Course Specification
(Bachelor)

Course Title:	Topographic and Photogrammetric Survey
Course Code:	CE2702
Program:	Bachelor of Science in Civil Engineering
Department:	: Civil Engineering Department
College:	College of Engineering and Architecture
Institution:	Umm Al-Qura University
Version:	1
Last Revision Date:	31 January 2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (3 hours)					
2. Course type					
A.	☐ University	☐ College	X Department	☐ Track	☐ Others
B.	X Required		☐ Elective		
3. Level/year at which this course is offered: Level 5 / 3rd Year					
4. Course General Description:					

The course covers the main aspects and application fields of topographic and photogrammetrc survey. It presents computation of traverses, horizontal and vertical curves, tachometry and topographic surveys. It includes all aspects of GPS needed to understand and use GPS including the basics of GPS technology, common hardware, surveying methods, survey design, planning and observations. It presents the principles of Analytical and Digital Photogrammetry, equipment and instruments, overlap photographs and stereoscopy, practical applications, ground control of photography, mosaics, stereoscopic and plotting Instruments.

The field work portion of this course aims to use theodolites, total stations, GPS receivers and photogrammetric instruments for different surveying applications.

5. Pre-requirements for this course (if any)**:**

Plane Surveying (CE1701)

6. Co-requisites for this course (if any)**:**

7. Course Main Objective(s):

The main objectives of this course that the student:

- **Will be able to use modern site surveying instruments as Total Station and GPS and develop his skill in photogrammetric techniques.**
- **Will design horizontal and vertical curves and prepare the necessary maps.**
- **Will practice Global Positioning System (GPS) instruments and techniques for providing solutions for Hajj and Umrah.**
- **Will apply the principles of analytical and digital photogrammetry for some photogrammetric applications.**

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	15
2.	**Laboratory/Studio**	45
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	To explain principles of topographic and photogrammetric surveying.	K1	• Lectures • Lab. work	• Written Exams • laboratory and fieldwork reports • Lab Exams
1.2	To discuss the required knowledge and the skills used in the surveying instruments such as theodolite, GPS, Total station, etc.	K1	• Lectures • Lab. work	• Written Exams • laboratory and fieldwork reports • Lab Exams
2.0	**Skills**			
2.1	To apply appropriate mathematical methods for calculating the coordinates of the traverse stations and	S1	Lectures	Written Exams

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	elements for designing horizontal and vertical curves .			
2.2	To perform GPS and photogrammetric applications using the basics of GPS and photogrammetry and modern engineering tools.	S2	• Lectures • Lab. Work	• Written Exams • Lab Exams
3.0	**Values, autonomy, and responsibility**			
3.1	To use life-long learning and continuing education for surveying techniques and instrumentation.	V3	• Group assignments. • Small group work. • Lab. work.	• Lab. Exam • Oral exams.
3.2.	To use professional GPS techniques for safety of pilgrims during Hajj and Umrah.	V1	• Lectures • Lab. work	• Written Exams • laboratory and fieldwork reports • Lab Exams

C. Course Content

No	List of Topics	Contact Hours
1	Traverse Surveys: Open and Closed Traverse, Determination of the Closure Errors and the Accuracy	4
2	Traverse adjustment	4
3	Coordinates calculation	4
4	Tacheometric Surveying: Stadia Principles, Inclined Stadia Measurements	4
5	Stadia Field Practice	4
6	Electronic Surveying Measurements: Total Station, Field Procedures for Total Stations in Topographic Surveys	4
7	Construction Layout Using Total Stations, Overview of Computerized Surveying Data Systems	4
8	Global Positioning System (GPS): Instruments	4
9	Observation Methods, Sources of Errors	4

10	Horizontal Curves: Computation, Field Procedures	4
11	Vertical Curves: Computation, Field Procedures	4
12	Introduction to Photogrammety: Camera Types and Photography	4
13	Vertical and Overlap Photographs, Stereoscopy	4
14	Ground Control of Photography, Mosaics, Stereoscopic and Plotting Instruments	4
15	Digital Photogrammetry.	4
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Tutorials	2-15	10%
2.	Reports and Practical Examination	3-15	15 %
3.	Mid Term Exam	7	25 %
4.	Final Exam	16	50%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	• Wolf, P. R., and Ghilani, C. D. “Elementary Surveying”, 14th Edition, Prentice Hall, 2015
Supportive References	• Barry F. K. and Gelnnbind, S. J. "Surveying, Principles and Applications", 9th Edition. Prentice Hall, 2014. • Wolf, P. R., and Ghilani, C. D. “Elementary Surveying”, 14th Edition, Prentice Hall, 2015
Electronic Materials	• http://www.sciencedirect.com. • http://ocw.mit.edu/
Other Learning Materials	• Latest Softwares and Techniques

2. Required Facilities and equipment

Items	Resources
facilities	• Classrooms for lectures and exams for 35 students during the scheduled class hours.

Items	Resources
(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Surveying lab. with sufficient surveying instruments for 20 students during the scheduled lab. or field work hours.
Technology equipment (projector, smart board, software)	• Data show for some work presentation.
Other equipment (depending on the nature of the specialty)	Printers and laptops for staff members with required computer software programs are required.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Faculty members who teach this course and the lab staff associated with the course.	• Both written and verbal, through presentations. • Analysis of students` marks • Regular feedback of the students about the course and the teaching methods
Effectiveness of Students assessment	Faculty members who teach this course and those teaching other courses relevant to this course.	• Regular revising and improving of the course contents and consulting the faculty members • Teaching faculty and lab staff associated with the course are also available for personal consultation.
Quality of learning resources	Faculty members who teach this course	• Frequent improvement for teaching and learning techniques. • Frequent survey for latest references. • Encouraging the students in team work cooperation and writing reports.
The extent to which CLOs have been achieved	Independent member(s) teaching staff	A sample of students answer sheets is revised by a specified committee of the department.
Other	--	--

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	CIVIL ENGINEERING COUNCIL
REFERENCE NO.	THE FIFTEENTH SESSION OF THE ACADEMIC YEAR 1446
DATE	30 APRIL 2025

