



60-Course Specification of bridge engineering

I. Course Identification and General Information:						
1	Course Title:	<i>Bridge Engineering</i>				
2	Course Code & Number:	CE406				
3	Credit hours:	C.H				Credit Hours
		Th.	Tu.	Pr.	Tr.	
		2	2			3
4	Study level/ semester at which this course is offered:	5th Level/ 1st semester				
5	Pre –requisite (if any):	Structure Analysis -Soil-Foundation- Concrete Design- Steel Design- Highway-Traffic				
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:	Ass. Prof. Dr. Mohammad A. Algorafi				
12	Date of Approval					

II. Course Description:
<p>This course deals with advanced topics in civil engineering special in structure related to the bridge engineering. The knowledge and abilities taught in this course are an essential evaluation for many previous courses of Engineering. Actual course will include topics selected from the following list: Definition the bridge and Component, History of Bridges, Types of Bridge, Factors Considered in Deciding Bridge Type, Loading, Analysis and Design of bridge.</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
Center & Quality Assurance
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 compound and type of bridges, Planning of Bridges and Loads on Bridge.	A1
a.2	Identify how to Load, analyses, and design the different bridge elements.	A3
a.3	Show the impact of environmental, safety, and cultural heritage in Bridge planning and design.	A4
b.1	Determine the bridge type, bridge planning, and select of the combination of Load of bridge elements.	B1
b.2	Develop accurate structural modeling of bridges to analyze all components.	B2
b.3	Demonstrate proficiency in the integration of information and processes in bridge design	B3
b.4	Consider the economic, social, and environmental issues in bridge design.	B4
c.1	Design bridge system and components using code of practice considering all design criteria.	C2
c.2	Use techniques to model the load, analyze and design of bridge elements.	C3
c.3	Perform feasibility studies for deciding bridge type.	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
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



(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 compound and type of bridges, Planning of Bridges and Loads on Bridge.	Lecture Multimedia Presentations Presentations Tutorial Reading	Problem set- Written exam- Written assignment
a2- Identify how to Load, analyses, and design the different bridge elements.	Lecture Individual/group projects Presentations	Project - Written exam- Written assignment
a3- Show the impact of environmental, safety, and cultural heritage in Bridge planning and design.	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- Determine the bridge type, bridge panning, and select of the combination of Load of bridge elements.	Lecture Multimedia Presentations Presentations Tutorial Reading	Participation- Written assignment-Project
b2- Develop accurate structural modeling of bridges to analyze all components.	Case study- Tutorial Individual/group projects Presentations	Project- Written assignment
b3- Demonstrate proficiency in the integration of information and processes in bridge design.	Presentations Tutorial Case study	Written exam - Project
b4- Consider the economic, social, and environmental issues in bridge design.	Presentations Tutorial Case study	Written exam - Project

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



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



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 bridge system and components using code of practice considering all design criteria.	Lecture Presentations Tutorial Reading	Written assignment- Written exam -Project
c2- Use techniques to model the load, analyze and design of bridge elements.	Case study- Individual/group projects Presentations	Written assignment- Written exam -Project
c3- Perform feasibility studies for deciding bridge type.	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 the project design report including calculation and drawing	Case study	d1- Write the project design report including calculation and drawing

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



IV. Course Content:					
A – Theoretical Aspect:					
Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	Introduction	a1-b1-b3-b4	history and type of bridge	1	2
2	Introduction	a1-a3-b1- b3- b4-c3	Factors Considered in Deciding Bridge Type and Planning of Bridges	1	2
3	Loads on Bridge and Combinations	a1- a2- b1- b2- b3-c1-c2	DL-LL-PL-BR-CE-CT-LS-ES	4	8
4	Analysis of bridge elements	a2- b1- b2-b3- c1- c2	Analysis of Concrete Deck Slab, Beam, Substructures pier, Substructures Abutment	1	2
5	Analysis of bridge elements	a2- b1- b2-b3- c1- c2	Analysis of Concrete Deck Slab, Beam, Substructures pier, Substructures Abutment	2	4
6	Concrete Design	a2-b2- b3- c1	LRFD Code & BS5400 Code	2	6
7	Design of Bearings	a2-b2- b3-c1	Design of Bearings	2	4
8	Bridge modeling	a2- b1- b2-b3- c1- c2	Using Staad III	1	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



B - Tutorial Aspect:				
Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	Influence line and Live Load Placements	2	4	b2- b3- c1- c2
2	Loads on Bridge and Combinations	3	6	a1- a2- b1- b2- b3-c1- c2
3	Analysis of bridge elements	4	8	a2- b1- b2-b3-c1- c2
4	Design of Bearings	1	2	a2-b2- b3-c1
5	Concrete Design	3	6	a2- b2- b3- c1
6	Bridge Modeling	1	2	b2- b3-s 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	Influence line	a1-b1-b2-b3-c1-c2	2	1
2	Theory part	a1-a2-b1-b2-b3-b4	3	1
3	Loading	a1-b1-b2-b3-c1-c2	5	1
4	Combination	a1-b1-b2-b3-c1-c2	6	1
5	Analysis	a1-b1-b2-b3-c1-c2	8	1
6	Concrete Design	a2-b12-b3-c1	10	1
7	Design of Bearing	a1-b1-b2-b3-c1-c2	12	1.5

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



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	2-3-4-5-6-11	7.5	5	a1-a2-b1-b2-b3-c1-c3
2	Quizzes.	Three time randomly	7.5	5	b3-c1
3	Mid-term exam.	7 th	30	20	a1-a2-b1-b2-b3-c1-c3
4	Final-exam.	13	90	60	a1-a2-b1-b2-b3-c1-c3
5	Project	7	15	10	b1-b2-b3-b4-c1-c2-c3-d1
	Sum		150	100%	

VIII. 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- Introduction of bridge Engineering, 2nd edition 2016 2- AASHTO Standard Specification for highway bridge 17th edition 2003 3- 5400 British Standard
2- Essential References.	
	1- Bridge engineering handbook wai-Faf Chen Lian Duan 1999, CRC Pres 2- ICE Manual of Bridge Engineering, 2nd edition. Edited by Gerard Parke and Nigel Hewson ice manuals Published by Thomas Telford Ltd.
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



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

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



Bridge Engineering

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
E-mail				8-10		

II. Course Identification and General Information:						
1-	Course Title:	<i>Bridge Engineering</i>				
2-	Course Number & Code:	CE406				
3-	Credit hours:	C.H				Credit Hours
		Th.	Tu.	Pr.	Tr.	
		2	2		3	
4-	Study level/year at which this course is offered:	5th Level / 1st semester				
5-	Pre –requisite (if any):	Structure Analysis -Soil-Foundation- Concrete Design- Steel Design- Highway-Traffic				
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
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 deals with advanced topics in civil engineering special in structure related to the bridge engineering. The knowledge and abilities taught in this course are an essential evaluation for many previous courses of Engineering. Actual course will include topics selected from the following list: **Definition** of the bridge and Component, History of Bridges, Types of Bridge, Factors Considered in Deciding Bridge Type, Loading, Analysis and Design of bridge.

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

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

- a1**-Define the compound and type of bridges, Planning of Bridges and Loads on Bridge. A1
a2-Identify how to Load, analyses, and design the different bridge elements. A3
a3-Show the impact of environmental, safety, and cultural heritage in Bridge planning and design. A4
b1-Determine the bridge type, bridge panning, and select of the combination of Load of bridge elements. B1
b2- Develop accurate structural modeling of bridges to analyze all components. B2
b3-Demonstrate proficiency in the integration of information and processes in bridge design B3
b4-Consider the economic, social, and environmental issues in bridge design. B4
c1- Design bridge system and components using code of practice considering all design criteria. C2
c2-Use techniques to model the load, analyze and design of bridge elements. C3
c3- Perform feasibility studies for deciding bridge type. C4
d1-Write the 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
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



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	Introduction	history and type of bridge	1	2
2	Introduction	Factors Considered in Deciding Bridge Type and Planning of Bridges	2	2
3	Loads on Bridge and Combinations	DL-LL-PL-BR-CE-CT-LS-ES	3-6	8
4	Analysis of bridge elements	Analysis of Concrete Deck Slab, Beam, Substructures pier, Substructures Abutment	7	2
4	Midterm Exam		8	2
5	Analysis of bridge elements	Analysis of Concrete Deck Slab, Beam, Substructures pier, Substructures Abutment	9-10	4
6	Concrete Design	LRFD Code & BS5400 Code	11-12	6
7	Design of Bearings	Design of Bearings	13-14	4
8	Bridge modeling	Using Staad III	15	2
9	Final Exam		16	2
Number of Weeks /and Units Per Semester			16	32

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



B - Tutorial Aspect:			
Order	Topics List	Week Due	Contact Hours
1	Influence line and Live Load Placements	1-2	4
2	Loads on Bridge and Combinations	3-5	6
3	Analysis of bridge elements	6-9	6
4	Concrete Design	10	6
5	Design of Bearings	11-13	2
6	Bridge Modeling	14	2
Number of Weeks /and Units Per Semester		14	28

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	Influence line	a1-b1-b2-b3-c1-c2	2	1
2	Theory part	a1-a2-b1-b2-b3-b4	3	1
3	Loading	a1-b1-b2-b3-c1-c2	5	1
4	Combination	a1-b1-b2-b3-c1-c2	6	1
5	Analysis	a1-b1-b2-b3-c1-c2	8	1
6	Concrete Design	a2-b12-b3-c1	10	1
7	Design of Bearing	a1-b1-b2-b3-c1-c2	12	1.5

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



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	2-3-4-5-6-11	7.5	5
2	Quizzes.	Three time randomly	7.5	5
3	Mid-term exam.	7 th	30	20
4	Final-exam.	13	90	60
5	Project	7	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- Introduction of bridge Engineering, 2 nd edition 2016 2- AASHTO Standard Specification for highway bridge 17 th edition 2003 3- 5400 British Standard
2- Essential References.
1- Bridge engineering handbook wai-Faf Chen Lian Duan 1999, CRC Pres 2- ICE Manual of Bridge Engineering, 2nd edition. Edited by Gerard Parke and Nigel Hewson ice manuals Published by Thomas Telford Ltd
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