15 Course Specification of Engineering Mechanics 2

I. Course Identification and General Information:

1	**Course Title:**	***Engineering Mechanics 2***				
2	**Course Code & Number:**	BR008				
3	**Credit hours:**	C.H				**Credit Hours**
		Th.	**Tu**	**Pr**	**Tr.**	
		2	2			3
4	**Study level/ semester at which this course is offered:**	1th Level/ 2st semester				
5	**Pre –requisite (if any):**	Engineering Mechanics 1, Math 1				
6	**Co –requisite (if any):**	----------				
8	**Program (s) in which the course is offered:**	Civil Engineering				
9	**Language of teaching the course:**	English+ Arabic				
10	**Location of teaching the course:**	Class room				
11	**Prepared by:**	Dr. Mohammad A. Algorafi				
12	**Date of Approval**					

II. Course Description:

Dynamics is that branch of mechanics which deals with the motion of particle under the action of forces.
This course provides fundamental concepts for most of civil engineering branches related to movements. The knowledge and abilities taught in this course are an essential prerequisite for subsequent courses involving dynamics; fluid, hydraulics, Traffic and highway Engineering. The course focuses on the physical/mathematical analysis of the kinematics and kinetics motion of particles and rigid bodies. The formulation and solution of mechanic's problems will help the students develop the ability of logical thinking and effective communication. A thorough comprehension of dynamics will provide one of the most useful and powerful tools for analysis in engineering. In each chapter, the complete theory and the method of analysis will be introduced in the beginning followed by solved examples and assignments.

Prepared by	Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance
	Dr. Abdulkareem Yahya Al khattabi	Ass. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Ass. Prof. Dr. Huda Al-Emad

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III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a.1	Develop the basic principles of engineering dynamics and apply this understanding as well as their knowledge of mathematical principles.	A1
a.2	Describe the principles of analyze techniques.	A3
b.1	Select the suitable analysis in achieving the engineering purposes.	B1
c.1	Solve the dynamics problems	C2
c.2	Apply engineering mechanics techniques to solve the dynamics problems encountered in projects.	C3

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1- Develop the basic principles of engineering dynamics and apply this understanding as well as their knowledge of mathematical principles.	Lecture Multimedia Presentations Presentations Tutorial Reading	Written exam- Written assignment
a2- Describe the principles of analyze techniques.	Lecture Multimedia Presentations Presentations Tutorial Reading	Written exam- Written assignment

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Select the suitable analysis in achieving the engineering purposes.	Lecture Multimedia Presentations Presentations Tutorial Reading	Participation- Written Assignment-Project

© Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1- Solve the dynamics problems	Lecture Presentations Tutorial	Written Assignment- Written exam -Project
c2- Apply engineering mechanics techniques to solve the dynamics problems encountered in projects.	Lecture Presentations Tutorial	Written Assignment- Written exam -Project

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	Introduction	a1, a2	Basic Concepts Newton's law System of Units Gravitation Dimensions	1	2
2	Rectilinear Kinematics: Continuous Motion	a1, a2, b1, c1, c2	Relationship between displacement and velocity and acceleration mathematically	1	2

3	Rectilinear Kinematics: Erratic Motion	a1, a2, b1, c1, c2	Relationship between displacement and velocity and acceleration graphically	1	2
4	Curvilinear Motion: Rectangular Components- Motion of a Projectile-	a1, a2, b1, c1, c2	Curvilinear Motion: Rectangular Components- Motion of a Projectile	2	4
5	Curvilinear Motion: Normal and Tangential Components	a1, a2, b1, c1, c2	Relationship between displacement and velocity and acceleration using N-T Components	1	2
6	Relative-Motion of Two Particles Using Translating Axes	a1, a2, b1, c1, c2	Relative-Motion of Two Particles Using Translating Axes	1	2
7	Newton's Second Law of Motion The Equation of Motion	a1, a2, b1, c1, c2	Newton's Second Law of Motion The Equation of Motion	2	4
8	Principle of Work, Energy, Power, and Conservative Forces and Energy of Particles	a1, a2, b1, c1, c2	Principle of Work, Energy, Power, and Conservative Forces and Energy of Particles	2	4
9	Principle of Linear Impulse and Momentum And Conservation of Linear Momentum for a System of Particles Impact	a1, a2, b1, c1, c2	Principle of Linear Impulse and Momentum And Conservation of Linear Momentum for a System of Particles - Impact	3	6
Number of Weeks /and Units Per Semester				**14**	**28**

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B - Tutorial Aspect:				
Order	**Tasks/ Experiments**	**Number of Weeks**	**contact hours**	**Learning Outcomes**
1	Introduction	1	2	a1,a2
2	Rectilinear Kinematics: Continuous Motion	1	2	a1,a2,b1,c1,c2
3	Rectilinear Kinematics: Erratic Motion	1	2	a1,a2,b1,c1,c2
4	Curvilinear Motion: Rectangular Components- Motion of a Projectile	2	4	a1,a2,b1,c1,c2
5	Curvilinear Motion: Normal and Tangential Components	1	2	a1,a2,b1,c1,c2
6	Relative-Motion of Two Particles Using Translating Axes	1	2	a1,a2,b1,c1,c2
7	Newton's Second Law of Motion The Equation of Motion	2	4	a1,a2,b1,c1,c2
8	Principle of Work , Energy ,Power , and Conservative Forces and Energy of Particles	2	4	a1,a2,b1,c1,c2
9	Principle of Linear Impulse and Momentum And Conservation of Linear Momentum for a System of Particles –Impact	**3**	**6**	a1,a2,b1,c1,c2
Number of Weeks /and Units Per Semester		**14**	**28**	

V. Teaching strategies of the course:

Lecture
Multimedia Presentations
Presentations
Tutorial
Reading

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VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Rectilinear Kinematics: Continuous Motion	a1,a2,b1,c1,c2	2	1
2	Rectilinear Kinematics: Erratic Motion	a1,a2,b1,c1,c2	3	1
3	Curvilinear Motion: Rectangular Components- Motion of a Projectile-	a1,a2,b1,c1,c2	5	1
4	Curvilinear Motion: Normal and Tangential Components	a1,a2,b1,c1,c2	6	1
5	Relative-Motion of Two Particles Using Translating Axes	a1,a2,b1,c1,c2	7	1
6	Newton's Second Law of Motion The Equation of Motion	a1,a2,b1,c1,c2	9	1.5
7	Principle of Work, Energy, Power, and Conservative Forces and Energy of Particles	a1,a2,b1,c1,c2	11	2
8	Principle of Linear Impulse and Momentum And Conservation of Linear Momentum for a System of Particles –Impact	a1,a2,b1,c1,c2	13	2

VII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Written assignment	2-3-5-6-7-9-11-13	10.5	7	a1,a2,b1,c1,c2
2	Quizzes.	Three time randomly	4.5	3	b1,c1,c2
3	Mid-term exam.	7th	30	20	a1,a2,b1,c1,c2
4	Final-exam.	13	105	70	a1,a2,b1,c1,c2
	Sum		**150**	**100%**	

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VIII. Learning Resources:

- Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

1- R. C. Hibbeler, 2012, Engineering Mechanics, Dynamics, 13th Edition, Prentice Hall

2- Essential References.

1. J. L. Meriam, L. G. Kraige, 2011, Engineering Mechanics, Dynamics,7th Edition, John Wiley Publisher
2- F.P.Beer and E.R. Russel, 1999, Vector Mechanics for Engineers Statics and Dynamic Edition, McGraw Hill

3- Electronic Materials and Web Sites etc.

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IX. Course Policies:	
1	**Class Attendance:** The students should have more than 75 % of attendance according to rules and regulations of the faculty.
2	**Tardy:** The students should respect the timing of attending the lectures. They should attend within 1 minutes from starting of the lecture.
3	**Exam Attendance/Punctuality:** The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for midterm exam and final exam.
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7	**Other policies:** _ All the teaching materials should be kept out the examination hall. _ the mobile phone is not allowed. _There should be a respect between the student and his teacher.

Reviewed By	**Vice Dean for Academic Affairs and Post Graduate Studies** **Dr. Tarek A. Barakat** **Dr.Abdulmalek Al-Jolahy**
	Deputy Rector for Academic Affairs Dr. Ibrahim AlMutaa **Dr. Ahmed mujahed** **Dr. Munaser Alsubri**

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Course Plan (Syllabus) of Engineering Mechanics2

I. Information about Faculty Member Responsible for the Course:							
Name of Faculty Member	Dr. Mohammad Algorafi	**Office Hours**					
Location& Telephone No.		**SAT**	**SUN**	**MON**	**TUE**	**WED**	**THU**
E-mail				8-10			

II. Course Identification and General Information:						
1-	**Course Title:**	***Engineering Mechanics 2***				
2-	**Course Number & Code:**	BR008				
3-	**Credit hours:**	**C.H**				**Credit Hours**
		Th.	**Tu**	**Pr**	**Tr.**	
		2	2			3
4-	**Study level/year at which this course is offered:**	1st Level/ 2nd Semester				
5-	**Pre –requisite (if any):**	Engineering Mechanics 1, Math 1				
6-	**Co –requisite (if any):**	----------				
7-	**Program (s) in which the course is offered**	Civil Engineering				
8-	**Language of teaching the course:**	English+ Arabic				
9-	**System of Study:**	Regular				
10-	**Mode of delivery:**	Lecture				
11-	**Location of teaching the course:**	Class				

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III. Course Description:

Dynamics is that branch of mechanics which deals with the motion of particle under the action of forces. This course provides fundamental concepts for most of civil engineering branches related to movements. The knowledge and abilities taught in this course are an essential prerequisite for subsequent courses involving dynamics; fluid, hydraulics, Traffic and highway Engineering. The course focuses on the physical/mathematical analysis of the kinematics and kinetics motion of particles and rigid bodies. The formulation and solution of mechanic's problems will help the students develop the ability of logical thinking and effective communication. A thorough comprehension of dynamics will provide one of the most useful and powerful tools for analysis in engineering. In each chapter, the complete theory and the method of analysis will be introduced in the beginning followed by solved examples and assignments.

