Model No.12
Course Specifications: Automatic Control

Shoubra Faculty
of Engineering

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University : Benha university

Faculty : Shoubra Faculty of Engineering

Department : Electrical Engineering Department

1- Course Data

   Course Code : ECE312c   Course Title : Automatic Control   Study Year : Third Year

   Specialization :
   Teaching Hours:
     Lecture : 3   Tutorial : 2   Practical :

2- Course Aim

    By the end of the course the students will be able to:
    2.1 Demonstrate the broad classifications of automatic control systems.
    2.2 Carry out mathematical modeling computations in automatic control systems.
    2.3 Analyze the behaviour of control systems by different methods of analysis and design .

3. 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 control.
  a.2) Basics of information and communication technology (ICT).
  a.4) Principles of design including elements design, process and/or a system related to automatic control.
  a.5) Methodologies of solving engineering problems, data collection interpretation.
  a.8) Current engineering technologies as related to automatic control.
  a.16) Principles of analyzing and design of control systems with performance evaluation.

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.11) Analyze results of numerical models and appreciate their limitations.
b.13) Develop innovative solutions for the practical industrial problems.

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 automatic control and develop required computer programs.
c.7) Apply numerical modeling methods to engineering problems.
c.13) Use appropriate mathematical methods or IT tools.

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 automatic control.
d.8) Acquire entrepreneurial skills.
d.9) Refer to relevant literatures.
d.12) Develop skills related to creative and critical thinking as well as problem solving.

4- Course Contents

No.	Topics	No of hours
1	Introduction to control system	5
2	Mathematical fundamentals	5
3	open loop and closed - loop control system.	5
4	Transfer functions and block diagrams	5
5	Signal flow graph models	5

6	Introduction to control system	**5**
7	Mathematical fundamentals	**5**
8	Root Locus Techniques	**5**
9	Design of Controller using Root locus techniques	**5**
10	Time Response of Control Systems	**5**
11	Frequency Response of Control Systems	**5**
12	Nyquist Stability Criterion	**5**
13	Control Systems applications communication systems	**5**

5.   Teaching and Learning Methods
       5.1 Modified Lectures
       5.2 Practical training / laboratory
       5.3 Class activity
       5.4 Assignments / homework

6- Teaching and Learning Methods of Disables

Not available

7- Student Assessment

   a- Student Assessment Methods

1	**Assignments to assess knowledge and intellectual skills.**
2	**Quiz to assess , intellectual and professional skills**
3	**Mid-term exam to assess knowledge, and intellectual skills**
4	**Final exam to assess knowledge, intellectual skills.**

   b- Assessment Schedule

No.	Assessment	Week
1	**Assignments**	**3, 5, 10, 12, 13**

2	Assessment 2 Quizzes	4, 6 , 9, 11,
3	Assessment 3 Mid-term exam	7

c- Weighting of Assessments

Assessment	Weight
Midterm Examination	15 %
Final Term Examination	64 %
Oral Examination	0 %
Practical Examination	0 %
Semester work	15 %
Other types of assessment	6 %
Total	100 %

8. **Course Notes**

8.1 Handouts prepared by instructor.

8.2 Essential Books (Text Books)
 * A textbook of Automatic Control Systems B. C. Kuo, 2004
 * Feedback and control systems Shaum's series .
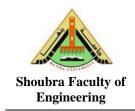
8.3 Recommended books
 Control System Engineering by K. Ogata, 2007

9. **Facilities Required for Teaching and learning**
 9.1 Lecture room equipped with overhead projector
 9.2 Presentation board, computer and data show

Course coordinator: **Prof. Dr. Wagdy Mohamed Mansour**

Course instructor: **Dr. Ayman Yousef   Head of department: Prof. Dr Sayed Abu-Elsood Ward**

Model No.11A
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Matrix of Knowledge and Skills of the course

No.	Topics	week	Basic Knowledge	Intellectual Skills	Professional Skills	General Skills
1	Introduction to control system	1	a1	b1	c1	
2	Mathematical fundamentals	2	a1 , a2	b1	c1	
3	Open loop and closed - loop control system.	3	a1 , a4	b1	c1	
4	Transfer functions and block diagrams	4	a1 , a4	b2 , b5	c1	
5	Signal flow graph models- control systems components	5	a1 , a4	b1 , b4	c1	
6	control systems components	6	a4, a5, a16	b11, b13	c1	
7	Steady-state error and transient response of control systems	7	a1 , a4	b3 , b5	c1 , c3	
8	Midterm exam	8	a4, a5, a16	b2 , b4, b5, b11, b13		d2
9	Root Locus Techniques	9	a5	b2	c1	
10	Design of Controller using Root locus techniques	10	a1 , a8	b2 , b5	c1	
11	Time Response of Control Systems	11	a4 , a8	b7 , b11	c6 , c7	
12	Frequency Response of Control Systems	12	a4 , a8	b7 , b11	c6 , c7	
13	Nyquist Stability Criterion	13	a5 , a8	b4	c3 , c13	
14	Control Systems applications communication systems	14	a5 , a8	b4	c3 , c13	
15	Final Exam	15	a2, a4, a5, a8	b1 , b2 , b5		d2

Course coordinator: Prof. Dr. Wagdy Mohamed Mansour

Course instructor: Dr. Mahmoud Soliman

Head of department: Prof. Dr Sayed Abu-Elsood Ward