Sana'a University
Faculty of Engineering
Mechanical Engineering Department
Mechanical Engineering Program

7. Course Specification of Engineering Mechanics - Statics

Course Identification and General Information:						
1.	Course Title:	Engineering Mechanics – Statics				
2.	Course Code & Number:	BR001				
3.	Credit hours:	C.H				TOTAL
		Th.	Seminar/Tu	Pr	Tr.	
		2	2	-	-	3
4.	Study level/ semester at which this course is offered:	First Year – First Semester				
5.	Pre –requisite (if any):	None				
6.	Co –requisite (if any):	Mathematics				
7.	Program (s) in which the course is offered:	Mechanical Engineering				
8.	Language of teaching the course:	English				
9.	Location of teaching the course:	Mechanical Engineering Department				
10.	Prepared By:	Prof.Dr.Eng. Mohammed Ahmed Al-Bukahiti				
11.	Date of Approval					

II. Course Description:

This course provides a basic understanding of the part of mechanics which is concerned with the equilibrium of bodies under the action of forces. It lays the foundation and framework for subsequent courses, namely Dynamics, Strength of Materials, Theory of Machines, Design of Machine Elements. Topics covered include basic concepts of mechanics and vectors; forces and force systems and their external effects on bodies, principally the condition of equilibrium of two-and three-dimensional systems; free-body diagrams and equilibrium of particles and bodies; moments; couples; structural analysis and trusses; distributed forces; center of mass; centroids; friction and application of frictional forces. The formulation and solution of mechanics problems will help the students develop the ability of logical thinking and effective communication. In each chapter, the complete theory and the method of analysis will be introduced in the beginning followed by solved examples and assignments.

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III. Course Intended learning outcomes (CILOs) of the course		**Referenced PILOs**
a1	Define the fundamental concepts used in engineering mechanics such as vectors, forces, moments, static equilibrium, structures, center of mass, center of gravity, and centroids.	A1
a2	Identify the appropriate tools and analytical methods in solving engineering mechanics problems.	A4
b1	Explain, describe and apply principles and components of Engineering Mechanics including vectors, forces, moments, mass and inertia in two and three dimensions, and equilibrium conditions.	B1
c1	Perform free-body diagrams of bodies, calculate forces, and do equilibrium analysis for a mechanical system in static rest.	C1
d1	Develop logical and creative thinking by defining their own methodologies for problem solution.	D3

(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 concepts used in engineering mechanics such as vectors, forces, moments, static equilibrium, structures, center of mass, center of gravity, and centroids.	Active Lectures. Tutorials. Self-learning from textbooks.	Written tests Homework and written assignments
a2. Identify the appropriate tools and analytical methods in solving engineering mechanics problems.	Active Lectures. Tutorials. Self-learning from textbooks.	Written tests Homework and written assignments

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

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b1. Explain, describe and apply principles and components of Engineering Mechanics including vectors, forces, moments, mass and inertia in two and three dimensions, and equilibrium conditions.	Active Lectures. Tutorials. Interactive class discussions. Self-learning from textbooks.	Written tests. Homework and written assignments.

© **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. Perform free-body diagrams of bodies, calculate forces, and do equilibrium analysis for a mechanical system in static rest.	Active Lectures. Tutorials. Interactive class discussions. Self-learning from textbooks.	Written tests. Homework and written assignments.

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Develop logical and creative thinking by defining their own methodologies for problem solution.	Active Lectures. Tutorials. Interactive class discussions. Self-learning from textbooks.	Written tests. Homework and written assignments.

I. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1.	Introduction to Statics	a1, a2	- Mechanics - Basic Concepts	1	2

			- Scalar & vector quantities - Newton's law, system of units, laws of gravitations		
2.	Two Dimensional Force Systems	a1, a2, b1, c1,d1	- Force, Force classifications, Concurrent forces - Vector components - Rectangular components - Moment - Couple - Resultants	3	6
3.	Three Dimensional Force Systems	a1, a2, b1, c1,d1	- Rectangular components - Dot product - Angle between two vectors - Moment and couple - Resultants	3	6
4.	Mid-term exam 1	a1, a2, b1, c1, d1	- The first six lectures	1	2
5.	Equilibrium in Two Dimensions	a1, a2, b1, c1,d1	- Mechanical system isolation and free-body diagram - Equilibrium conditions	2	4
6.	Equilibrium in Three Dimensions	a1, a2, b1, c1,d1	- Free-body diagrams - Equilibrium conditions - Constraints and statical determinacy	1	2
7.	Structures	a1, a2, b1, c1,d1	- Plane trusses, simple trusses - Internal and external redundancy	1	2

