



51-Course Specification of Steel Structures 2

I. Course Identification and General Information:					
1	Course Title:	Steel Structures 2			
2	Course Code & Number:	CE310			
3	Credit hours:	C.H			Credit Hours
		Th.	Tu.	Pr.	Tr.
		2	2		
4	Study level/ semester at which this course is offered:	4 th Level/ 2 nd semester			
5	Pre –requisite (if any):	Steel Structures 1			
6	Co –requisite (if any):	-----			
8	Program (s) in which the course is offered:	Civil Engineering			
9	Language of teaching the course:	English			
10	Location of teaching the course:	Class room			
11	Prepared By:	Dr. Sulaiman Ismail Al-Safi			
12	Date of Approval				

II. Course Description:
<p>This course teaches students the analysis and selection of structural steel members, connections, and other structures encountered in typical civil engineering projects according to current adopted specifications. The course relates design specifications to the basic behavior of structures and shows students how specifications and codes are used in the solution of practical design problems. Topics covered include, introduction to plastic analysis of beams and frames, design of beams (flexure, shear and deflection), analysis and design of members subjected to bending and axial loads (Beam-Column). In addition eccentric welded and bolted moment connections including base and end plates will be covered. The course will also introduce the students to the topics of cover plated steel beams, plate girders, composite structures, and to the analysis and design of steel buildings. At the end of this course, the students are expected to implement their gained knowledge to</p>

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
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Ass. Prof. Dr.
Huda Al-Emad

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perform a full analysis and design of multi-story steel building and to present full details of its members and connections.

III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a.1	Recognize the basic concepts of elastic and plastic analysis and design of steel structures.	A1
a.2	Describe the latest methods of AISC specification and other related codes to execute analysis and design of steel structures	A2
a.3	Define how to select a proper steel section and connections for members subjected to different loading conditions.	A3
b.1	Select a proper structural system and load-combinations for different types steel structures.	B1
b.2	Choose accurate structural modeling of steel structures to analyze all components.	B2
b.3	Demonstrate proficiency in the integration of information and processes in structural steel design.	B3
b.4	Consider the economic, social, and environmental issues in structural steel design.	B4
c.1	Design the steel structures and their components using latest structural steel specification and code of practice considering all design criteria.	C2
c.2	Apply structural engineering analysis and design techniques to model the load, analyze and design of structural steel members and connections.	C3
c.3	Perform feasibility studies for selecting the proper structural system for steel structures.	C4
d.1	Write project design report including calculation and drawing.	D1

Prepared by Head of Department
Dr. Abdulkareem
Yahya Al khattabi

Quality Assurance Unit
Ass. Prof. Dr. Mohammad
Algorafi

Dean of the Faculty
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AL-Bukhaiti

Academic Development
Center & Quality Assurance
Ass. Prof. Dr.
Huda Al-Emad

Rector of Sana'a University
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(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- Recognize the basic concepts of elastic and plastic analysis and design of steel structures.	Lecture Multimedia Presentations Presentations Tutorial Reading	Problem set- Written exam- Written assignment
a2- Describe the latest methods of AISC specification and other related codes to execute analysis and design of steel structures	Lecture Individual/group projects Presentations	Project - Written exam- Written assignment
a3- Define how to select a proper steel sections and connections for members subjected to different loading conditions.	Lecture Individual/group projects Presentations	Project - 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 a proper structural system and load-combinations for different types steel structures.	Lecture Multimedia Presentations Presentations Tutorial Reading	Participation- Written assignment-Project
b2- Choose accurate structural modeling of steel structures to analyze all components.	Case study- Tutorial Individual/group projects Presentations	Term Project- Written assignment
b3- Demonstrate proficiency in the integration of information and processes in structural steel design	Presentations Tutorial Case study	Written exam - Project
b4- Consider the economic, social, and environmental issues in structural steel design.	Presentations Tutorial Case study	Written exam - Project

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Quality Assurance Unit
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Algorafi

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Prof. Dr. Al-Qassim Mohammed Abbas



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- Design the steel structures and their components using latest structural steel specification and code of practice considering all design criteria.	Lecture Presentations Tutorial Reading	Written assignment- Written exam -Project
c2- Apply structural engineering analysis and design techniques to model the load, analyze and design of structural steel members and connections.	Case study- Individual/group projects Presentations	Written assignment- Written exam -Project
c3- Perform feasibility studies for selecting the proper structural system for steel structures.	Lecture Presentations Tutorial	Written assignment- Group work

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Write project design report including calculation and drawing.	Case Study-Term Project	d1- project