IV. Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop**:**

a.1 Develop the basic principles of engineering dynamics and apply this understanding as well as their knowledge of mathematical principles. A1
a.2 Describe the principles of analyze techniques. A3
b.1 Select the suitable analysis in achieving the engineering purposes. B1
c.1 Solve the dynamics problems C2
c.2 Apply engineering mechanics techniques to solve the dynamics problems encountered in projects. C3

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V. Course Content:

- Distribution of Semester Weekly Plan of Course Topics/Items and Activities.

A – Theoretical Aspect:

Order	Topics List		Week Due	Contact Hours
1	Introduction	Basic Concepts Newton's law System of Units Gravitation Dimensions	1	2
2	Rectilinear Kinematics: Continuous Motion	Relationship between displacement and velocity and acceleration mathematically	2	2
3	Rectilinear Kinematics: Erratic Motion	Relationship between displacement and velocity and acceleration graphically	3	2
4	Curvilinear Motion: Rectangular Components- Motion of a Projectile-	Curvilinear Motion: Rectangular Components- Motion of a Projectile	4,5	4
5	Curvilinear Motion: Normal and Tangential Components	Relationship between displacement and velocity and acceleration using N-T Components	6	2
6	Relative-Motion of Two Particles Using Translating Axes	Relative-Motion of Two Particles Using Translating Axes	7	2
7	Midterm Exam		8	2
8	Newton's Second Law of Motion The Equation of Motion	Newton's Second Law of Motion The Equation of Motion	9,10	4
9	Principle of Work , Energy ,Power , and	Principle of Work, Energy, Power, and	11,12	4

	Conservative Forces and Energy of Particles	Conservative Forces and Energy of Particles		
10	Principle of Linear Impulse and Momentum And Conservation of Linear Momentum for a System of Particles - Impact	Principle of Linear Impulse and Momentum And Conservation of Linear Momentum for a System of Particles –Impact	13,14,15	6
11	Final Exam		16	2
Number of Weeks /and Units Per Semester			**16**	**32**

B - Tutorial Aspect:

Order	Topics List	Week Due	Contact Hours
1	Introduction	1	2
2	Rectilinear Kinematics: Continuous Motion	2	2
3	Rectilinear Kinematics: Erratic Motion	3	2
4	Curvilinear Motion: Rectangular Components- Motion of a Projectile	4,5	4
5	Curvilinear Motion: Normal and Tangential Components	6	2
6	Relative-Motion of Two Particles Using Translating Axes	7	2
7	Newton's Second Law of Motion The Equation of Motion	8,9	4
8	Principle of Work, Energy, Power, and Conservative Forces and Energy of Particles	10,11	4
9	Principle of Linear Impulse and Momentum And Conservation of Linear Momentum for a System of Particles –Impact	12,13,14	6
Number of Weeks /and Units Per Semester		**14**	**28**

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VI. Teaching strategies of the course:

Lecture
Multimedia Presentations
Presentations
Tutorial
Reading

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Rectilinear Kinematics: Continuous Motion	a1,a2,b1,c1,c2	2	1
2	Rectilinear Kinematics: Erratic Motion	a1,a2,b1,c1,c2	3	1
3	Curvilinear Motion: Rectangular Components- Motion of a Projectile-	a1,a2,b1,c1,c2	5	1
4	Curvilinear Motion: Normal and Tangential Components	a1,a2,b1,c1,c2	6	1
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8	Principle of Linear Impulse and Momentum and Conservation of Linear Momentum for a System of Particles -Impact	a1,a2,b1,c1,c2	13	2

VIII. Schedule of Assessment Tasks for Students During the Semester:

Assessment	Type of Assessment Tasks	Week Due	Mark	Proportion of Final Assessment
1	Written assignment	2-3-5-6-7-9-11-13	10.5	7
2	Quizzes.	Three time randomly	4.5	3
3	Mid-term exam.	7^{th}	30	20
4	Final-exam.	13	105	70

IX. Learning Resources:

• Written in the following order: (Author – Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

1- R. C. Hibbeler, 2012, Engineering Mechanics, Dynamics, 13^{th} Edition, Prentice Hall

2- Essential References.

1. J. L. Meriam, L. G. Kraige, 2011, Engineering Mechanics, Dynamics,7^{th} Edition, John Wiley Publisher

2- F.P.Beer and E.R. Russel, 1999, Vector Mechanics for Engineers Statics and Dynamics, 6^{th} Edition, McGraw Hill

3- Electronic Materials and Web Sites *etc*.

X. Course Policies:	
Unless otherwise stated, the normal course administration policies and rules of the Faculty of Engineering apply. For the policy, see: ----------	
1	**Class Attendance:** The students should have more than 75 % of attendance according to rules and regulations of the faculty.
2	**Tardy:** The students should respect the timing of attending the lectures. They should attend within 1 minutes from starting of the lecture.
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4	**Assignments & Projects:** The assignment is given to the students after each chapter, the student has to submit all the assignments for checking on time.
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7	**Other policies:** _ All the teaching materials should be kept out the examination hall. _ the mobile phone is not allowed. _There should be a respect between the student and his teacher.

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