



## 19 Course Specification of Theory of Structures

I. Course Identification and General Information:					
1	Course Title:	<i>Theory of Structures</i>			
2	Course Code & Number:	CE102			
3	Credit hours:	C.H			Credit Hours
		Th.	Tu.	Pr.	Tr.
		2	2		
4	Study level/ semester at which this course is offered:	2 <sup>nd</sup> Level/ 1 <sup>st</sup> 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 <b>Engineering</b>			
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:
<p>Theory of Structures is that branch of engineering mechanics which deals with structural elements behavior under load <b>and how</b> a structural element and the whole structure responds to applied loads.</p> <p>The knowledge and abilities taught in this course are an essential prerequisite for subsequent courses <b>involve on</b> structure analysis, strength of material, and most of structure engineering courses.</p> <p>This course includes fundamental <b>concepts</b> of behavior of different type of structures under external loads. It <b>teaches students</b> how to determine the reaction and the internal loads (such as normal force, shear force and bending moment) <b>and</b> different structure types such as beams, frames, trusses, cables and arches.</p>

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III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a.1	Demonstrate the principles of structural engineering.	A1
a.2	Define the basic differences between diverse structural engineering systems	A3
b.1	Justify the internal forces for different structural elements.	B1
b.2	Develop the modeling of real structures and how-to analysis them.	B2
c.1	Calculate the internal forces for different structural elements.	C2
c.2	Apply structure engineering 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- Demonstrate the principles of structural engineering	Lecture Multimedia Presentations Presentations Tutorial Reading	Problem set- Written exam- Written assignment
a2- Define the basic differences between diverse structural engineering systems	Lecture Multimedia Presentations Presentations Tutorial Reading	Problem set- Written exam- Written assignment

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<b>(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:</b>		
<b>Course Intended Learning Outcomes</b>	<b>Teaching strategies</b>	<b>Assessment Strategies</b>
<b>b1-</b> Justify the internal forces for different structure elements.	Lecture Multimedia Presentations Presentations Tutorial	Participation- Written assignment
<b>b2.</b> Develop the modeling of real structures and how-to analysis them.	Lecture Presentations Tutorial Reading	Participation- Written assignment

<b>C Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:</b>		
<b>Course Intended Learning Outcomes</b>	<b>Teaching strategies</b>	<b>Assessment Strategies</b>
<b>c1-</b> Calculate the internal forces for different structural elements.	Lecture Presentations Tutorial Multimedia Presentations	Written assignment- Written exam
<b>c2-</b> Apply structure engineering techniques to solve the problems encountered in projects.	Case study Independent study	Written assignment

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<b>IV. Course Content:</b>					
<b>A – Theoretical Aspect:</b>					
<b>Order</b>	<b>Units/Topics List</b>	<b>Learning Outcomes</b>	<b>Sub Topics List</b>	<b>Number of Weeks</b>	<b>contact hours</b>
1	Types of Structures and Loads	a1, a2, b1, b2	Classification of Structures and Loads Structural Design Types of structural members, Pinned and rigged connections	1	2
2	Analysis of Statically Determinate Structures	a1, a2, b1, b2	Idealized Structure Equations of Equilibrium Determinacy and Stability Application of the Equations of Equilibrium in 2D and 3D	1	2
3	Analysis of Statically Determinate Trusses	a1,a2,b1,b2,c1,c2	The Method of Joints The Method of Sections Compound Trusses	2	4
4	Analysis of Statically Determinate beams	a1,a2,b1,b2,c1,c2	Shear and Moment The relation between loads, shear, and moment	2	4
5	Analysis of Statically Determinate frames	a1,a2,b1,b2,c1,c2	Normal, Shear and Moment	1	2
6	Analysis of Statically Determinate frames	a1,a2,b1,b2,c1,c2	Normal, Shear and Moment	1	2
7	Analysis of Statically Determinate cables	a1,a2,b1,b2,c1,c2	Cable Subjected to Concentrated Loads Cable Subjected to a Uniform Distributed Load	2	4
8	Analysis of Statically Determinate arches	a1,a2,b1,b2,c1,c2	Geometry of arches Normal, Shear and Moment	2	4
9	Influence Lines for Statically Determinate Structures	a1,a2,b1,b2,c1,c2	Beam, trusses	2	4
<b>Number of Weeks /and Units Per Semester</b>				<b>14</b>	<b>28</b>