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Algorafi

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AL-Bukhaiti

Academic Development
Center & Quality Assurance
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Huda Al-Emad

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IV. Course Content:					
A – Theoretical Aspect:					
Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	Plastic Properties of Steel Sections and their Classification for Local Stability + Classification of Steel Beams for Lateral Torsional Stability	a1-a2-b1-b2-c2	Plastic Properties of Steel Sections and their Classification for Local Stability + Classification of Steel Beams for Lateral Torsional Stability	1	2
2	Introduction to plastic analysis of steel continuous beam and building frames	a1-a2-b1-b2-b3-b4-c2-c3	Introduction to plastic analysis of steel continuous beam and building frames	1	2
3	Analysis and Design of steel Beams (considering Lateral Torsional Buckling LTB, flange Local Buckling FLB and web local buckling WLB)	a1-a2-a3-b1-b2-b3-b4-c1-c2	Design for flexure (lateral and local stability) Design for shear Design for serviceability requirements	2	4
4	Analysis and Design of Members Subjected to Axial load and Bending (Beam-Column)	a1-a2-a3-b1-b2-b3-c1-c2	-AISC interaction equation - Bending and tension. - Beam Column DM and ELM for: braced/un-braced frames non slender/slender members	3	6
5	Design of Eccentric Welded and Bolted Connections including Base and End Plates	a2-a3-b3-c1	Design of Eccentric Welded and Bolted Connections including Base and End Plates	2	4

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

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6	Design of Cover-Plated Beams and Plate Girder	a2-a3-b1-b2-b3-b4-c1	Design of Cover-Plated Beams and Plate Girder	2	4
7	Introduction to the Design of Composite Structures	a2-a3-b1-b2-b3-b4-c1	Composite slabs Composite beams Composite columns	2	4
8	Design of Steel Building	a2-a3-b1-b2-b3-b4-c1-c2-c3-d1	Design of Steel Building	1	2
Number of Weeks /and Units Per Semester				14	28

B - Tutorial Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	Plastic Properties of Steel Sections and their Classification for Local Stability + Plastic Analysis of Steel beam and Building Frames	2	4	a1-a2-b1-b2-b3-b4-c2-c3
2	Analysis and Design of steel Beams (considering Lateral Torsional Buckling LTB, flange Local Buckling FLB and web local buckling WLB)	2	4	a1-a2-a3-b1-b2-b3-b4-c1-c2
3	Analysis and Design of Members Subjected to Axial load and Bending (Beam-Column)	3	6	a1-a2-a3-b1-b2-b3-c1-c2
4	Design of Eccentric Welded and Bolted Eccentric and Moment Connections including Base and End Plates	2	4	a2-a3-b3-c1
5	Design of Cover-Plated Beams and Plate Girder	2	4	a2-a3-b1-b2-b3-b4-c1
6	Introduction to the Design of Composite Structures	2	4	
7	Analysis and Design of Composite Structures and Steel Buildings	1	2	a2-a3-b1-b2-b3-b4-c1- c2-d1
Number of Weeks /and Units Per Semester		14	28	

Prepared by Head of Department
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V. Teaching strategies of the course:

Lecture
Multimedia Presentations
Presentations
Tutorial
Reading
Small group working
Independent study

VI. Assignments 5%+Term Project 10%:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Plastic Properties of Steel Sections and their Classification for Local Stability + Plastic Analysis of Steel beam and Frames	a1-a2-b1-b2-b3-b4-c2-c3	1,2	1
2	Analysis and Design of Steel Beams	a1-a2-a3-b1-b2-b3-b4-c1-c2	3,4	1.5
3	Analysis and Design of Members Subjected to Axial Load and Bending (Beam-Column)	a1-a2-a3-b1-b2-b3-c1-c2	5,7	1
4	Design of Eccentric Welded and Bolted Eccentric and Moment Connections including Base and End Plates	a2-a3-b3-c1	8,9	1.5
5	Design of Cover-Plated Beams and Plate Girder	a2-a3-b1-b2-b3-b4-c1	10,11	1
6	Analysis and Design of Composite Structures and Steel Buildings	a2-a3-b1-b2-b3-b4-c1- c2	12,13	1
7	Analysis and Design of Steel Building (Term Project)	a2-a3-b1-b2-b3-b4-c1- c2-d1	14	0.5

Prepared by Head of Department
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Quality Assurance Unit
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Algorafi

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AL-Bukhaiti

Academic Development
Center & Quality Assurance
Ass. Prof. Dr.
Huda Al-Emad

Rector of Sana'a University
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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	3-6-8-10-11-12	7.5	5	a1-a2-b1-b2-b3-c1-c3-c2-d1-a3
2	Quizzes.	Twice randomly	7.5	5	b3-c1
3	Mid-term exam.	8 th	30	20	a1-a2-b1-b2-b3-c1-c3
4	Final-exam.	During Final Exam-duration	90	60	a1-a2-b1-b2-b3-c1-c3
5	Project	13 th	15	10	b1-b2-b3-b4-c1-c2-c3-d1
	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- Geschwindner L. F., 2016, Unified Design of Steel Structures, 3rd ed., USA, PROVIDENCE ENGINEERING GROUP.
- 2- S. Al-Safi, 2019 -Structural Steel Design Aids SI-Version + AISC 360-16 Specification for Structural Steel Buildings, USA, AISC

2- Essential References.

- 1- Jack C. McCormac and Stephen F. Csernak, 2012, Structural Steel Design, 5th edition, USA, PEARSON.
- 2- American Institute of Steel Construction (AISC), 2017, Steel Construction Manual, AMERICAN 15th edition, USA, AISC.

3- Electronic Materials and Web Sites etc.

- 1-AISC website

IX. Course Policies:

1 Class Attendance:

Prepared by Head of Department
Dr. Abdulkareem
Yahya Al khattabi

Quality Assurance Unit
Ass. Prof. Dr. Mohammad
Algorafi

Dean of the Faculty
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AL-Bukhaiti

Academic Development
Center & Quality Assurance
Ass. Prof. Dr.
Huda Al-Emad

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

Prepared by Head of Department
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Yahya Al khattabi

Quality Assurance Unit
Ass. Prof. Dr. Mohammad
Algorafi

Dean of the Faculty
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AL-Bukhaiti

Academic Development
Center & Quality Assurance
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Rector of Sana'a University
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Template for Course Plan (Syllabus) of Steel Structures 2

I. - Information about Faculty Member Responsible for the Course:							
Name of Faculty Member	Dr. Sulaiman Al-Safi	Office Hours					
Location& Telephone No.		SAT	SUN	MON	TUE	WED	THU
E-mail	alsafi11@hotmail.com			12-2 pm		12-2 pm	

II. Course Identification and General Information:					
1-	Course Title:	<i>Structural Steel Design II</i>			
2-	Course Code & Number:	CE310			
3-	Credit hours:	C.H			
		Th.	Tu.	Pr.	Tr.
		2	2		
4-	Study level/ semester at which this course is offered:	4th Level/ 2 nd semester			
5-	Pre –requisite (if any):	Steel Structures 1			
6-	Co –requisite (if any):	-----			
7-	Program (s) in which the course is offered:	Civil Engineering			
8-	Language of teaching the course:	English			
9-	Location of teaching the course:	Class room			
10-	Course Title:	Steel Structures 2			
11-	Location of teaching the course:	Class			

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



III. Course Description:

This course teaches students the analysis and selection of structural steel members, connections, and other structures encountered in typical civil engineering projects according to current adopted specifications. The course relates design specifications to the basic behavior of structures and shows students how specifications and codes are used in the solution of practical design problems. Topics covered include, introduction to plastic analysis of beams and frames, design of beams (flexure, shear and deflection), analysis and design of members subjected to bending and axial loads (Beam-Column). In addition, eccentric welded and bolted moment connections including base and end plates will be covered. The course will also introduce the students to the topics of cover plated steel beams, plate girders, composite structures, and to the analysis and design of steel buildings. At the end of this course, the students are expected to implement their gained knowledge to perform a full analysis and design of multi-story steel building and to present full details of its members and connections.

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

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

- a.1- Recognize the basic concepts of elastic and plastic analysis and design of steel structures. A1
- a.2- Describe the latest methods of AISC specification and other related codes to execute analysis and design of steel structures A2
- a.3- Define how to select a proper steel section and connections for members subjected to different loading conditions. A3
- b.1- Select a proper structural system and load-combinations for different types steel structures. B1
- b.2- Choose accurate structural modeling of steel structures to analyze all components. B2
- b.3- Demonstrate proficiency in the integration of information and processes in structural steel design. B3
- b.4- Consider the economic, social, and environmental issues in structural steel design. B4
- c.1- Design the steel structures and their components using latest structural steel specification and code of practice considering all design criteria. C2
- c.2- Apply structural engineering analysis and design techniques to model the load, analyze and design of structural steel members and connections. C3
- c.3- Perform feasibility studies for selecting the proper structural system for steel structures. C4
- d.1 -Write project design report including calculation and drawing. D1

Prepared by Head of Department
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Yahya Al khattabi

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Ass. Prof. Dr. Mohammad
Algorafi

