Model No.12
Course Specifications: Automatic Control

Facultyof Engineering at Shoubra

University : Benha university

Faculty : Faculty of Engineering At Shoubra

Department : Electrical Engineering Department

1- Course Data

Course Code : ECE 321 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) Learn concepts and theories of mathematics and sciences, appropriate to the open and closed-loop control systems.(a1)
a.2) Define basics of automatic control systems.(a3)
a.3) Study principles of design including elements design, process and/or a system related to automatic control.(a5)
a.4) Demonstrate Methodologies of solving engineering problems related to automatic control systems.(a6)
a.5) Define current engineering technologies related to automatic control.(a9)
a.6) Illustrate principles of analyzing and design of control systems with performance evaluation.(a20)

b. Intellectual Skills

b.1) Select suitable mathematical and computer-based methods for modeling Root Locus Techniques.(b1)
b.2) Choose appropriate solutions for engineering automatic control problems depending on analytical thinking.(b3)
b.3) Study in a creative and innovative way in the design of automatic control systems.(b4)
b.4) Collect, exchange, and assess different ideas and knowledge about control systems applications.(b5)
b.5) Study the characteristics and performance of control components and systems.(b6)
b.6) Analyze the results of numerical control models and suitable their limitations.(b12)
b.7) Develop innovative ways for the practical industrial problems related to time and frequency response of Control Systems .(b14)

c. Professional and Practical Skills

c.1) Apply knowledge of mathematics, science, information technology, design and engineering practice to solve control system problems.(c1)
c.2) Establish and/or re-design a process, component of automatic control system, and enhancement specialized engineering designs.(c3)
c.3) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to automatic control and develop required computer programs.(c6)
c.4) Apply numerical modeling ways of signal flow graphs.(c7)
c.5) Use approriate mathematical fundamentals related to control systems.(c13)

d. General and Transferable Skills

d.1) Collaborate effectively within multidisciplinary team.(d1)
d.2) Work in stressful environment and within constraints.(d2)

d.3) Communicate effectively(d3)
d.4) Effectively manage tasks, time, and resources.(d6)
d.5) Search for information and engage in life-long self learning automatic control.(d7)
d.6) Acquire entrepreneurial skills. (d8)
d.7) Refer to relevant literatures.(d9)
d.8) Develop skills related to creative and critical thinking as well as problem solving.?(d12)

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.

8.2Essential 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. Mohammed abdelwahab**

Head of department: **Prof. DrSayed Abu-ElsoodWard**

Faculty of Engineering at Shoubra

Model No.11A
Course Specifications : Automatic Control

University : Benha university

Faculty : Faculty of Engineering At Shoubra

Department : Electrical Engineering Department

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 , a3	b1	c1	
4	Transfer functions and block diagrams	4	a1 , a3	b2 , b5	c1	
5	Signal flow graph models- control systems components	5	a1 , a3	b1 , b4	c1	
6	control systems components	6	a3, a5, a6	b6, b7	c1	
7	Steady-state error and transient response of control systems	7	a1 , a4	b3 , b5	c1 , c2	
8	Midterm exam	8	a4, a5, a6	b2 , b4, b5, b6, b7		d2
9	Root Locus Techniques	9	a5	b2	c1	
10	Design of Controller using Root locus techniques	10	a1 , a5	b2 , b5	c1	
11	Time Response of Control Systems	11	a4 , a5	b7 , b6	c3 , c4	
12	Frequency Response of Control Systems	12	a4 , a5	b7 , b6	c3 , c4	
13	Nyquist Stability Criterion	13	a4 , a5	b4	c3 , c5	
14	Control Systems applications communication systems	14	a4 , a5	b4	c3 , c5	
15	Final Exam	15	a2, a4, a5, a5	b1 , b2 , b5		d2

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