



**Faculty of Engineering – Assiut University
Bachelor Degree**

Mechatronics Engineering Program

Mechanical engineering Department

Course specification

Automatic Control MT 323

1. Course Aim

Main Aim	By the end of this course the student will be able to discuss the: Introduce basic concepts and theory of feedback control systems to mechatronics engineering students.
Sub-Aims	<ul style="list-style-type: none">• Emphasize the necessity of controller design , selection and tuning to achieve the desired performance accuracy according to stability requirements.• Present main control components such as controller, actuators and processes/ equipment.• Understand the Modeling, steady state analysis, Transient response, frequency response, stability, root locus analysis and basic control actions form the corner stones of the course.• Cast the minimum knowledge requirements as an introduction to control engineering.

2. Course Content

Introduction to control systems and feedback – Mathematical modeling of physical systems – Mathematical modeling of feedback control systems – Transfer function – steady state error – steady state response – transient response – Routh stability criterion – Root – locus method – performance criteria – Basic control actions – Design of P- PI - PD - PID controllers – Frequency response – Nyquist Stability criterion – Gain margin and phase margin – Applications using MATLAB software package.

3. Course Topics		
Topic	subject	week
1st topic	Introduction and classifications of linear control systems	1
2nd topic	Mathematical modeling of physical systems	2
3rd topic	Block diagram representations	1
4th topic	Control systems components	1
5th topic	Transfer function and steady state- error analysis	2
6th topic	Transient response of first and second order systems	3
7th topic	Stability analysis applying Routh stability criterion	1
8th topic	Basic control actions P,PI,PD and PID	1
9th topic	Frequency response analysis	2
10th topic	Stability analysis applying Nyquist stability criterion	1

4. Grades Distribution			
Assesment Methods		Percentage	
Final Exam		66.67	
Year work		33.3	
Med term exam			
Assessments	Written Exam	% 75	100%
	Oral Exam		
	Tutorial assessment	2.5%	
	Project assessment		
	Model assessment	%5	
	Report assessment		
	Quiz assessment	15%	

	Presentation assessment		
	Discussion	2.5%	
	Laboratory test		
	Home Exam		
	Monitoring		
Total			100%

5. List of References

12.1- Reference Book :

1-Modern Control Engineering, Katsuhiko Ogata, Prentice- Hall Inc.

12.2- Recommended Books:

- 1-Automatic Control Engineering, Francis H. Raven, McGraw-Hill Inc.
- 2-Control Systems Engineering, Norman S. Nise, John Wiley & Sons Inc.
- 3- Modern Control Systems, Richard C. Dorf & Robert H. Bishop, Addison Wesley Inc.
- 4- Modern Control Design With MATLAB and SIMULINK, Ashish Tewari, John Wiley & Sons Ltd.