Dean of the Faculty
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AL-Bukhaiti

Academic Development
Center & Quality Assurance
Ass. Prof. Dr.
Huda Al-Emad

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



V. Course Content:				
<ul style="list-style-type: none"> 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	Plastic Properties of Steel Sections and their Classification for Local Stability + Classification of Steel Beams for Lateral Torsional Stability	Plastic Properties of Steel Sections and their Classification for Local Stability + Classification of Steel Beams for Lateral Torsional Stability	1	2
2	Introduction to plastic analysis of steel continuous beam and building frames	Introduction to plastic analysis of steel continuous beam and building frames	2	2
3	Analysis and Design of steel Beams (considering Lateral Torsional Buckling LTB, flange Local Buckling FLB and web local buckling WLB)	Design for flexure (lateral and local stability Design for shear Design for serviceability requirements	3,4	4
4	Analysis and Design of Members Subjected to Axial load and Bending (Beam-Column)	-AISC interaction equation - Bending and tension. - Beam Column DM and ELM for: braced/un-braced frames non-slender/slender members	5,6,7	6
5	Midterm Exam		8	2
6	Design of Eccentric Welded and Bolted Connections including Base and End Plates	Design of Eccentric Welded and Bolted Connections including Base and End Plates	9,10	4

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Dr. Abdulkareem
Yahya Al khattabi

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Algorafi

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7	Design of Cover-Plated Beams and Plate Girder		11,12	4
8	Introduction to the Design of Composite Structures	Composite slabs Composite beams Composite columns	13,14	4
9	Design of Steel Building	Design of Steel Building	15	2
10	Final Exam		16	2
Number of Weeks /and Units Per Semester			16	32

B - Tutorial Aspect:			
Order	Topics List	Week Due	Contact Hours
1	Plastic Properties of Steel Section and Plastic Analysis of Steel beam and Frames	1,2	4
2	Analysis and Design of steel Beams (considering Lateral Torsional Buckling LTB, flange Local Buckling FLB and web local buckling WLB)	3,4	6
3	Analysis and Design of Members Subjected to Axial load and Bending (Beam-Column)	5,6,7	6
4	Design of Eccentric Welded and Bolted Eccentric and Moment Connections including Base and End Plates	8,9	4
5	Design of Cover-Plated Beams and Plate Girder	10,11	4
6	Introduction to the Design of Composite Structures	12,13	4
7	Analysis and Design of Steel Building	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
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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	Plastic Properties of Steel Sections and their Classification for Local Stability + Plastic Analysis of Steel beam and Frames	a1-a2-b1-b2-b3-b4-c2-c3	1-2	1
2	Analysis and Design of steel Beams	a1-a2-a3-b1-b2-b3-b4-c1-c2	6	1.5
3	Analysis and Design of Members Subjected to Axial load and Bending (Beam-Column)	a1-a2-a3-b1-b2-b3-c1-c2	8	1
4	Design of Eccentric Welded and Bolted Eccentric and Moment Connections including Base and End Plates	a2-a3-b3-c1	10	1.5
5	Design of Cover-Plated Beams and Plate Girder	a2-a3-b1-b2-b3-b4-c1	11	1
6	Design of Composite Structures	a2-a3-b1-b2-b3-b4-c1-c2	12-13	1
7	Analysis and Design of Steel Building (Term Project)	a2-a3-b1-b2-b3-b4-c1- c2-d1	14	0.5

Prepared by Head of Department
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Yahya Al khattabi

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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



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	3-6-8-10-11-12	7.5	5
2	Quizzes.	Twice randomly	7.5	5
3	Mid-term exam.	8th	30	20
4	Final-exam.	During Final Exam-duration	90	60
5	Project	12th	15	10

IX. Learning Resources:	
<ul style="list-style-type: none"> • Written in the following order: (Author – Year of publication – Title – Edition – Place of publication – Publisher). 	
1- Required Textbook(s) (maximum two).	
1- Geschwindner L. F., 2016, Unified Design of Steel Structures, 3rd ed., USA, PROVIDENCE ENGINEERING GROUP 2- S. Al-Safi, 2019 -Structural Steel Design Aids SI-Version + AISC 360-16 Specification for Structural Steel Buildings, USA, AISC	
2- Essential References.	
1- Jack C. McCormac, & Stephen F. Csernak, 2012, - Structural Steel Design, 5 th edition, USA, PEARSON 2- American Institute of Steel Construction (AISC), 2017, Steel Construction Manual, AMERICAN 15 th edition, USA, AISC.	
3- Electronic Materials and Web Sites etc.	
AISC website	

Prepared by Head of Department
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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.
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