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<b>B - Tutorial Aspect:</b>				
Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	Types of Structures and Loads	1	2	a1,a2,b1,b2
2	Analysis of Statically Determinate Structures	2	4	a1,a2,b1,b2
3	Analysis of Statically Determinate Trusses	2	4	a1,b1,b2,c1,c2
4	Analysis of Statically Determinate beam	2	4	a1,b1,b2,c1,c2
5	Analysis of Statically Determinate frame	2	4	a1,b1,b2,c1,c2
6	Analysis of Statically Determinate cable	2	4	a1,b1,b2,c1,c2
7	Analysis of Statically Determinate arch	2	4	a1,b1,b2,c1,c2
8	Influence Lines for Statically Determinate Structures	1	2	a1,b1,b2,c1,c2
<b>Number of Weeks /and Units Per Semester</b>		<b>14</b>	<b>28</b>	

<b>V. Teaching strategies of the course:</b>
Lecture Multimedia Presentations Presentations Tutorial Reading Small group working Independent study

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<b>VI. Assignments:</b>				
No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Types of Structures and Loads	a1,2,b1,b2	1	1.5
2	Analysis of Statically Determinate Structures	a1,a2,b1,b2	2,3	1
3	Analysis of Statically Determinate Trusses	a1,b1,b2,c1,c2	4,5	1
4	Analysis of Statically Determinate beam	a1,b1,b2,c1,c2	6,7	1
5	Analysis of Statically Determinate frame	a1,b1,b2,c1,c2	8,9	1.5
6	Analysis of Statically Determinate cable	a1,b1,b2,c1,c2	10,11	1.5
7	Analysis of Statically Determinate arch	a1,b1,b2,c1,c2	12,13	1.5
8	Influence Lines for Statically Determinate Structures	a1,b1,b2,c1,c2	14	1.5

<b>VII. Schedule of Assessment Tasks for Students During the Semester:</b>					
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Written assignment	1-to 14	10.5	7	a1,a2,b1,b2,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
	<b>Sum</b>		<b>150</b>	<b>100%</b>	

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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, 2011, " Structural analysis " 8th Edition, Prentice Hall

### 2- Essential References.

1- Theory of Structures, Part I, Wagih Mohamed El-Dakhakni, Dar Al-Maaref  
2- Structural analysis by Jack McCormac

### 3- Electronic Materials and Web Sites *etc.*

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<b>IX. Course Policies:</b>	
1	<b>Class Attendance:</b> The students should have more than 75 % of attendance according to rules and regulations of the faculty.
2	<b>Tardy:</b> The students should respect the timing of attending the lectures. They should attend within 1 minutes from starting of the lecture.
3	<b>Exam Attendance/Punctuality:</b> 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	<b>Assignments &amp; Projects:</b> The assignment is given to the students after each chapter, the student has to submit all the assignments for checking on time.
5	<b>Cheating:</b> If any cheating occurred during the examination, the student is not allowed to continue and he/she has to face the examination committee for <b>enquiries</b> .
6	<b>Plagiarism:</b> 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	<b>Other policies:</b> - 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.

<b>Reviewed By</b>	<b><u>Vice Dean for Academic Affairs and Post Graduate Studies</u></b> <b><u>Dr. Tarek A. Barakat</u></b> <b><u>Dr. Ahmed Alwadhaf</u></b>
	<b><u>Deputy Rector for Academic Affairs Dr. Ibrahim AlMutaa</u></b> <b><u>Dr. Ahmed mujahed</u></b> <b><u>Dr. Munaser Alsubri</u></b>

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## Template for Course Plan (Syllabus) of Theory of Structures

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:	Theory of Structures			
2-	Course Number & Code:	CE102			
3-	Credit hours:	C.H			
		Th.	Tu.	Pr.	Tr.
		2	2		
4-	Study level/year at which this course is offered:	2 <sup>nd</sup> Level/ 1 <sup>st</sup> 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:

Theory of Structures is that branch of engineering mechanics which deals with structural elements behavior under load **and how** a structural element and the whole structure responds to applied loads.

The knowledge and abilities taught in this course are an essential prerequisite for subsequent courses **involve on** structure analysis, strength of material, and most of structure engineering courses.

This course includes fundamental **concepts** of behavior of different type of structures under external loads. **It teaches students** how to determine the reaction and the internal loads (such as normal force, shear force and bending moment) **and** different structure types such as beams, frames, trusses, cables and arches.

