



Arab Academy for Science, Technology & Maritime Transport  
College of Engineering & Technology  
Mechanical Engineering (Mechatronics) Program

**University/Academy:** Arab Academy for Science, Technology & Maritime Transport  
**Faculty/Institute:** College of Engineering & Technology  
**Program:** B.Sc. Mechanical Engineering

**Form no. (12)**  
**Course Specification**

**1- Course Data**

Course Code: <b>ME 458</b>	Course Title: <b>Mechanical vibrations</b>	Academic Year/Level: <b>3<sup>rd</sup> year / 6<sup>th</sup> semester</b>	
Specialization: <b>Mechanical</b>	No. of Instructional Units <b>3 credits</b>	Lecture <b>2 hrs.</b>	Practical <b>2 hrs.</b>

**2- Course Aim**

To enable the student to recognize the importance and significance of the mechanical vibrations phenomena.

**3- Intended Learning Outcomes**

<b>a- Knowledge and Understanding</b>	<p><b>Through knowledge and understanding, students will be able to:</b></p> <p>K4) Principles of design including elements design, process and/or a system related to specific disciplines.</p> <p>K5) Methodologies of solving engineering problems, data collection and interpretation</p>
<b>b- Intellectual Skills</b>	<p><b>Through intellectual skills, students will be able to:</b></p> <p>I1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems.</p> <p>I2) Select appropriate solutions for engineering problems based on analytical thinking.</p> <p>I3) Think in a creative and innovative way in problem solving and design</p> <p>I6) Investigate the failure of components, systems, and processes.</p> <p>I11) Analyze results of numerical models and assess their limitations.</p> <p>I12) Create systematic and methodic approaches when dealing with new and advancing technology.</p>
<b>c- Professional Skills</b>	<p><b>Through professional and practical skills, students will be able to:</b></p> <p>P2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, Products and/or services</p> <p>P3) Create and/or re-design a process, component or system, and carry out specialized engineering designs</p> <p>P5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results</p> <p>P6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs.</p> <p>P7) Apply numerical modeling methods to engineering problems</p> <p>P8) Apply safe systems at work and observe the appropriate steps to manage risks.</p> <p>P11) Exchange knowledge and skills with engineering community and industry</p>

<b>d- General Skills</b>	<p><b>Through general and transferable skills, students will be able to:</b></p> <p>G3) Communicate effectively</p> <p>G4) Demonstrate efficient IT capabilities.</p> <p>G5) Lead and motivate individuals</p>
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#### 4- Course Content

<b>Week No.1</b>	Introduction, Harmonic and periodic motions
<b>Week No.2</b>	Equivalent systems
<b>Week No.3</b>	Equivalent systems (contd.)
<b>Week No.4</b>	Free vibrations of single degree of freedom systems
<b>Week No.5</b>	Free vibrations of single degree of freedom systems (contd.)
<b>Week No.6</b>	Free vibrations of single degree of freedom systems (contd.)
<b>Week No.7</b>	Forced vibrations of single degree of freedom systems / 7th week evaluation
<b>Week No.8</b>	Transmissibility
<b>Week No.9</b>	Vibration measurements
<b>Week No.10</b>	Vibration measurements (contd.)
<b>Week No.11</b>	Vibration under general forcing conditions
<b>Week No.12</b>	Two degree of freedom systems / 12th week evaluation
<b>Week No.13</b>	Two degree of freedom systems (contd.).
<b>Week No.14</b>	Multi-degree of freedom systems (Eigen value and Eigen vector problems)
<b>Week No.15</b>	Multi-degree of freedom systems (Eigen value and Eigen vector problem)
<b>Week No.16</b>	Final Examination

#### 5- Teaching and Learning Methods

<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Tutorials</li> <li>• Reports &amp; sheets</li> <li>• Laboratories</li> <li>• Seminars</li> </ul>
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**6-Teaching and Learning Methods for Students with Special Needs**

<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Tutorials</li> <li>• Reports &amp; sheets</li> <li>• Laboratories</li> <li>• Seminars</li> </ul> <p><b><u>Academic Support:</u></b></p> <ul style="list-style-type: none"> <li>• The general academic advisor appoints an academic supervisor for handicapped students.</li> <li>• Continuous follow ups are made for handicapped students after each assessment to evaluate their academic level of achievement</li> </ul>
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**7- Student Assessment**

<b>a-Procedures used</b>	1-Written Examinations to assess The Intended Learning Outcomes.	
	2-Class Activities (Reports, Discussions, -----) to assess The Intellectual and general Skills.	
<b>b- Schedule:</b>	Assessment 1	7 <sup>th</sup> Week Assessment
	Assessment 2	12 <sup>th</sup> Week Assessment
	Assessment 3	Continuous Assessments
	Assessment 4	16 <sup>th</sup> Week Final Written Exam
<b>c- Weighing of Assessment</b>	7 <sup>th</sup> Week Evaluation	30 %
	12 <sup>th</sup> Week Evaluation	20 %
	Final-term Examination	40 %
	Oral Examination	00 %
	Practical Examination	00 %
	Semester Work	10 %
	Total	100%

**8- List of References:**

<b>a- Course Notes</b>	N/A
<b>b- Required Books (Textbooks)</b>	• Singiresu. S.Rao, “Mechanical vibrations “, Addison – Wesley Publishing company, latest Edition.
<b>c- Recommended Books</b>	• William Thomson, “Theory of vibrations and applications “, prentice Hall. Victor Wowk, “machinery vibrations measurements and analysis”,Mc Graw Hill , Inc. Daniel J. Inman, “Engineering vibration “, Prentice Hall International, Inc.
<b>d- Periodicals, Web Sites, etc.</b>	N/A

Course coordinator:

Program Manager: