7 Course Specification of Engineering Mechanics 1

I.	Course Identification and General Information:					
1	**Course Title:**	*Engineering Mechanics 1*				
2	**Course Code & Number:**	BR007				
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/ 1st semester				
5	**Pre –requisite (if any):**	----------				
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:

Engineering Mechanics 1 is that branch of mechanics which deals with the equilibrium of particle under the action of forces at rest or constant velocity.

This course provides fundamental concepts for most of civil engineering branches which are related to equilibrium. The knowledge and abilities taught in this course are an essential prerequisite for subsequent courses involving dynamics; fluid, theory of structure, strength of material. The course focuses on the physical/mathematical analysis of the forces of particles and rigid bodies such as Basic concepts of mechanics. Scalar and Vectors, Position, unit and force vectors, Two-dimensional force systems, Moment of a force about a point. Moment of a force about a line, Equivalent Systems, cable, fraction.

 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 statics 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
    Dr. Abdulkareem   Ass. Prof. Dr. Mohammad   Prof. Dr. Mohammed   Center & Quality Assurance
    Yahya Al khattabi   Algorafi   AL-Bukhaiti   Ass. Prof. Dr.
    Huda Al-Emad

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a.1	Define the fundamental knowledge of mechanics to solve for forces and moments on structure systems under rest.	A1
a.2	Define the basic differences between diverse engineering systems and Describe the principles of analyze techniques	A3
b.1	Distinguish the basic differences between diverse engineering systems, and select the suitable analysis in achieving the engineering purposes.	B1
c.1	Apply the fundamental knowledge of mechanics to solve for forces and moments on simple systems.	C2
c.2	Apply engineering mechanics techniques to solve the 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- Define the fundamental knowledge of mechanics to solve for forces and moments on structure systems under rest.	Lecture Multimedia Presentations Presentations Tutorial Reading	Problem set- Written exam- Written assignment
a2- Define the basic differences between diverse engineering systems and Describe the principles of analyze techniques	Lecture Multimedia Presentations Presentations Tutorial Reading	Problem set- 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- Distinguish the basic differences between diverse engineering systems, and select the suitable analysis in achieving the engineering purposes.	Lecture Multimedia Presentations Presentations Tutorial Reading	Participation- Written Assignment-Project

C 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- Apply the fundamental knowledge of mechanics to solve for forces and moments on simple systems.	Lecture Presentations Tutorial	Written Assignment- Written exam -Project
c2- Apply engineering mechanics techniques to solve the 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,	Basic Concepts Newton's law System of Units Gravitation Dimensions	1	2
2	Force Vectors	a1, c1, c2	Vector Operations Resolving of Forces Resultant of Forces	2	4

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

                                                        Rector of Sana'a University
                                                        Prof. Dr. Al-Qassim Mohammed Abbas

3	Equilibrium of Particles	a1, a2, b1, c1, c2	Free Body Diagram Concepts Solving Equilibrium Problems Spring and Pulley Systems Concepts	2	4
4	Truss	a1, a2, b1, c1, c2	Determine the Forces in the Members of a Truss: Joint Method Section Method	1	2
5	Cable	a1, a2, b1, c1, c2	Determine the Forces in the Members of a Cable by Joint Method	1	2
6	Force System Resultants	a1, a2, b1, c1, c2	Moment Concepts Moment of Couples Resolution of Forces into a single force and couple acting at another point [Equivalent Systems] Distributed Loads Supports	1	2
7	Equilibrium of Rigid Bodies	a1, a2, b1, c1, c2	Free Body Diagram Concepts Solving Equilibrium of beams and frame	2	4
8	Friction	a1, c1, c2	Concepts of Dry Friction Analyze Equilibrium of Rigid Bodies Subjected to This Force Concepts of Rolling Resistance	2	4
9	Centroid & Moments of Inertia.	a1, a2, b1, c1, c2	Centroid of a Body. Moments of Inertia. Composite Areas.	2	4
Number of Weeks /and Units Per Semester				**14**	**28**

Prepared by

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

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

B -Tutorial Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	Introduction	1	2	a1,
2	Force Vectors	2	4	a1, c1, c2
3	Equilibrium of Particles	2	4	a1, a2, b1, c1, c2
4	Truss	1	2	a1, a2, b1, c1, c2
5	Cable	1	2	a1, a2, b1, c1, c2
6	Force System Resultants	1	2	a1, a2, b1, c1, c2
7	Equilibrium of Rigid Bodies	2	4	a1, a2, b1, c1, c2
8	Friction	2	4	a1, c1, c2
9	Centroid & Moments of Inertia.	2	4	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
Small group working
Independent study

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Newton's law	a1,	1	1
2	Force Vectors	a1, c1, c2	2,3	1
3	Equilibrium of Particles	a1, a2, b1, c1, c2	4,5	1.5
4	Truss	a1, a2, b1, c1, c2	6	1
5	Cable	a1, a2, b1, c1, c2	7	1

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

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

6	Force System Resultants	a1, a2, b1, c1, c2	8	1
7	Equilibrium of Rigid Bodies	a1, a2, b1, c1, c2	9,10	1
8	Friction	a1, c1, c2	11	1
9	Centroid & Moments of Inertia.	a1, a2, b1, c1, c2	12	1

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	1-to 12	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.	16	90	70	a1, a2, b1, c1, c2
	Sum		**150**	**100%**	

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 - Hibbeler, R.C., "Engineering Mechanics: statics", 12th edition, and Prentice Hall

2- Essential References.

1. J. L. Meriam, L. G. Kraige, 2011, Engineering Mechanics, statics,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*.