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

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

- a.1** Demonstrate the principles of structural engineering. A1
- a.2** Define the basic differences between diverse structural engineering systems. A3
- b.1** Justify the internal forces for different structural elements. B1
- b.2** Develop the modeling of real structures and how-to analysis them. B2
- c.1** Calculate the internal forces for different structural elements. C2
- c.2** Apply structure engineering techniques to solve the 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:				
Ord er	Topics List	Sub Topics List	Week Due	Contact Hours
1	Types of Structures and Loads	Classification of Structures and Loads Structural Design Types of structural members, Pinned and rigged connections	1	2
2	Analysis of Statically Determinate Structures	Idealized Structure Equations of Equilibrium Determinacy and Stability Application of the Equations of Equilibrium in 2D and 3D	2,3	4
3	Analysis of Statically Determinate Trusses	The Method of Joints The Method of Sections Compound Trusses	4,5	4
4	Analysis of Statically Determinate beams	Shear and Moment The relation between loads, shear, and moment	6,7	4
5	Midterm Exam		8	2
6	Analysis of Statically Determinate frames	Normal, Shear and Moment	9,10	4
7	Analysis of Statically Determinate cables	Cable Subjected to Concentrated Loads Cable Subjected to a Uniform Distributed Load	11,12	4
8	Analysis of Statically Determinate arches	Geometry of arches Normal, Shear and Moment	13,14	4
9	Influence Lines for Statically Determinate Structures	Beam, trusses	15	4
10	Final Exam		16	2
Number of Weeks /and Units Per Semester			16	32

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<b>B - Tutorial Aspect:</b>			
<b>Order</b>	<b>Topics List</b>	<b>Week Due</b>	<b>Contact Hours</b>
1	Types of Structures and Loads	1	2
2	Analysis of Statically Determinate Structures	2,3	4
3	Analysis of Statically Determinate Trusses	4,5	4
4	Analysis of Statically Determinate beam	6,7	4
6	Analysis of Statically Determinate frame	8,9	4
7	Analysis of Statically Determinate cable	10,11	4
8	Analysis of Statically Determinate arch	12,13	4
9	Influence Lines for Statically Determinate Structures	14	2
<b>Number of Weeks /and Units Per Semester</b>		<b>14</b>	<b>28</b>

<b>VI. Teaching strategies of the course:</b>
Lecture Multimedia Presentations Presentations Tutorial Reading Small group working Independent study

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VII. Assignments:				
No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Types of Structures and Loads	a1,b1,b2	1	1.5
2	Analysis of Statically Determinate Structures	a1,b1,b2	2,3	1
3	Analysis of Statically Determinate Trusses	a1,b1,b2,c1,c2	4,5	1
4	Analysis of Statically Determinate beam	a1,b1,b2,c1,c2	6,7	1
5	Analysis of Statically Determinate frame	a1,b1,b2,c1,c2	8,9	1.5
6	Analysis of Statically Determinate cable	a1,b1,b2,c1,c2	10,11	1.5
7	Analysis of Statically Determinate arch	a1,b1,b2,c1,c2	12,13	1.5
8	Influence Lines for Statically Determinate Structures	a1,b1,b2,c1,c2	14	1.5

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 14	10.5	7
2	Quizzes.	Three time randomly	4.5	3
3	Mid-term exam.	7 <sup>th</sup>	30	20
4	Final-exam.	13	105	70

IX. Learning Resources:	
<ul style="list-style-type: none"> <li>• Written in the following order: (Author – Year of publication – Title – Edition – Place of publication – Publisher).</li> </ul>	
<b>1- Required Textbook(s) (maximum two ).</b>	
1- R. C. Hibbeler, 2011, " Structural analysis " 8th Edition, Prentice Hall	
<b>2- Essential References.</b>	
-1- Theory of Structures, Part I, Wagih Mohamed El-Dakhakni, Dar Al-Maaref 2- Structural analysis by Jack McCormac	
<b>3- Electronic Materials and Web Sites etc.</b>	

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<b>X. Course Policies:</b>	
Unless otherwise stated, the normal course administration policies and rules of the Faculty of Engineering apply. For the policy, see: -----	
1	<b>Class Attendance:</b> The students should have more than 75 % of attendance according to rules and regulations of the faculty.
2	<b>Tardy:</b> The students should respect the timing of attending the lectures. They should attend within 1 minutes from starting of the lecture.
3	<b>Exam Attendance/Punctuality:</b> 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	<b>Assignments &amp; Projects:</b> 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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