



BENHA UNIVERSITY



FACULTY OF ENGINEERING AT SHOUBRA

**COURSE SPECIFICATIONS (2014-2015)**

**Model No.12**  
**Course Specifications: System Dynamic and**  
**Mechanical Vibration**

**University:** Benha University

**Faculty:** Faculty of Engineering at Shoubra

**Department offering the program:** Mechanical Engineering Department

**Department offering the course:** Mechanical Engineering Department

**1- Course Data**

**Course Code:** MDP322

**Course Title:** System Dynamic Mechanical Vibration

**Specialization:** Mechanical Production Engineering

**Course Type:** Compulsory

**Study Year:** Third Year

**Teaching Hours:** Lecture: 3

Tutorial:2

Practical: 0

Total: 5

**2- Course Aim**

For students undertaking this course, the aims are to:

- 1- Understanding concepts, principles of automatic control
- 2- Understanding of basic principles and stability of control systems
- 3- provide students with solid understanding of controller designs and compensation techniques

**3- Intended Learning Outcomes of Course (ILOS)**

**a- Knowledge and Understanding**

On completing this course, students will be able to demonstrate the knowledge and understanding of:

- a- 1 - The modeling of mechanical systems :Translation, Rotation. (A17)
- a- 2 - The modeling of physical systems: Electrical and electromechanical systems, Hydraulic and Pneumatic systems. (A17)
- a- 3 - The free damped vibration and forced damped vibration (A18).

**b- Intellectual Skills**

At the end of this course, the students will be able to:

- b- 1 - Analyze and solve the modeling systems by Laplace transform method and partial fraction expansion to find transfer functions of system. (B7)
- b- 2 - represent of block diagram, signal flow graph representation and compute steady state error and evaluate the stability of system. (B11)

**c- Professional Skills**

On completing this course, the students are expected to be able to:

- c- 1 - Find the transfer functions to modeling of physical systems, hydraulic and pneumatic and electrical and electromechanical systems and thermal and combined systems. (C6)
- c- 2 - Select the steady state error analysis with MatLab application and stability of system. (C16)

**d- General Skills**

At the end of this course, the students will be able to:

- d- 1 - Refer to relevant literatures .(D9)



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**4- Course Contents**

No.	Topics
1	Modeling mechanical systems: Translation
2	Modeling mechanical systems: Rotation -Kinematics
3	Modeling of physical systems Electrical and electromechanical systems
4	Modeling of physical systems Hydraulic, Pneumatic
5	Modeling of physical systems Thermal and combined systems
6	Laplace transform method: Partial fraction expansion - Expansion with Matlab - Transfer functions
7	Block diagram, Signal flow graph representation
8	Steady state error analysis with Matlab application
9	Linearizing nonlinear models about equilibrium
10	Stability: Internal stability - Asymptotic stability - BIBO stability
11	Free damped vibration
12	Forced damped vibration-1
13	Forced damped vibration-2

**5- Teaching and Learning Methods**

- 5.1 Lectures
- 5.2 Tutorial
- 5.3 Class activity
- 5.4 Case study
- 5.5 Seminar

**6- Teaching and Learning Methods of Disables**

- Nothing.

**7- Student Assessment**

**a- Student Assessment Methods**

1. Five Assignments to assess knowledge and intellectual skills.
2. Two Quizzes to assess knowledge, intellectual and professional skills.
3. Midterm exam to assess knowledge, intellectual, professional and general skills.
4. Oral exam to assess knowledge and intellectual skills
5. Final exam to assess knowledge, intellectual, professional and general skills.

**b- Assessment Schedule**

NO.	Assessment	Week
1	Assignments	3, 5, 7, 10, 11
2	Quiz	4, 9
3	Midterm exam	8
4	Oral exam	14
5	Final exam	15



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**c- Weighting of Assessments**

<b>Assessment</b>	<b>Weight (%)</b>
Midterm Examination	10
Final Term Examination	60
Oral Examination	20
Semester Work	10
Other Types of Assessment	-
<b>Total</b>	<b>100</b>

**8- List of References**

**a- Course Notes:** Course notes prepared by instructor.

**b- Recommended Books**

1. Mechanical Systems Design Handbook - Modeling, Measurement and Control (2002)
2. System Dynamics, 2nd Ed, William Palm, McGraw-Hill

**Course Coordinator:** Dr. Maha Mahmoud Ali Lashen

**Head of Department:** Prof. Dr. Osama Ezzat Abdelatif



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**COURSE SPECIFICATIONS (2014-2015)**

**Model No.11A**  
**Course Specifications: system dynamic and**  
**mechanical vibration**

**University:** Benha University

**Faculty:** Faculty of Engineering at Shoubra

**Department offering the program:** Mechanical Engineering Department

**Department offering the course:** Mechanical Engineering Department

**Matrix of Knowledge and Skills of the course**

No.	Topics	week	Basic Knowledge	Intellectual Skills	Professional Skills	General ls
1	Modeling mechanical systems: Translation	1	a1		c1	
2	Modeling mechanical systems: Rotation-Kinematics	2		b2		d1
3	Modeling of physical systems Electrical and electromechanical systems	3	a1		c1	
4	Modeling of physical systems Hydraulic, Pneumatic	4		b1		d1
5	Modeling of physical systems Thermal and combined systems	5	a2		c2	
6	Laplace transform method: •Partial fraction expansion •Expansion with Matlab - Transfer functions	6		b1		d1
7	Block diagram, Signal flow graph representation	7	a2		c2	
8	Steady state error analysis with Matlab application	8				
9	Linearizing nonlinear models about equilibrium	9	a2	b2	c1	
10	Stability: Internal stability -Asymptotic stability -BIBO stability	10			c1	
11	Free damped vibration	11	a3	b1		d1
12	Forced damped vibration-1	12		b1		
13	Forced damped vibration-2	13	a3		c1	

**Course Coordinator:** Dr. Maha Mahmoud Ali Lashen

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**COURSE SPECIFICATIONS (2014-2015)**

**Matrix of Course Aims and ILO's**

**Course Title:** System Dynamic and Mechanical Vibration

**Course Code:** MDP322

**Teaching Hours:** Lecture: 2                      Tutorial: 3                      Total: 5

**Major or minor element of program:** Major

**Program on which the course is given:** B.Sc. Mechanical Production Engineering

**Department offering the program:** Mechanical Engineering Department

**Department offering the course:** Mechanical Engineering Department

**Academic year / level:** 2014-2015 Third Year / Second semester

**Date of specifications approval:** 2014

Course aims	Basic Knowledge	Intellectual Skills	Professional Skills	General Skills
Understanding concepts, principles of Automatic control	a1, a3	b1		d1
Understanding of basic principles and stability of control systems	a1, a3	b2	c1, c2	d1
provide students with solid understanding of controller designs and compensation techniques	a2		c2	

**Course Coordinator:** Dr. Maha Mahmoud Ali Lashen

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