A. Basic Information

Course Title: Automatic control (2) **Code**: EPE412
Lecture: 3 **Tutorial**: 2 **Practical**: - **Total: 5**
Program on which the course is given: B.Sc. Electrical Engineering (Electrical Power and Machines)
Major or minor element of program: Major
Department offering the program: Electrical Engineering Department
Department offering the course: Electrical Engineering Department
Academic year / level: **Fourth** Year / **First** Semester
Date of specifications approval: 10/5/2006

B. Professional Information

1. Overall aims of course

By the end of the course the students will be able to:

- Study the behavior of control systems.
- Understand the basics of digital and optimal control systems.

2. Intended Learning outcomes of Course (ILOs)

By completion of the course, the student should be able to:

a. Knowledge and Understanding:

a.1) Concepts and theories of mathematics and sciences, appropriate to the discipline.
a.4) Principles of design including elements design, process and/or a system related to specific disciplines.
a.5) Methodologies of solving engineering problems, data collection interpretation.
a.8) Current engineering technologies as related to disciplines.
a.13) Analytical and computer methods appropriate for electrical power and machines engineering.
a.14) Design methods and tools for electrical power and machines equipment and systems.

b. Intellectual Skills

b.1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems.
b.2) Select appropriate solutions for engineering problems based on analytical thinking.
b.3) Think in a creative and innovative way in problem solving and design.
b.4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.
b.5) Assess and evaluate the characteristics and performance of components, systems and processes.
b.7) Solve engineering problems, often on the basis of limited and possibly contradicting information.
b.11) Analyze results of numerical models and appreciate their limitations.
b.13) Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering.

c. Professional and Practical Skills

c.1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice to solve engineering problems.
c.3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.
c.6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs.
c.7) Apply numerical modeling methods to engineering problems.
c.11) Exchange knowledge and skills with engineering community and industry.

d. General and Transferable Skills

d.1) Collaborate effectively within multidisciplinary team.
d.2) Work in stressful environment and within constraints.
d.3) Communicate effectively
d.6) Effectively manage tasks, time, and resources.
d.7) Search for information and engage in life-long self learning discipline.
d.8) Acquire entrepreneurial skills.
d.9) Refer to relevant literatures.

3. Contents

No	Topic	No. of hours	ILOs	Teaching / learning methods and strategies	Assessment method
1	Root Locus Techniques	5	a1 , b1 , b7	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home assignments , Quizzes , oral exam
2	Design of Controller using Root locus techniques	5	a1 , a4 , b2	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home assignments , Quizzes , oral exam
3	Time Response of Control Systems	5	a1 , a5 , b1 , b5	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home assignments , Quizzes , oral exam
4	Frequency Response of Control Systems	5	a5 , a8 , b2 , c1 , d6	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home assignments , Quizzes , oral exam
5	Nyquist Stability Criterion	5	a5 , a8 , b4 , c1 ,	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home assignments , Quizzes , oral exam
6	Applications	5	a5 , a8 , b7 , b13 , c7 , c11	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home assignments , Quizzes , oral exam
7	Bode plot technique	5	a1 , a5 , a8 , b5	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home assignments , Quizzes , oral exam
8	Mid term exam				
9	Design of Lead Compensator using Bode	5	a1 , a4 , a13 , b4 , b11 , d1	Lectures, Practical training / laboratory, Class activity, Case	Home assignments , Quizzes , oral exam

	plot			study, Assignments / homework	
10	Design of Lag Compensator using Bode plot	5	a1 , a4 , a13 , b3 , b7 , c1 , d2	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home assignments , Quizzes , oral exam
11	Design of lag- lead Compensator using Bode plot	5	a1 , a4 , a14 ,b3 , b11 , c3 , d6 , d7 , d9	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home assignments , Quizzes , oral exam
12	Non-linear Control Systems	5	a1 , a4 , b4 , c6 , d8	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home assignments , Quizzes , oral exam
13	Stability of Non-linear Control Systems	5	a1 , a4 , b4 , b7 , b11 , d3	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home assignments , Quizzes , oral exam
14	Microprocessor Control	5	a1 , a4 , b4 , c6 , d6	Lectures, Practical training / laboratory, Class activity, Case study, Assignments / homework	Home assignments , Quizzes , oral exam
15	Final exam				
16					

4. Teaching and Learning Methods

Lectures
Practical training / laboratory
Class activity
Case study
Assignments / homework

5. Student Assessment Methods

Assignments to assess knowledge and intellectual skills and proffesional and practical skills.
Quiz to assess knowledge ,intellectual skills and professional skills and proffesional and practical skills..

Mid-term exam to assess knowledge , intellectual skills and proffesional and practical skills.
Oral exam to assess proffesional , practical , general and transferable skills .
Final exam to assess knowledge , intellectual skills and proffesional and practical skills.

6. Assessment schedule

Assessment 1 on weeks 2, 5, 9, 11
Assessment 2 Quizzes on weeks 4 , 6 , 10 , 12
Assessment 3 Mid-term exam on week 8
Assessment 4 Oral Exam on week 14
Assessment 5 Final exam on week 15

7. Weighting of Assessments

Mid- Term Examination	10 %
Final- Term Examination	60 %
Oral Examination	10 %
Semester Work	10 %
Other	10 %
Total	100 %

8. List of References

8.1 Course Notes
Course notes prepared by instructor.

8.2 Essential Books (Text Books)
A textbook of Automatic Control Systems B. C. Kuo, 2004.
A textbook of Control System Engineering by K. Ogata, 2007.

8.3 Recommended Books
"Modern Control Systems Engineering", By Z. Gajic & M. Lelic, 2006.

9. Facilities Required for Teaching and learning

Lecture room equipped with overhead projector

Presentation board, computer and data show

Course coordinator: Prof. Dr. Wagdy Mohamed Mansour

Course instructor: **Dr. Mahmoud Soliman**

Head of department: Prof. Dr Mousa Abd-Allah **Date: 27 / 11 / 2011**