			- Method of joints - Special Conditions		
8.	Distributed Forces	a1, a2, b1, c1,d1	- Centre of mass, center of gravity, and centroids - Centroids of lines, areas & volumes - Composite bodies and figures	2	4
9.	Friction	a1, a2, b1, c1,d1	- Frictional phenomenon - Types of friction - Dry friction	1	2
10.	Final Exam			1	2
Number of Weeks /and Units Per Semester				**16**	**32**

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	Contact hours	Learning Outcomes
1.	Introduction to Statics	**1**	**2**	a1, a2
2.	Two-Dimensional Force Systems	**3**	**6**	a1, a2, b1, c1,d1
3.	Three-Dimensional Force Systems	**3**	**6**	a1, a2, b1, c1,d1
4.	Equilibrium in Two Dimensions	**2**	**4**	a1, a2, b1, c1,d1
5.	Equilibrium in Three Dimensions	**1**	**2**	a1, a2, b1, c1,d1
6.	Structures	**1**	**2**	a1, a2, b1, c1,d1
7.	Distributed Forces	**2**	**4**	a1, a2, b1, c1,d1
8.	Friction	**1**	**2**	a1, a2, b1, c1,d1
Number of Weeks /and Units Per Semester		**14**	**28**	

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II. Teaching strategies of the course:

- Active Lectures.
- Tutorials.
- Interactive class discussions.
- Self-learning from textbooks.
- Exercises and Homework.
- Small group working.
- Problem based learning.
- Presentations

III. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	Introduction to Statics. Vectors	a1, a2	1	
2.	Two Dimensional Force Systems: Force, Concurrent forces, Vector components Rectangular components.	a1, a2, b1, c1,d1	2	0.5
3.	Two Dimensional Force Systems: Moment and couple.	a1, a2, b1, c1,d1	3	
4.	Two Dimensional Force Systems: Resultants.	a1, a2, b1, c1,d1	4	0.5
5.	Three Dimensional Force Systems: Rectangular components, Dot product.	a1, a2, b1, c1,d1	5	0.5
6.	Three Dimensional Force Systems: Moment and couple.	a1, a2, b1, c1,d1	6	
7.	Three Dimensional Force Systems: Resultants.	a1, a2, b1, c1,d1	7	0.5
8.	Equilibrium in Two Dimensions: Mechanical system isolation and free-body diagram.	a1, a2, b1, c1,d1	8	0.5
9.	Equilibrium in Two Dimensions: Equilibrium conditions.	a1, a2, b1, c1,d1	9	0.5
10.	Equilibrium in Three Dimensions	a1, a2, b1, c1,d1	10	0.5

11.	Structures	a1, a2, b1, c1,d1	11	
12.	Distributed Forces: Centre of mass, center of gravity, and centroids, Centroids of lines, areas & volumes.	a1, a2, b1, c1,d1	12	0.5
13.	Distributed Forces: Composite bodies and figures.	a1, a2, b1, c1,d1	13	0.5
14.	Friction.	a1, a2, b1, c1,d1	14	0.5
	Total			**5**

IV. 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 assignments.	1-14	7.5	5	a1, a2, b1, c1,d1
2.	Homework and project.	1-14	7.5	5	a1, a2, b1, c1,d1
3.	Written test: Mid-term exam 1	7	15	10	a1, a2, b1, c1,d1
4.	Written test: Mid-term exam 2	12	15	10	a1, a2, b1, c1,d1
5.	Written test: Final Exam	16	105	70	a1, a2, b1, c1,d1
	Total		**150**	**100%**	

V. Learning Resources:

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

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

1. J. L. Meriam, L. G. Kraige, 2014, Engineering Mechanics, Statics, 8th Edition, John Wiley Publisher.

2- Essential References.

1. R. C. Hibbeler, Kai Beng Yap, 2013, Engineering Mechanics, Statics, 13th Edition, Pearson Education South Asia Ltd.

3- Electronic Materials and Web Sites *etc*.

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VI. Course Policies:

1.	Class Attendance: A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring an approved statement from university Clinic
2.	Tardy: For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
3.	Exam Attendance/Punctuality: A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam.
4.	Assignments & Project The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.
5.	Cheating: For cheating in exam, a student will be considered as failure. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.
6.	Plagiarism: Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proved a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.
7.	Other policies: - Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room - Mobile phones are not allowed in class during the examination. - Lecture notes and assignments my given directly to students using soft or hard copy

Reviewed By	**Vice Dean for Academic Affairs and Post Graduate Studies: Asst. Prof. Dr. Tarek A. Barakat** **President of Quality Assurance Unit: Assoc. Prof. Dr. Mohammed Algorafi**

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	Deputy Rector for Academic Affairs Asst. Prof. Dr. Ibrahim AlMutaa **Assoc. Prof. Dr. Ahmed Mujahed** **Asst. Prof. Dr. Munasar Alsubri**

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