)	Mapping of Course Learning Outcomes (CLOs) to Program Student Outcomes ABET/ETAC Student Outcomes / Program Specific Criteria									Mapping of CLOs to College Mission	
	Application of Engineering Knowledge, Techniques, skills and Tools (a), (Program Criterion)	Application of Mathematics, Science, Engineering and Technology (b), (Program Criterion)	Testing and Experimental Skills (c)	Teamwork (d)	Analytical Skills (e)	Communication Skills (f)	Self Directed Professional Development (g)	Professional And Ethical Responsibility (h)	Quality, Timeliness and Continuos Improvement (i)	Program Specific Knowledge	Program Specific Practical Skills
CLO 1.01	☑	☑									
CLO 1.02		☑									
CLO 1.03			☑		☑					☑	
CLO 1.04			☑								
CLO 1.05						☑					
CLO 1.06	☑						☑				
CLO 2.01	☑	☑	☑	☑							
CLO 2.02	☑										
CLO 2.03	☑			☑							
CLO 3.01				☑							
CLO 3.02								☑			
CLO 3.03							☑	☑			
CLO 4.01		☑			☑	☑					
CLO 4.02				☑			☑				
CLO 4.03					☑				☑		

Course Objectives

Upon successful completion of this course, the students will be able to :

- Explain MATLAB basic features, and mathematical operations.
- Explain complex number manipulation.
- Construct matrix formation with different mathematical operations.
- Solve system of linear algebraic equations using MATLAB.
- Demonstrate different ways of plotting.
- Use of programming such as loop structure, logic operations, and if-statements.
- Solve differential equations using SIMULINK blocks.
- Model a general RLC circuit; perform how to run a simulation.
- Model and simulate a DC motor.
- Model and simulate a DC generator.
- Model and simulate of some electronics components such as rectifier circuits.

Intended Learning Outcomes in the Domains of Learning

1. 00 Knowledge and Understanding

Course Learning Outcomes	Teaching Strategies and Activities	Assessment Methods
1. 01 Ability to understand MATLAB software.	• Lectures and Labs • Problem analysis and decision-making process to determine the most effective and solutions. • Mini-projects • Laboratory Exercises	• Assignments • Quizzes • Theory Examination • Laboratory Examination • Group Presentation • Mini projects
1. 02 Ability to use MATLAB and different commands.		
1. 03 Ability to make mathematical calculations, complex numbers manipulation and perform plotting using MATLAB.		
1. 04 Understanding differential equations and their solution in MATLAB.		
1. 05 Ability to write M-Code and make algorithms in MATLAB.		
1. 06 Ability to use SIMULINK and make different models.		
1. 07 Ability to use SmPower System and make different models related to the power systems, Power electronics and machines.		

Cognitive Skills

Course Learning Outcomes	Teaching Strategies and Activities	Assessment Methods
2.01 Know the latest engineering softwares used in the electrical engineering and especially in the power systems application. Comparison between some of these softwares and MATLAB	Students are also directed and engaged to make a group survey report about the latest software and an open discussion regarding to this survey is done.	Analysis and display results generated by the models Time-constrained assignments Problem based learning through interactive

		brainstorming (group work).
2.02 Design Solutions for complex engineering problems in the area of specialization, design systems and simulate different systems.	Interaction with subject specific knowledge, covered in both theoretical and practical aspects of the course material. .	
2.03 Apply suitable techniques, resources, and modern engineering and computing tools (simulation, design, and programming) to some power system applications.	Students are engaged to investigate, design and build MATLAB code and SIMULINK models for control and design of some applications in the specialization. Some mini projects are proposed for the students and they make groups to build, design and analysis for these proposed projects.	
3.00 Interpersonal Skills and Responsibility		
Course Learning Outcomes	**Teaching Strategies and Activities**	**Assessment Methods**
3.01 Elucidate personal values and objectives.	Assignments Mini-project Problem based learning through interactive brainstorming (group work)	Lab reports Time-constrained exam and assignments
3.02 Show effectively his role in the individual or a member of the section in multi-disciplinary settings		
3.03 Work with a variety of people		
4.00 Communication, Information Technology and Numerical Skills		
Course Learning Outcomes	**Teaching Strategies and Activities**	**Assessment Methods**
4.01 Ability to search appropriate literature and other scientific resources for problem formulation, analysis and design.	Realize design through MATLAB and/or SIMULINK /SimPower system tools. Build algorithms MATLAB. Design some models and Simulation of some tasks conducted in other courses like (EEET 322-EEET 321)	Mid Lab, Final lab exams Mini-projects and home assignments Completion of tasks in weekly laboratory exercises
4.02 Ability for engineering thinking in analysing and solving the simulation problems through algorithms and flowcharts.		
4.03 Ability to understand and prepare effective design documentation		
5.00 Psychomotor Skills (if applicable)		

Course Learning Outcomes	Teaching Strategies and Activities	Assessment Methods
5.01 N/A	• N/A	• N/A

C. Course Components

Total Contact Hours and Credit Hours per Semester

	Lecture	Laboratory	Tutorial	Practical	Other	Total
Contact Hours	30	45	N/A	N/A	N/A	75
Credit Hours	2	1				

Forms and Schedule of Assessment Tasks During the Semester

Assessment task	Form of assessment		Week due	Proportion of final assessment
	Summative	Formative		
Quizzes	**Summative**		Bi-weekly	5%
Assignments	**Summative**		Bi-weekly	10%
Mid Term Theory Exam	**Summative**		8	10%
Mid Term Lab Exam	**Summative**		9	15%
Lab Performance	**Summative**		15	10%
Final Lab Exam	**Summative**		15	15%
Final Theory Exam	**Summative**		16	35%

Student Support

(Availability of teaching staff for individual student consultations and academic advice per week)

Topics to be Covered

List of topics	Weeks	Contact Hours
1. Matlab programming in Mathematics.	1-5	10
2. Steady state analysis using Matlab programming in electrical machines.	6	2
3. Electrical circuit elements.	7	2
4. Control analysis techniques applications.	8	2
5. Transient analysis using Simulink to solve differential equations.	10	2
6. Simulation of some electrical systems such as DC motor and generator.	11-12	4
7. Simulation of some power electronics systems such as rectifiers	13-15	6

Laboratory Outline (if applicable)

Laboratory exercises	Weeks	Contact Hours
1. MATLAB familiarization	1	3
2. Complex Numbers manipulation	2	3
3. Matrices Formation	3	3
4. Matrices manipulation (Matrices Algebra)	4	3
5. Polynomials	5	3

6. Basic plotting	6	3
7. Building a simple SIMULINK	7	3
8. Modelling of Equations in SIMULINK	9	3
9. Different blocks manipulation	10	3
10. Modelling and simulation of DC motors	11	3
11. Modelling and simulation of DC generators	12	3
12. Modelling and simulation of some electronic components	13	3

D. Teaching and Learning Resources and Facilities

Required Textbook(s)

Title and ISBN	Author(s)	Publication year	Edition	Publisher
MATLAB An Introduction with Applications	Amos Gilat	**2011**	**4st Edition**	John Wiley and Sons,
EEET 324 – Computer Applications in Electrical Systems – Laboratory Manual				

Essential References/Recommended Books

Title and ISBN	Author(s)	Publication year	Edition	Publisher
Essential Matlab For Scientists and Engineers	Brian D. Hahn	2014	**5th**	ELSEVIER Butterworth Heinemann, Amsterdam

Required Software/Computer-Based Programs/Laboratory Equipment

Name	Version (if any)	Model/Year	Company	Other
MATLAB	Release 2014a	**2014**	The MathWorks Inc.	

Accommodation and Facilities

Other Resources

E. Course Evaluation and Improvement Processes

- Students' feedback and alumina discussion
- Contents review frequency: End of each semester

	Developer	Head of Department(s)	Curriculum Development Unit Head(s)	Head - Curriculum Development Dept.
Name	Dr. Mohamed I. Mosaad	Dr M Mostafa		
Signature				
Completion Date				
Received Date				
Approved Date				