52 Course Specification of Highway Engineering (I)

I. Course Identification and General Information:

1	**Course Title:**	***Highway Engineering (1)***				
2	**Course Code & Number:**	CE311				
3	**Credit hours:**	C.H				**Credit Hours**
		Th.	Tu.	Pr.	Tr.	
		2	2			3
4	**Study level/ semester at which this course is offered:**	3rd Level / 1st semester				
5	**Pre –requisite (if any):**	Strength of Materials (CE108)				
6	**Co –requisite (if any):**	Non				
7	**Program (s) in which the course is offered:**	Civil engineering				
8	**Language of teaching the course:**	English+ Arabic				
9	**Location of teaching the course:**	Class room				
10	**Prepared By:**	Dr. Abdullah A. Al-Maswari				
11	**Date of Approval**					

II. Course Description:

This course deals with advanced topics in modern Highway Geometric Design. The course content includes the following subjects: Principles of highway survey and location, Horizontal Alignment, Road Cross-section, Vertical Alignment and Intersections and their elements.

Prepared by	Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance
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III.	Course Intended learning outcomes (CILOs) of the course	Referenced PILOs
a.1	Define of Mathematics, Science and Engineering concepts to the solution of Highway Geometric Design problems	**A1**
a.2	describe the codes and standards of practice of Highway Geometric Design disciplines effectively and professionally	**A2**
a.3	Define how to use computer programs such as Land Development or Civil -3D to design full geometric design.	**A3**
b.1	Identify the Highway Geometric Design problems	**B1**
b.2	Choose appropriate mathematical and computer-based methods for analyzing Highway Geometric Design problems	**B2**
c.1	Design the Geometric, component of highway engineering and process to meet the required needs within realistic constraints	**C2**
c.2	Apply the software for highway Geometric Design.	**C3**
c.3	Preform the highway engineering feasibility studies and Geometry design options.	**C4**
d.1	Communicate effectively using written, oral and graphical skills related to geometry highway engineering	**D1**
d.2	Engage in life-long learning related to geometry highway engineering.	**D5**

(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 of Mathematics, Science and Engineering concepts to the solution of Highway Geometric Design problems	Lecture Multimedia Presentations &Tutorial	Mid Term and Final Exam. Assignment
a2- Describe the codes and standards of practice of Highway Geometric Design disciplines effectively and professionally.	Lecture Multimedia Presentations &Tutorial	Mid Term and Final Exam. Assignment -Quiz
a3- Define how to use computer programs such as Land Development or	Case study- Individual/group projects	Project - - Exam- Assignment

Civil -3D to design full geometric design.	Presentations	

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Identify the Highway Geometric Design	Lecture Multimedia Presentations Presentations Reading	Mid Term and Final Exam. Assignment
b2. Choose appropriate mathematical and computer-based methods for analyzing Highway Geometric Design problems	Lecture Multimedia Presentations Presentations Reading	Mid Term and Final Exam. Assignment Quiz

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 Geometric, component of highway engineering and process to meet the required needs within realistic constraints	Lecture Multimedia Presentations Tutorial -Reading	Mid Term and Final Exam. Assignment Quiz
c2. Apply the software for highway Geometric Design	Case study- Individual/group projects Presentations Computer lab	Project Exam Assignment
c3. Preform the highway engineering feasibility studies and Geometry design options.	Lecture	Mid Term and Final Exam. Assignment

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively using written, oral and graphical skills related to geometry highway engineering.	computer lab	project
d2. Engage in life-long learning related to geometry highway engineering.	computer lab	project

IV. Course Content:

A – Theoretical Aspect:

No	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	Introduction, of Highway Geometric Design and type of Roads	a1, a2	Introduction to geometric design Types of roads and streets Highway functional classification Factors effecting selection road alignment	1	2
2	Highway survey and location	a1, a2, a3, b1, b2, c1, c2, d1, d2	The highway survey and location include: Office study of existing information Reconnaissance survey Preliminary survey Final location survey	1	2
3	Horizontal Alignment	a1, a2, a3, b1, b2, c1, c2, d1, d2	-Horizontal Curves Radius and super elevation Sight Distance Transition curves Curve widening	4	8

4	Road Cross – section and its elements	a1, a2, a3, b1, b2, c1, c2, d1, d2	Typical cross-section Cross-section elements Design of cross-section	1	2
5	Road Cross – section and its elements	a1, a2, a3, b1, b2, c1, c2, d1, d2	Typical cross-section Cross-section elements Design of cross-section	1	2
6	Vertical Alignment	a1, a2, a3, b1, b2, c1, c2, d1, d2	Types of vertical curves Length of Sag vertical curves Length of crest vertical curves Geometry of vertical curves	4	8
7	Intersections and their elements	a1, a2, a3, b1, b2, c1, c2, d1, d2	Types of Intersections Design principles for At-Grade Intersections	2	4
Number of Weeks /and Units Per Semester				**14**	**28**

B – Tutorial Aspect:

No.	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	Sight Distance	**1**	**2**	a1-a2-a3-b1-b2-c1-c2-c3-d1-d2
2	Cross-section	**2**	**4**	a1-a2-a3-b1-b2-c1-c2-c3-d1-d2
3	Horizontal curves	**2**	**4**	a1-a2-a3-b1-b2-c1-c2-c3-d1-d2
4	Vertical Curves	**2**	**4**	a1-a2-a3-b1-b2-c1-c2-c3-d1-d2
5	Intersection Design	**3**	**6**	a1-a2-a3-b1-b2-c1-c2-c3-d1-d2
6	Small project	**4**	**8**	a1-a2-a3-b1-b2-c1-c2-c3-d1-d2
Number of Weeks /and Units Per Semester		**14**	**28**	

V. Teaching strategies of the course:

Lecture
Multimedia Presentations &Tutorial
Case study-
Individual/group projects
Reading

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Computer lab

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Sight Distance	a1-a2-b1-c1-c3	2	2
2	Cross-section	a1-a2-b1-c1-c3	3	2
3	Horizontal curves	a1-a2-b1-c1-c3	5	2
4	Vertical Curves	a1-a2-b1-c1-c3	7	2
5	Intersection Design	a1-a2-b1-c1-c3	10	1
6	Small project	a1-a2-b1-c1-c3	13	1.5

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	10.5	7	a1-a2-b1-c1-c3
2	Quizzes.	3 times randomly	4.5	3	a1-a2-a3-b1-b2-c1-c2-c3
3	Mid-term exam.	7^{th}	22.5	15	a1-a2-b1-c1-c3
4	Project	13	7.5	5	a1-a2-a3-b1-b2-c1-c2-c3
5	Final-exam.	14	105	70	a1-a2-a3-b1-b2-c1-c2-c3-d1-d2
6	**Sum**		**100**	**100%**	

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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- AASHTO A Policy on Geometric Design of Highway and Streets *6*th edition 20*11*

2-Nichols J. Garber and Lester A. Hoel - 4th edition 2010 – Traffic and Highway Engineering

2- Essential References.

1- Dr.L.R. Kadyall and Dr. N.B. Lal - 6th edition 2013 – Principles and Practices of Highway Engineering (Including Expressways and Airport Engineering
2- Different Arabic References

3- Electronic Materials and Web Sites etc.

1- Land Development and highway engineering Civil 3D
2- web site of the local and international organizations related traffic

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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 10 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 has to face the examination committee for enquiries.
6.	**Plagiarism**: The student will be terminated from the Faculty, if one student attend 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. Mohammad Algorafi**
	Deputy Rector for Academic Affairs Dr. Ibrahim AlMutaa **Dr. Ahmed mujahed** **Dr. Munaser Alsubri**

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Template for Course Plan (Syllabus)
Highway Engineering (I)

I. Information about Faculty Member Responsible for the Course:								
Name of Faculty Member	Dr. Abdullah A. Al-Maswari	**Office Hours**						
Location& Telephone No.	Faculty, 777455428	**SAT**	**SUN**	**MON**	**TUE**	**WED**	**THU**
E-mail					10-12		

II. Course Identification and General Information:						
1-	**Course Title:**	***Highway Engineering (1)***				
2-	**Course Number & Code:**	CE311				
3-	**Credit hours:**	**C.H**				**Credit Hours**
		Th.	Tu.	Pr.	Tr.	
		2	2			3
4-	**Study level/year at which this course is offered:**	3rd Level / 1st semester				
5-	**Pre –requisite (if any):**	Strength of Materials (CE108)				
6-	**Co –requisite (if any):**	Non				
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:

This course deals with advanced topics in modern Highway Geometric Design. The course content includes the following subjects: Principles of highway survey and location, Horizontal Alignment, Road Cross-section, Vertical Alignment and Intersections and their elements.

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

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

a.1 Define of Mathematics, Science and Engineering concepts to the solution of Highway Geometric Design problems A1
a.2 Describe the codes and standards of practice of Highway Geometric Design disciplines effectively and professionally A2
a.3 Define how to use computer programs such as Land Development or Civil -3D to design full geometric design. A3
b.1 Identify the Highway Geometric Design problems B1
b.2 Choose appropriate mathematical and computer-based methods for analyzing Highway Geometric Design problems B2
c.1 Design the Geometric, component of highway engineering and process to meet the required needs within realistic constraints C2
c.2 Apply the software for highway Geometric Design. C3
c.3 Preform the highway engineering feasibility studies and Geometry design options. C4
d.1 Communicate effectively using written, oral and graphical skills related to geometry highway engineering D1
d.2 Engage in life-long learning related to geometry highway engineering. D5

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, of Highway Geometric Design and type of Roads	Introduction to geometric design Types of roads and streets Highway functional classification Factors effecting selection road alignment	1	2
2	Highway survey and location	The highway survey and location include: Office study of existing information Reconnaissance survey Preliminary survey Final location survey	2	2
3	Horizontal Alignment	-Horizontal Curves Radius and super elevation Sight Distance Transition curves Curve widening	3,4,5,6	8
4	Road Cross – section and it's elements	Typical cross-section Cross-section elements Design of cross-section	7	4
5	Midterm Exam		8	2
6	Road Cross – section and it's elements	Typical cross-section Cross-section elements Design of cross-section	9	2
7	Vertical Alignment	Types of vertical curves Length of Sag vertical curves Length of crest vertical curves Geometry of vertical curves	10,11,12,13	8

8	Intersections and their elements	Types of Intersections Design principles for At-Grade Intersections	14,15	4
9	Final Exam		16	2
Number of Weeks /and Units Per Semester			**16**	**32**

B – Tutorial Aspect:

Order	Topics List	Week Due	Contact Hours
1	Sight Distance	**1**	**2**
2	Cross-section	**2,3**	**4**
3	Horizontal curves	4,5	**4**
4	Vertical Curves	6,7	**4**
5	Intersection Design	8,9,10	**6**
6	Small project	11,12,13,14	8
Number of Weeks /and Units Per Semester		14	28

VI. Teaching strategies of the course:

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VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
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2	Cross-section	a1-a2-b1-c1-c3	3	2
3	Horizontal curves	a1-a2-b1-c1-c3	5	2
4	Vertical Curves	a1-a2-b1-c1-c3	7	2
5	Intersection Design	a1-a2-b1-c1-c3	10	1
6	Small project	a1-a2-b1-c1-c3	13	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	2-3-4-5-6-11	10.5	7
2	Quizzes.	3 times randomly	4.5	3
3	Mid-term exam.	7^{th}	22.5	15
4	Project	13	7.5	5
5	Final-exam.	14	105	70

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Dean of the Faculty: Prof. Dr. Mohammed AL-Bukhaiti

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3- Electronic Materials and Web Sites *etc*.

1- Land Development and highway engineering Civil 3D
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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 engineering 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 the rules and regulations of the engineering 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.
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7	**Other policies:** - All the teaching materials should be kept out of the examination hall. - Cellular phone or alike devices are not allowed into the examination hall. - There should be a respect between the student and his teacher.