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

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

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.
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.
5	**Cheating:** If any cheating occurred during the examination, the student is not allowed to continue and he/she has to face the examination committee for enquiries.
6	**Plagiarism:** The student will be terminated from the Faculty, if one student attends the exam on another behalf according to the policy, rules and regulations of the university.
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. Riyad A. Muharam**
	Deputy Rector for Academic Affairs Dr. Ibrahim AlMutaa **Dr. Ahmed mujahed** **Dr. Munaser Alsubri**

Template for Course Plan (Syllabus) of

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

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

Engineering Mechanics1

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 1*				
2-	**Course Number & Code:**	BR007				
3-	**Credit hours:**	C.H				Credit Hours Th.
		Th.	Tu.	Th.	Tu.	
		2	2			3
4-	**Study level/year at which this course is offered:**	1th Level/ 1st semester				
5-	**Pre –requisite (if any):**					
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				

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

                                       Rector of Sana'a University
                            Prof. Dr. Al-Qassim Mohammed Abbas

III.   Course Description:

Engineering Mechanics 1 is that branch of mechanics which deals with the equilibrium of particle under the action of forces at rest or constant velocity.

This course provides fundamental concepts for most of civil engineering branches which are related to equilibrium. The knowledge and abilities taught in this course are an essential prerequisite for subsequent courses involving dynamics; fluid, theory of structure, strength of material. The course focuses on the physical/mathematical analysis of the forces of particles and rigid bodies such as Basic concepts of mechanics, Scalar and Vectors, Position, unit and force vectors, Two dimensional force systems, Moment of a force about a point, Moment of a force about a line, Equivalent Systems, cable, and fraction.

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 statics 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 Define the fundamental knowledge of mechanics to solve for forces and moments on structure systems under rest.   (A1)

a.2 Define the basic differences between diverse engineering systems and Describe the principles of analyze techniques   (A3)

b.1 Distinguish the basic differences between diverse engineering systems, and select the suitable analysis in achieving the engineering purposes.   (B1)

c.1 Apply the fundamental knowledge of mechanics to solve for forces and moments on simple systems.   (C2)

c.2 Apply engineering mechanics techniques to solve the problems encountered in projects. (C3)

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

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

V. Course Content:				
Distribution of Semester Weekly Plan of Course Topics/Items and Activities.				
A – Theoretical Aspect:				
Order	Topics List	Sub Topics List	Week Due	Contact Hours
1	Introduction	Basic Concepts Newton's law System of Units Gravitation Dimensions	1	2
2	Force Vectors	Vector Operations Resolving of Forces Resultant of Forces	2,3	4
3	Equilibrium of Particles	Free Body Diagram Concepts Solving Equilibrium Problems Spring and Pulley Systems Concepts	4,5	4
4	Truss	Determine the Forces in the Members of a Truss: Joint Method Section Method	6	2
5	Cable	Determine the Forces in the Members of a Cable by Joint Method	7	2
6	Midterm Exam		8	2
7	Force System Resultants	Moment Concepts Moment of Couples Resolution of Forces into a single force and couple acting at another point [Equivalent Systems] Distributed Loads Supports	9	2
8	Equilibrium of Rigid Bodies	Free Body Diagram Concepts Solving Equilibrium of beams and frame	10,11,12	6

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

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

9	Friction	Concepts of Dry Friction Analyze Equilibrium of Rigid Bodies Subjected to This Force Concepts of Rolling Resistance	13,14	4
10	Centroid & Moments of Inertia.	Centroid of a Body. Moments of Inertia. Composite Areas.	15	2
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	Force Vectors	2,3	4
3	Equilibrium of Particles	4,5	4
4	Truss	6	2
5	Cable	7	2
6	Force System Resultants	8	2
7	Equilibrium of Rigid Bodies	9,10,11	6
8	Friction	12,13	4
9	Centroid & Moments of Inertia.	14	2
Number of Weeks /and Units Per Semester		**14**	**28**

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

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

VI. Teaching strategies of the course:

Lecture
Multimedia Presentations
 Presentations
Tutorial
 Reading
Small group working
Independent study

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Newton's law	a1,	1	1
2	Force Vectors	a1, c1, c2	2,3	1
3	Equilibrium of Particles	a1, a2, b1, c1, c2	4,5	1.5
4	Truss	a1, a2, b1, c1, c2	6	1
5	Cable	a1, a2, b1, c1, c2	7	1
6	Force System Resultants	a1, a2, b1, c1, c2	8	1
7	Equilibrium of Rigid Bodies	a1, a2, b1, c1, c2	9,10,11	1
8	Friction	a1, c1, c2	12	1
9	Centroid & Moments of Inertia.	a1, a2, b1, c1, c2	12	1

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	1-to 12	10.5	7
2	Quizzes.	Three time randomly	4.5	3
3	Mid-term exam.	7th	30	20
4	Final-exam.	13	90	70

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

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

IX.   Learning Resources:

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

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

Hibbeler, R.C., "Engineering Mechanics: statics", 12th edition, and Prentice Hall

2- Essential References.

1. -J. L. Meriam, L. G. Kraige, 2011, Engineering Mechanics, Statics,7th Edition, John Wiley Publisher

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

3- Electronic Materials and Web Sites *etc.*

1- Staad pro manual

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

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

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.
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.
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.
5	**Cheating:** If any cheating occurred during the examination, the student is not allowed to continue and he/she has to face the examination committee for enquiries.
6	**Plagiarism:** The student will be terminated from the Faculty, if one student attends the exam on another behalf according to the policy, rules and regulations of the university.
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.

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

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas