Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department

Academic Program and Course Description Guide

2025-2026

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills, so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide includes a description of the Master of Civil Engineering program in the Department of Civil Engineering / College of Engineering / Al-Muthanna University for the academic year 2025-2026. It has been prepared in a manner consistent with the requirements of postgraduate studies in Iraqi universities and in a way that reflects the specialized nature of the program in terms of its objectives, study plan, courses, and intended learning outcomes. In addition, the approved academic program description template circulated under the Studies Department letter No. T M3/2906 dated 3/5/2023 has been adopted in order to unify the formulation of program and course descriptions and to provide an approved academic and administrative reference that benefits students, faculty members, scientific committees, and the bodies responsible for quality assurance and academic accreditation.

In this regard, it is important to emphasize the significance of preparing academic program and course descriptions as an effective tool for ensuring the proper functioning of the educational process, improving its efficiency, and strengthening its ability to respond to scientific, research, and societal requirements.

Concepts and terminology:

- **Academic Program Description:** The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.
- **Course Description:** Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.
- **Program Vision:** An ambitious picture for the future of the academic program to be sophisticated, inspiring, stimulating, realistic and applicable.
- **Program Mission:** Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.
- **Program Objectives:** They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.
- **Curriculum Structure:** All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.
- **Learning Outcomes:** A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.
- **Teaching and learning strategies:** They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

Academic Program Description Form

University Name: Al-Muthanna University

Faculty/Institute: College of Engineering

Scientific Department: Department of Civil Engineering

Academic or Professional Program Name: Master Program in Civil Engineering

Final Certificate Name: Master of Science in Civil Engineering

Academic System: Semester System / Coursework and Thesis

Description Preparation Date: **September/2025**

File Completion Date: **January /2026**

Signature:

Head of Department Name:

Asst. Prof. Dr. Othman Hameed Zinkah

Date: **January /2026**

Signature:

Scientific Associate Name:

Asst. Prof. Dr. Furat Yasser Sharad

Date: **January /2026**

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date: **January /2026**

Signature:

Approval of the Dean

1. Program Vision

The Master of Civil Engineering program seeks to achieve academic and research excellence in the fields of civil engineering by preparing advanced scientific cadres equipped with specialized knowledge and the ability to conduct research, analysis, and innovation, in a manner that contributes to serving the community, supporting sustainable development, and responding to the requirements of scientific and professional advancement at the local and regional levels.

2. Program Mission

The Master of Civil Engineering program at the College of Engineering / Al-Muthanna University works to prepare specialized scientific and research cadres who possess advanced knowledge and analytical and research skills in the fields of civil engineering, through a supportive academic environment that invests in the expertise of faculty members and the department's laboratory and scientific capabilities, thereby contributing to the production of rigorous research and appropriate engineering solutions to meet the needs of the country in general and Al-Muthanna Governorate in particular.

3. Program Objectives

Our program is dedicated to preparing students to:

- Graduate with advanced specialized knowledge in the fields of civil engineering.
- Develop students' research and analytical skills, enabling them to conduct rigorous scientific research.
- Enhance students' ability to address engineering and urban problems and propose appropriate scientific solutions.

- Utilize the expertise of faculty members and the department's laboratory and scientific capabilities in support of teaching and research.
- Prepare qualified cadres capable of meeting the needs of society and the labor market in various fields of civil engineering.
- Contribute to local and national development through applied scientific research.
- Promote the quality of academic and research performance in line with accreditation and quality assurance requirements.

4. Program Accreditation

None

5. Other external influences

None

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	0	0	0%	
College Requirements	0	0	0%	
Department Requirements	13	24	68.57%	
Summer Training	0	0	0%	
Thesis	1	11	31.43%	
Total	14	35	100%	

* This can include notes whether the course is basic or optional.

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
First Semester	MS-C101	Soil Improvement	2	
First Semester	MS-C102	Advanced Traffic Engineering	2	
First Semester	MS-C103	Pavement Management	2	
First Semester	MS-C104	Advanced Statistics	2	
First Semester	MS-103	Technical English Language (I)	2	
First Semester	MS-C105	Advanced Mathematics	2	
Second Semester	MS-C201	Airport Engineering	2	
Second Semester	MS-C202	Railway Engineering	2	
Second Semester	MS-C203	Advanced Pavement Materials	2	
Second Semester	MS-C204	Highway Route Location and Planning	2	
Second Semester	MS-201	Finite Element Analysis	2	
Second Semester	MS-201	Scientific Research Methodology	2	
Second Semester	MS-203	Technical English Language (II)	1	

8. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	Demonstrate advanced knowledge of concepts, theories, and scientific foundations in the fields of civil engineering.
Learning Outcomes 2	Understand the nature of engineering and urban problems and relate them to community needs and local development.
Learning Outcomes 3	Recognize the fundamentals of scientific research and engineering analysis in postgraduate studies.
Skills	
Learning Outcomes 1	Analyze civil engineering problems using appropriate scientific and mathematical methods.
Learning Outcomes 2	Employ specialized knowledge in evaluating engineering solutions and selecting appropriate alternatives.

Learning Outcomes 3	Use scientific research skills in collecting data, analyzing it, and interpreting results.
Learning Outcomes 4	Prepare academic and engineering research and reports in a well-organized scientific manner.
Learning Outcomes 5	Employ software and modern methods in analysis, study, and planning within the fields of civil engineering.
Ethics	
Learning Outcomes 1	Adhere to research ethics and academic integrity in preparing studies and research.
Learning Outcomes 2	Assume professional responsibility in addressing engineering issues in a way that serves society and the public interest.
Learning Outcomes 3	Work in a spirit of cooperation and effective scientific communication with instructors, researchers, and fellow students.
Learning Outcomes 4	Respect standards of quality, accuracy, and discipline in academic and professional performance.
Learning Outcomes 5	Adopt positive attitudes toward community service, sustainable development, and responsiveness to local needs.

9. Teaching and Learning Strategies

- Specialized lectures.
- In-class scientific discussions.
- Research-based learning, including the preparation of reports and scientific presentations.
- Analysis of engineering problems and study of practical cases.
- Guided self-learning based on modern scientific sources.
- Use of software and modern analytical methods.
- Academic supervision in the preparation of research and the thesis.

10. Evaluation methods

- Written examinations.
- Reports and assignments.
- Presentations and seminars.

- Class participation and scientific discussions.
- Evaluation and defense of the thesis.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Prof. Dr. Issam Jawad Abdul Ali	Civil Engineering	Environmental Engineering			✓	
Prof. Dr. Hussein Yousif Aziz	Civil Engineering	Bridges and Tunnels			✓	
Prof. Dr. Basim Jabbar Abbas	Building and Construction Engineering	Geotechnical Engineering			✓	
Prof. Dr. Hussein Kareem Sultan	Civil Engineering	Structural Engineering			✓	
Assist. Prof. Dr. Noorans Ali Razzaq	Civil Engineering	Roads and Transportation			✓	
Assist. Prof. Dr. Othman Hameed Zinkah	Civil Engineering	Structural Engineering			✓	

Assist. Prof. Dr. Yousif Abdul Kadhim	Surveying Engineering	Remote Sensing			✓	
Assist. Prof. Dr. Talib Kamil Qasim	Civil Engineering	Geotechnical Engineering			✓	
Assist. Prof. Atheer Mohammed Ali Jasim	Civil Engineering	Roads and Transportation			✓	
Assist. Prof. Dr. Amjad Mohammed	Civil Engineering	Water Resources Engineering			✓	
Assist. Prof. Dr. Mohammed Bali	Civil Engineering	Traffic Engineering			✓	

Professional Development

Mentoring new faculty members

- Preparing a comprehensive orientation program that explains the academic regulations and policies adopted by the university, college, and department.
- Involving new faculty members in pedagogical and training courses on modern teaching methods, classroom management, and assessment methods in higher education.
- Introducing them to the mechanisms of postgraduate studies and the requirements of academic and research supervision.
- Supporting their integration into the academic environment through follow-up and guidance by the scientific committees and the head of department

Professional development of faculty members

- Encouraging participation in workshops and continuous training courses in the fields of teaching, scientific research, and modern educational technologies.
- Supporting scientific publication in reputable journals and attendance at local and international conferences and seminars.

- Providing opportunities for academic missions, research visits, and scientific cooperation with universities and other academic institutions for the exchange of expertise.
- Conducting periodic evaluation of teaching and research performance in order to identify individual developmental needs and improve the quality of academic performance.
- Promoting a culture of continuous development that positively reflects on the quality of the program and its educational and research outcomes.

12. Acceptance Criterion

Applicants holding a Bachelor's degree in Civil Engineering are eligible for admission to the Master of Civil Engineering program, in accordance with the postgraduate studies regulations and the criteria approved by the Ministry of Higher Education and Scientific Research.

13. The most important sources of information about the program

* Approved textbooks available in the department.
* Supporting books and references available in the library.
* Faculty lecture notes.

14. Program Development Plan

1. Measuring Learning Outcomes (GOs):
    - Assessment Tools: Exams, student evaluations, graduate surveys.
    - Standard: Achievement rate of 60% or higher.
    - Review: Annually by the department and faculty members.
2. Reviewing Program Educational Objectives (PEOs):
    - Methods: Surveys for students, graduates, parents, faculty members, and employers.
    - Review: Every 4–6 years.
3. Accreditation Indicators (ICAEE):
    - Curriculum Review: Courses, study plan, and sequencing of courses (every 3 years).
    - Follow-up: Graduation requirements, faculty competence, financial and administrative support (annually to every 2 years).
    - Evaluation: Infrastructure and services (as needed).

Program Skills Outline															
Required program Learning outcomes															
Year/Level	Course Code	Course Name	Basic or optional	Knowledge			Skills					Ethics				
				A1	A2	A3	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5
First Year	MS-C101	Soil Improvement	Optional	√	√	√	√	√	√	√	√	√	√	√	√	√
	MS-C102	Advanced Traffic Engineering	Optional	√	√	√	√	√	√	√	√	√	√	√	√	√
	MS-C103	Pavement Management	Optional	√	√	√	√	√	√	√	√	√	√	√	√	√
	MS-C104	Advanced Statistics	Basic	√	√	√	√	√	√	√	√	√	√	√	√	√
	MS-103	Technical English Language	Basic	√	√	√	√	√	√	√	√	√	√	√	√	√
	MS-C105	Advanced Mathematics	Basic	√	√	√	√	√	√	√	√	√	√	√	√	√
	MS-C201	Airport Engineering	Optional	√	√	√	√	√	√	√	√	√	√	√	√	√
	MS-C202	Railway Engineering	Optional	√	√	√	√	√	√	√	√	√	√	√	√	√
	MS-C203	Advanced Pavement Materials	Optional	√	√	√	√	√	√	√	√	√	√	√	√	√
	MS-C204	Highway Route Location and	Optional	√	√	√	√	√	√	√	√	√	√	√	√	√
	MS-201	Finite Element Analysis	Basic	√	√	√	√	√	√	√	√	√	√	√	√	√
	MS-201	Scientific Research	Basic	√	√	√	√	√	√	√	√	√	√	√	√	√
	MS-203	Technical English Language	Basic	√	√	√	√	√	√	√	√	√	√	√	√	√

- **Please tick the boxes corresponding to the individual program learning outcomes under evaluation.**

Program Description

Course Description Form

1. Course Name:
Technical English Language (I)
2. Course Code:
MS-103
3. Semester / Year:
First Semester / 2025-2026
4. Description Preparation Date:
01/09/2025
5. Available Attendance Forms:
Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hrs. /1 Unit
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Riyadh Dakhel Mansoor Email: riyadhdmu@mu.edu.iq
8. Course Objectives

Course Objectives	(a) Understand the five steps for successful reading and writing in English. (b) Understand how to use abbreviations in the engineering field and writing resume, progress report, activity report, test report, special purpose internal proposal, and questionnaire. (c) Increase skills in reading and writing memos and bar graphs, and use headings in a document. (d) Increase the ability to provide professional presentations and meetings. (e) Increase ability to write abstracts and use citation.

9. Teaching and Learning Strategies	
Strategy	An ability to apply knowledge of English Language; Reading, Writing, Speaking and Listening

10. Course Structure

Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1	*2*	*D4, D3, D2, D1*	Introduction to the steps for technical reading and writing in English.		Quiz
Week-2	*2*	*D4, D3, D2, D1*	Establishing purpose, identifying audience or readers, considering a		*Report*

			context for writing, determining scope and coverage, and selecting the medium.		
Week-3	*2*	*D4, D3, D2, D1*	Brainstorm to determine what you already know and conduct research. Take note, interview for information, create and use questionnaires, avoid plagiarism, and document sources		*Seminar*
Week-4	*2*	*D4, D3, D2, D1*	Checking your writing: error correction – punctuate on and spelling. Writing an informal email		*Exam*
Week-5	*2*	*D4, D3, D2, D1*	Student Résumé for an entry level position (highlighting professional credentials). Writing résumé for applicant with management experience.		Quiz
Week-6	*2*	*D4, D3, D2, D1*	Advanced Résumé: Showing promotion within a single company, and combining functional and chronological elements.		*Report*
Week-7	*2*	*D4, D3, D2, D1*	Progress reports, activity reports, test reports, special purpose internal proposals, and questionnaires.		*Seminar*
Week-8	*2*	*D4, D3, D2, D1*	Writing a progress report, activity report, test report, special purpose internal proposal, and questionnaire. (continue)		*Exam*
Week-9	*2*	*D4, D3, D2, D1*	Typical Memo Format (Printed with Sender's Handwritten Initials)		Quiz
Week-10	*2*	*D4, D3, D2, D1*	Bar graph (quantities of different items during a fixed period). Bar (column) graph (showing the parts that make up the whole)		*Report*
Week-11	*2*	*D4, D3, D2, D1*	Headings used in a document.		*Seminar*
Week-12	*2*	*D4, D3, D2, D1*	Presentations and Meetings. Meeting agenda, e-mail to accompany an agenda, minutes of a meeting, slides for a presentation.		*Exam*
Week-13	*2*	*D4, D3, D2, D1*	Informative abstract		Quiz
Week-14	*2*	*D4, D3, D2, D1*	Documenting sources (e.g. APA, IEEE, MLA, etc.)		*Report*
Week-15	*2*	*D4, D3, D2, D1*	Final exam (date to be assigned later)		*Seminar*

11. Course Structure/ Lab

Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1					
Week-2					
Week-3					
Week-4					
Week-5					
Week-6					
Week-7					
Week-8					
Week-9					
Week-10					

Week-11					
Week-12					
Week-13					
Week-14					
Week-15					

12. Course Evaluation	
Quiz; 15 Mark, Exam; 10 Mark, Seminar; 5 Marks Final Exam; 70 Mark	
13. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Philpot, S., & Curnick, L. (2013). Headway Academic Skills: Reading, Writing, and Study Skills: Level 2: Student's Book. Oxford University Press.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Soil Improvement	
2. Course Code:	
MS−C101	
3. Semester / Year:	
First Semester / 2025−2026	
4. Description Preparation Date:	
01/09/2025	
5. Available Attendance Forms:	
Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30	
7. Course administrator's name (mention all, if more than one name)	
Name: HusseinYousif Aziz Email: husseinyousifaziz@mu.edu.iq	
8. Course Objectives	
Course Objectives	The course aims to develop an understanding of the basic concepts of soil improvement and the techniques available in this field.
9. Teaching and Learning Strategies	
Strategy	The teaching strategies include delivering in-person lectures, assigning classroom tasks, and forming student groups for discussion, in addition to examinations and presentations.

10. Course Structure					
Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1	*3*	*Understanding*	*Soil Improvements*	*Theoretical*	Written exam and quizzes
Week-2	*3*	*Understanding*	*Soil Improvements*	*Theoretical*	Written exam and quizzes
Week-3	*3*	*Understanding*	*Method of soil improvements*	*Theoretical*	Written exam and quizzes
Week-4	*3*	*Understanding*	*Method of soil improvements*	*Theoretical*	Written exam and quizzes
Week-5	*3*	*Understanding*	*Method of soil improvements*	*Theoretical*	Written exam and quizzes
Week-6	*3*	*Understanding*	*Method of soil improvements*	*Theoretical*	Written exam and quizzes
Week-7	*3*	*Understanding*	*Method of soil improvements*	*Theoretical*	Written exam and quizzes
Week-8	*3*	*Understanding*	*Method of soil improvements*	*Theoretical*	Written exam and quizzes
Week-9	*3*	*Understanding*	*Method of soil improvements*	*Theoretical*	Written exam and quizzes
Week-10	*3*	*Understanding*	*Method of soil improvements*	*Theoretical*	Written exam and quizzes
Week-11	*3*	*Understanding*	*Method of soil improvements*	*Theoretical*	Written exam and quizzes
Week-12	*3*	*Understanding*	*Method of soil improvements*	*Theoretical*	Written exam and quizzes
Week-13	*3*	*Understanding*	*Method of soil improvements*	*Theoretical*	Written exam and quizzes
Week-14	*3*	*Understanding*	*Method of soil improvements*	*Theoretical*	Written exam and quizzes
Week-15	*3*	*Understanding*	*Method of soil improvements*	*Theoretical*	Written exam and quizzes

11. Course Structure/ Lab					
Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1					
Week-2					
Week-3					
Week-4					
Week-5					
Week-6					

Week-7					
Week-8					
Week-9					
Week-10					
Week-11					
Week-12					
Week-13					
Week-14					
Week-15					

12. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

1. Daily Exam (Quiz): 10
2. Class activity: 5
3. Monthly Exams: 15
4. Final Exam: 70

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Soil Improvement Books
Main references (sources)	Techniques of soil improvement
Recommended books and references (scientific journals, reports…)	scientific journals, reports
Electronic References, Websites	Electronic References, Websites

Course Description Form

1. Course Name:
Advanced Traffic Engineering
2. Course Code:
MS-C102
3. Semester / Year:
First Semester / 2025-2026
4. Description Preparation Date:
01/09/2025
5. Available Attendance Forms:
Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
30
7. Course administrator's name (mention all, if more than one name)
Name: Noorance Ali Razzaq Email: noorance@mu.edu.iq
8. Course Objectives

Course Objectives	• to study and improve traffic performance of road networks and terminals. • to achieve efficient, free and rapid flow of traffic. • to eliminate traffic accidents and causalities as much as possible.
9. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises in the field of advanced traffic engineering, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure

Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1	*2*	*Understanding traffic characteristics*	Introduction	Attendance	Daily oral & exam
Week-2	*2*	*Understanding human behaviour and safety*	Pedestrian studies -1	Attendance	Daily oral & exam
Week-3	*2*	*Understanding human behaviour and safety*	Pedestrian studies -2	Attendance	Daily oral & exam
Week-4	*2*	*Understanding* speed analysis	Speed studies -1	Attendance	Daily oral & exam
Week-5	*2*	*Understanding* speed analysis	Speed studies -2	Attendance	Daily oral & exam
Week-6	*2*	*Understanding* strategies	Traffic calming strategies	Attendance	Daily oral & exam
Week-7	*2*	-	Exam 1	Attendance	*Monthly exam*
Week-8	*2*	*Understanding intersection design*	Intersection design & control	Attendance	Daily oral & exam
Week-9	*2*	*Understanding intersection design*	Signalized intersection	Attendance	Daily oral & exam
Week-10	*2*	*Understanding intersection design*	Unsignalized intersection	Attendance	Daily oral & exam
Week-11	*2*	*Understanding traffic flow regimes*	Traffic flow theory	Attendance	Daily oral & exam
Week-12	*2*	*Understanding traffic flow regimes*	Queueing theory	Attendance	Daily oral & exam
Week-13	*2*	*Understanding traffic capacity and LOS*	Traffic assessment	Attendance	Daily oral & exam
Week-14	*2*	-	Exam 2	Attendance	*Monthly exam*
Week-15	*2*	-	Presentation	Attendance	Daily oral

11. Course Structure/ Lab

Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1					
Week-2					
Week-3					
Week-4					
Week-5					
Week-6					
Week-7					
Week-8					
Week-9					
Week-10					
Week-11					
Week-12					

Week-13					
Week-14					
Week-15					

12. Course Evaluation

Coursework Assessment: 30%, including:
Monthly examinations: 20%
Homework assignments: 5%
Classroom activities: 5%
.Final Examination: 60%

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Highway Traffic Analysis and Design_R.J. Salter, 1996
Main references (sources)	Traffic and Highway Engineering Nicholas J. Garber and Lester A. Hoel Edition: 5 , Year: 2014
Recommended books and references (scientif journals, reports…)	Highway Capacity Manual by: Transportation Research Board, 2010.
Electronic References, Websites	https://pdfkeys.com/download/3486798-Traffic_Highway_Engineering_Garber_4th_Si_Edition.pdf

Course Description Form

1. Course Name:	
Pavement management	
2. Course Code:	
MS-C103	
3. Semester / Year:	
First Semester / 2025-2026	
4. Description Preparation Date:	
01/09/2025	
5. Available Attendance Forms:	
Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr Mohammed Bally Mahdi Email: engmohbaly@mu.edu.iq	
8. Course Objectives	
Course Objectives	This course introduces the principles and practices of pavement management systems (PMS). It covers pavement evaluation, performance modeling, maintenance and rehabilitation (M&R) strategies, life-cycle cost analysis, and decision-making tools to ensure cost-effective, safe, and sustainable pavement networks
9. Teaching and Learning Strategies	
Strategy	Teaching strategies include in-person lectures, classroom assignments, student discussion groups, exams, and presentations.

10. Course Structure					
Week	***Hours***	***Required Learning Outcomes***	***Unit or subject name***	***Learning method***	***Evaluation method***
Week-1	*2*	*Introduction to Pavement Management*	*Introduction to Pavement Management*	Attendance	discussion
Week-2	*2*	*Pavement Evaluation*	*Pavement Evaluation*	Attendance	discussion
Week-3	*2*	*Data Collection*	*Data Collection*	Attendance	quiz
Week-4	*2*	*Pavement Performance*	*Pavement Performance*	Attendance	quiz
Week-5	*2*	*Deterioration*	*Deterioration*	Attendance	Reports
Week-6	*2*	*Maintenance*	*Maintenance*	Attendance	discussion
Week-7	*2*	*Economic Evaluation*	*Economic Evaluation*	Attendance	monthly exam
Week-8	*2*	*Life-Cycle Cost Analysis*	*Life-Cycle Cost Analysis*	Attendance	discussion
Week-9	*2*	*Optimization in PMS*	*Optimization in PMS*	Attendance	discussion
Week-10	*2*	*Prioritization in PMS*	*Prioritization in PMS*	Attendance	quiz
Week-11	*2*	*Pavement Management Software and Case Studies*	*Pavement Management Software and Case Studies*	Attendance	discussion
Week-12	*2*	*National and international case studies*	*National and international case studies*	Attendance	Reports
Week-13	*2*	*Future Trends in Pavement Management*	*Future Trends in Pavement Management*	Attendance	discussion
Week-14	*2*	*Sustainable pavement management*	*Sustainable pavement management*	Attendance	discussion
Week-15	*2*	*Review and Final Assessment*	*Review and Final Assessment*	Attendance	monthly exam

11. Course Structure/ Lab					
Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1					
Week-2					
Week-3					
Week-4					
Week-5					
Week-6					

Week-7					
Week-8					
Week-9					
Week-10					
Week-11					
Week-12					
Week-13					
Week-14					
Week-15					

12. Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
13. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Haas, Hudson, & Zaniewski – Modern Pavem Management.
Main references (sources)	Shahin, M.Y. – Pavement Management for Airpo Roads, and Parking Lots. Huang, Y.H. – Pavement Analysis and Design.
Recommended books and references (scientific journals, reports…)	AASHTO – Pavement Management Guide.
Electronic References, Websites	Relevant research papers and case studies.

Course Description Form

1. Course Name:
Advanced Engineering Statistics
2. **Course Code:**
MS-C104
3. Semester / Year:
1st Semester 2025-2026
4. Description Preparation Date:
1/9/2025
5. **Available Attendance Forms:**
Attendance
6. **Number of Credit Hours (Total) / Number of Units (Total)**:
30
7. **Course administrator's name (mention all, if more than one nam**
Name: Baleegh saud Abdulrazzaq Alobaid Email: Baleegh.saud@mu.eud.iq
8. Course Objectives

Course Objectives	The Nature of Probability and Statistics; Frequency Distributions and Graphs; Data Description; Probability and Counting Rules; Discrete Probability Distributions; The Normal Distribution; Confidence Intervals and Sample Size; Hypothesis Testing; Testing the Difference Between Two Means, Two Proportions, and Two Variances; Correlation and Regression.
9. Teaching and Learning Strategies	
Strategy	▪ Different forms of teaching will be used to cover with objectives of the course. PowerPoint presentations for the head titles, definitions, graphs, and many useful illustrations with a summary at the end of each chapter will be presented and discussed.

	▪ The PowerPoint contains information about new topics and unsolved examples, and then the whiteboard will be used to solve them and to let students see the solutions. ▪ Instruct students how to use **Excel and MINITAB (computer software)** to solve the types of problems covered in the section.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	The Nature of Probability and Statistics	Descriptive and Inferent Statistics ; Variables and Types c Data; Data Collection ar Sampling Techniques; Experimental Design; Computers and Calculat	Theory computer software	Classwork & Homework
2	2	Frequency Distributions and Graphs	Organizing Data; Histograms, Frequency Polygons, and Ogives; Other Types of Graphs	Theory computer software	Classwork & Homework
3	2	Data Description	Measures of Central Tenden ; Measures of Variatio	Theory computer software	Classwork & Homework
4	2	Data Descripti	Measures of Position ; Exploratory Data Analysi	Theory computer software	Classwork & Homework
5	2	Probability and Counting Rules	ample Spaces and Probabil ; The Addition Rules fo Probability ; The Multiplication Rules and conditional Probability	Theory computer software	Classwork & Homework
6	2	Probability and Counting Rules	Counting Rules robability and Counting Ru	Theory computer software	Classwork & Homework
7	2	Discrete Probability Distributions	Probability Distributio ; Mean, Variance, Standar Deviation, and Expectation ; The Binomial Distributio Other Types of Distributio	Theory computer software	Classwork & Homework
8	2	The Normal Distribution	Normal Distributions ; Applications of the Norma Distribution	Theory computer software	Classwork & Homework

			The Central Limit Theorer		
9	2	The Normal Distribution	he Normal Approximation the Binomial Distribution	Theory computer software	Classwork & Homework
10	2	Confidence Intervals and Sample Size	Confidence Intervals for th Mean When s Is Known Confidence Intervals for th Mean When s Is Unknown ; Confidence Intervals and Sample Size for Proportions ; Confidence Intervals for Variances and Standard Deviations	Theory computer software	Classwork & Homework
11	2	Hypothesis Testing;	teps in Hypothesis Testing- Traditional Method ; z Test for a Mean ; t Test for a Mean Test for a Proportion; x2 T for a Variance or Standard Deviation Additional Topics Regardi Hypothesis Testing	Theory computer software	Classwork & Homework
12	2	Testing the Difference Between Two Means	Testing the Difference Between Two Means: Using the z Test ; Testing the Difference Between Two Means of Independent Samples: Using the t Test	Theory computer software	Classwork & Homework
13	2	Testing the Difference Between Two Means	Testing the Difference Between Two Means: Dependent Samples ; Testing the Difference Between Proportions ; Testing the Difference Between Two Variances	Theory computer software	Classwork & Homework
14	2	Correlation and Regression.	Scatter Plots and Correlation ; Regression	Theory computer software	Classwork & Homework

15	2	Correlation and Regression.	Coefficient of Determination and Standard Error of the Estimate ; Multiple Regression (Optional)	Theory computer software	Classwork & Homework

11. Course Evaluation

Formative assessment: Quizzes 2; Homework assignments 2; Onsite assignments 2 ; Project 1 using MIN-Lab (30 %)

Final Exam: 70%

Total assessment: 100% (100 Marks)

12.Learning and Teaching Resources

Required textbooks (curricu books, if any)	**Elementary Statistics: A Step-by-Step Approach, by Allan G. Bluman, 9th edition.**
Main references (sources)	Elementary Statistics by Mario Triola, 9th Edition. Engineering Statistics by Douglas C. Montgomery, Fifth Edition.
Recommended books and references (scientific journals, reports...)	Statistics for Engineering and the Sciences, by William Mendenhall and William Mendenhall, 5th Edition. Applied Statistics and Probability for Engineers, 3rd Edition, by Douglas C. Montgomery and George C. Runger. Probability, Statistics, and Decision for Civil Engineering, by Jack R. Benjamin and C. Allin Cornell. Applied Statistics for Civil and Environmental Engineers, 2nd Edition, by N. T. Kottegoda, and R. Rosso
Electronic References, Websi	https://engineering.mu.edu.iq/, https://classroom.google.com/c/Nzc1MTcwMDQwNDcw?cjc=6ytd2xhn

Course Description Form

1. Course Name:	
Advanced Mathmatics	
2. Course Code:	
MS−C105	
3. Semester / Year:	
First Semester / 2025−2026	
4. Description Preparation Date:	
01/09/2025	
5. Available Attendance Forms:	
Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30 hours	
7. Course administrator's name (mention all, if more than one name)	
Name: Basim Jabbar Abbas Email: basim.jabar@mu.edu.iq	
8. Course Objectives	
Course Objectives	Teaching graduate students how to form and solve mathematical models and the scientific methods for solving equations related to engineering models, as well as learning about the traditional and modern methods used to extract the values of variables for mathematical models and the differential equations that are formed.
9. Teaching and Learning Strategies	
Strategy	Teaching strategies include lectures, classroom assignments, student discussion groups, exams, and some time presentations.

10. Course Structure					
Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1	*2*	Ordinary Differential Equations (ODEs)-First-Order ODEs-Solving Linear Differential Equations-Basic Concepts.	Ordinary Differential Equations	*presence*	*Discussion and examination*
Week-2	*2*	Modeling-Second-Order Linear ODEs. Modeling of Free Oscillations of a Mass–Spring System-Leaking Tank. Outflow of Water Through a Hole (Torricelli's Law-Mixing Problem .	Modeling-Second-Order Linear ODEs	*presence*	*Discussion and examination*
Week-3	*2*	Ordinary Differential Equations (ODEs)-Separable Equations-Second-Order Linear ODEs	(ODEs)-Separable Equations	*presence*	*Discussion and examination*
Week-4	*2*	Euler–Cauchy Equations	Euler–Cauchy Equations	*presence*	*Discussion and examination*
Week-5	*2*	Homogeneous Linear ODE: Superposition Principle, General Solution-Homogeneous Linear ODEs with Constant Coefficients.	Homogeneous Linear ODE	*presence*	*Discussion and examination*
Week-6	*2*	Higher Order Linear ODEs- Homogeneous Linear ODEs	Higher Order Linear ODEs	*presence*	*Discussion and examination*
Week-7	*2*	Series Solutions of ODEs. Special Functions	Series Solutions of ODEs	*presence*	*Discussion and examination*
Week-8	*2*	Laplace Transforms	Laplace Transforms	*presence*	*Discussion and examination*
Week-9	*2*	Fourier Analysis.Partial Differential Equations (PDEs)	Fourier Analysis.Partial Differential Equations (PDEs)	*presence*	*Discussion and examination*

Week-10	*2*	Arbitrary Period. Even and Odd Functions. Half-Range Expansions	Arbitrary Period	*presence*	*Discussion and examination*
Week-11	*2*	Fourier Cosine and Sine Transforms	Fourier Cosine and Sine Transforms	*presence*	*Discussion and examination*
Week-12	*2*	Orthogonal Series. Generalized Fourier Series	Orthogonal Series	*presence*	*Discussion and examination*
Week-13	*2*	Partial Differential Equations (PDEs)	Partial Differential Equations (PDEs)	*presence*	*Discussion and examination*
Week-14	*2*	Modeling: Vibrating Spring, Wave Equation	Modeling: Vibrating Spring	*presence*	*Discussion and examination*
Week-15	*2*	Solution by Separating Variables.Use of Fourier Series	Solution by Separating Variables	*presence*	*Discussion and examination*

11. Course Structure/ Lab

Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1					
Week-2					
Week-3					
Week-4					
Week-5					
Week-6					
Week-7					
Week-8					
Week-9					
Week-10					
Week-11					
Week-12					
Week-13					
Week-14					
Week-15					

12. Course Evaluation

Distributing the score out of 100 as:
30% according to the daily discussion and monthly examinations.
70% as final examination.

13. Learning and Teaching Resources

Required textbooks (curricular boo if any)	**Advanced Engineering Mathematics by erwin kreyszig.10th.Edition**
Main references (sources)	**advanced engineering mathematics by Dennis G. Zill 7th edition**
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

14. Course Name:	
Finite Element Analysis	
15. Course Code:	
MS-201	
16. Semester / Year:	
Second Semester / 2025–2026	
17. Description Preparation Date:	
01/09/2025	
18. Available Attendance Forms:	
Attendance	
19. Number of Credit Hours (Total) / Number of Units (Total)	
30 Hours	
20. Course administrator's name (mention all, if more than one name)	
Name: Othman Hameed Zinkaah Email: Othman.h.zinkaah@mu.edu.iq	
21. Course Objectives	
Course Objectives	1. Understand the basic principles and applications of FEM. 2. Formulate and solve finite element models for beams, trusses, plates, and shell elements. 3. Develop strain–displacement relationships and analyze plane stress/strain problems. 4. Apply commercial software such as ABAQUS for modeling and analysis. 5. Interpret results and critically assess modeling assumptions.
22. Teaching and Learning Strategies	
Strategy	• Learn fundamental FEM principles and element formulations through lectures. • Solve numerical problems for beams, trusses, plates, and shell elements in tutorials. • Model and analyze structures using ABAQUS in lab sessions. • Complete assignments, reports, and quizzes to reinforce understanding and practical skills.

23. Course Structure

Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1	*2*	Explain the fundamental concepts and applications of FEM.	Introduction	Lecture, discussion	Quiz
Week-2	*2*	Derive stiffness formulation procedure for structural elements.	General Method for Deriving Stiffness Matrix	Lecture, derivation	Homework
Week-3	*2*	Formulate stiffness matrix of prismatic and non-prismatic beam elements.	Beam Elements	Lecture, problem solving	Assignment
Week-4	*2*	Develop truss element equations (prismatic & non-prismatic).	Truss Elements	Lecture, tutorial	Quiz
Week-5	*2*	Formulate torsion element stiffness relations.	Torsion Elements	Lecture, worked examples	Homework
Week-6	*2*	Analyze pile elements using FEM formulation.	Pile Elements	Lecture, case study	Assignment
Week-7	*2*	Apply plane stress and plane strain formulations.	Plane Stress & Strain	Lecture, numerical examples	Midterm Exam
Week-8	*2*	Develop strain–displacement relationships for 2D problems.	Strain–Displacement Relationship	Lecture, derivation practice	Homework
Week-9	*2*	Formulate bending equations of thin flat plates.	Bending of Thin Flat Plates (Part I)	Lecture	Quiz
Week-10	*2*	Construct triangular finite elements.	Triangular Elements	Lecture, computational examples	Assignment
Week-11	*2*	Formulate rectangular & quadrilateral elements.	Quadrilateral Elements	Lecture, derivation	Homework
Week-12	*2*	Evaluate rectangular element with 8 DOF.	Rectangular Element (8 DOF)	Lecture, analytical modeling	Quiz
Week-13	*2*	Analyze advanced bending behavior of thin plates.	Bending of Thin Flat Plates (Part II)	Lecture	Assignment
Week-14	*2*	Formulate and analyze flat shell elements.	Flat Shell Element	Lecture, modeling session	Project
Week-15	*2*	Develop and validate FEM models using commercial software.	FE Computer Programs – ABAQUS as an example	Computer Lab, practical training	Final Project / Oral Presentation

24. Course Evaluation
Final Written Exam/ 70 Midterm Exam /10 Monthly Exams / 10 Software Report (ABAQUS Project) / 10

25. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1. Bathe, K.J., "Finite Element Procedures", 2nd Edition, Prentice Hall, 1996. 2. Cook, R.D., Malkus, D.S., Plesha, M.E., "Concepts and Applications of Finite Element Analysis", 4th Edition, Wiley, 2002. 3. Reddy, J.N., "Introduction to the Finite Element Method", 3rd Edition, McGraw-Hill, 2006.
Main references (sources)	1. Zienkiewicz, O.C., Taylor, R.L., "The Finite Element Method: Its Basis and Fundamentals", Elsevier, 2000. 2. Segerlind, L., "Applied Finite Element Analysis", 2nd Edition, Wiley, 1984. 3. Rao, S.S., "Finite Elements in Engineering", Butterworth-Heinemann, 2011.
Recommended books and references (scientific journals, reports…)	1. Journals: *Finite Elements in Analysis and Design*, "Engineering Computations*, *Computers & Structures". 2. Technical Reports: American Concrete Institute (ACI) reports, American Society of Civil Engineers (ASCE) technical papers.
Electronic References, Websites	1. ABAQUS Documentation: https://www.3ds.com/products-services/simulia/products/abaqus/ 2. MIT OpenCourseWare – Finite Element Method: https://ocw.mit.edu/courses/mechanical-engineering/ 3. NPTEL – Finite Element Method Video Lectures: https://nptel.ac.in/courses/112/105/112105066/ 4. Research Databases: ScienceDirect, SpringerLink, Wiley Online Library.

Course Description Form

1. Course Name:
Scientific Research Methodology
2. Course Code:
MS−202
3. Semester / Year:
First Semester / 2025−2026
4. Description Preparation Date:
01/09/2025
5. Available Attendance Forms:
Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
30
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Isam Alyaseri Email: ialyase@mu.edu.iq:
8. Course Objectives

Course Objectives	Upon successful completion of this course, students are expected to be able to: (a) Understand the eight steps for successful research conducting. (b) Understand how to recognize problems in your field, conduct a literature review to the publications related, and set a course for research in this field. (c) Increase skills in writing proposals and reports, collecting and treating data, understanding results, forming conclusions, setting recommendations, and providing professional presentations. (d) Increase ability to write abstracts, introductions, methodologies, results' reports, and use citation to your work.

9. Teaching and Learning Strategies	
Strategy	Effective teaching and learning strategies for research methodology focus on active learn blending theoretical knowledge with practical, hands-on experience. Key approac include: case study analyses, research-based inquiry, and scaffolded, cumula assignments (e.g., developing a hypothesis, collecting and then data analysis). These meth promote critical thinking and engagement. For example, the case study method: analyz published research to understand methodology application, strengths, and weaknesses, w the peer review & discussion means using "muddiest point" (identifying least clear conce and peer review of work to improve understanding.

10. Course Structure					
Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1	*2*	**Introduction:** Reasons for doing research and the applications, paradigms, types, characteristics, and requirements of research processes. What to research, planning and conducting a study.			Assignment No. 1
Week-2	*2*	**Step I:** Conducting literature review, developing theoretical framework, formulating a research problem, and establishing operational definitions.			Assignment No. 2
Week-3	*2*	Step I: Identifying variables, types of variables, constructing hypotheses, testing hypotheses, and use of hypotheses in qualitative research.			Assignment No. 3
Week-4	*2*	**Step II:** Research design, important functions of research design, and theory of causality and the research design.			Assignment No. 4
Week-5	*2*	**Step II:** Differences between quantitative and qualitative study designs and strengths and weaknesses of different study designs.			Assignment No. 5
Week-6	*2*	**Step III:** Constructing an instrument for data collection, selecting a method of data collection, and major approaches to information gathering.			Assignment No. 6
Week-7	*2*	**Step III:** Constructing an instrument for data collection, attitudinal scales, developing an attitudinal scale, and measurement scales.			Monthly test-1
Week-8	*2*	**Step III:** Constructing an instrument for data collection, types of validity in quantitative research, and concept of reliability.			Assignment No. 7
Week-9	*2*	**Step IV**: Selecting a sample, differences between sampling in qualitative and quantitative research, and types of sampling.			Assignment No. 8
Week-10	*2*	**Step V:** Writing a research proposal, purpose of a research proposal in quantitative and qualitative research, and how to structure it?			Assignment No. 9
Week-11	*2*	**Step VI:** Collecting data, research stakeholders, and ethical issues to consider research participants,			Assignment No. 10

		researcher, and sponsoring organization.			
Week-12	*2*	**Step VII:** Processing and displaying data, edit and prepare data for coding, coding data in qualitative and quantitative studies, and role of statistics.			Monthly test-2
Week-13	*2*	**Step VII:** Processing and displaying data, and methods of communicating and displaying analyzed data in quantitative and qualitative research.			Assignment No. 11
Week-14	*2*	**Step VIII:** Writing a research report, develop an outline for a research report, different referencing systems, and writing a bibliography.			Assignment No. 12
Week-15		**Practicing Evaluation:** process for using evaluation to develop an intervention, different perspectives in classification, and process of evaluation.			Review

11. Course Structure/ Lab

Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1					
Week-2					
Week-3					
Week-4					
Week-5					
Week-6					
Week-7					
Week-8					
Week-9					
Week-10					
Week-11					
Week-12					
Week-13					
Week-14					
Week-15					

12. Course Evaluation

30% Student annual effort, 70% final

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Kumar, R. (2018). "Resear methodology: A step-by-step guide beginners". Sage.

Main references (sources)	Singh, Y. K. (2006). "Fundamental research methodology and statistic New Age International.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Technical English Language (II)	
2. Course Code:	
MS-203	
3. Semester / Year:	
Second Semester / 2025-2026	
4. Description Preparation Date:	
01/09/2025	
5. Available Attendance Forms:	
Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30 hrs. /1 Unit	
7. Course administrator's name (mention all, if more than one name)	
Name: Assist. Prof. Amjad M. F. Hussein Email: Amjad.muhamad@mu.edu.iq	
8. Course Objectives	
Course Objectives	(a) Understand the five steps for successful reading and writing in English. (b) Understand how to use abbreviations in the engineering field and writing resume, progress report, activity report, test report, special purpose internal proposal, and questionnaire. (c) Increase skills in reading and writing memos and bar graphs, and use headings in a document. (d) Increase the ability to provide professional presentations and meetings. (e) Increase ability to write abstracts and use citation.
9. Teaching and Learning Strategies	
Strategy	An ability to apply knowledge of English Language; Reading, Writing, Speaking and Listening

10. Course Structure					
Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1	*2*	*D4, D3, D2, D1*	Introduction to the steps for technical reading and writing in English.		Quiz
Week-2	*2*	*D4, D3, D2, D1*	Establishing purpose, identifying audience or readers, considering a context for writing, determining scope and coverage, and selecting the medium.		*Report*
Week-3	*2*	*D4, D3, D2, D1*	Brainstorm to determine what you already know and conduct research. Take note, interview for information, create and use questionnaires, avoid plagiarism, and document sources		*Seminar*
Week-4	*2*	*D4, D3, D2, D1*	Checking your writing: error correction – punctuate on and spelling. Writing an informal email		*Exam*
Week-5	*2*	*D4, D3, D2, D1*	Student Résumé for an entry level position (highlighting professional credentials). Writing résumé for applicant with management experience.		Quiz
Week-6	*2*	*D4, D3, D2, D1*	Advanced Résumé: Showing promotion within a single company, and combining functional and chronological elements.		*Report*
Week-7	*2*	*D4, D3, D2, D1*	Progress reports, activity reports, test reports, special purpose internal proposals, and questionnaires.		*Seminar*
Week-8	*2*	*D4, D3, D2, D1*	Writing a progress report, activity report, test report, special purpose internal proposal, and questionnaire. (continue)		*Exam*
Week-9	*2*	*D4, D3, D2, D1*	Typical Memo Format (Printed with Sender's Handwritten Initials)		Quiz
Week-10	*2*	*D4, D3, D2, D1*	Bar graph (quantities of different items during a fixed period). Bar (column) graph (showing the parts that make up the whole)		*Report*
Week-11	*2*	*D4, D3, D2, D1*	Headings used in a document.		*Seminar*
Week-12	*2*	*D4, D3, D2, D1*	Presentations and Meetings. Meeting agenda, e-mail to accompany an agenda, minutes of a meeting, slides for a presentation.		*Exam*
Week-13	*2*	*D4, D3, D2, D1*	Informative abstract		Quiz
Week-14	*2*	*D4, D3, D2, D1*	Documenting sources (e.g. APA, IEEE, MLA, etc.)		*Report*
Week-15	*2*	*D4, D3, D2, D1*	Final exam (date to be assigned later)		*Seminar*

11. Course Structure/ Lab					
Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1					
Week-2					

Week-3					
Week-4					
Week-5					
Week-6					
Week-7					
Week-8					
Week-9					
Week-10					
Week-11					
Week-12					
Week-13					
Week-14					
Week-15					

12. Course Evaluation	
Quiz; 15 Mark, Exam; 10 Mark, Seminar; 5 Marks Final Exam; 70 Mark	
13. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Philpot, S., & Curnick, L. (2013). Headway Academic Skills: Reading, Writing, and Study Skills: Level 2: Student's Book. Oxford University Press.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Airport Engineering
2. Course Code:
MS−C201
3. Semester / Year:
Second Semester / 2025−2026
4. Description Preparation Date:
01/02/2026
5. Available Attendance Forms:
Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
30
7. Course administrator's name (mention all, if more than one name)
Name: Noorance Ali Razzaq Email: noorance@mu.edu.iq
8. Course Objectives

Course Objectives	• to study airport planning and forecasting of air transport. • to achieve efficient air transport. • to enhance geometric design of airport and pavement.
9. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises in the field of airport engineering, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure

Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1	*2*	Understanding airport layout	*Introduction*	Attendance	Daily oral & exam
Week-2	*2*	Understanding airport types and services	*Airport classification*	Attendance	Daily oral & exam

Week-3	*2*	Understanding airport planning	*Airport Planning*	Attendance	Daily oral & exam
Week-4	*2*	Understanding analysis of air transport	*Forecasting Air Transport Demand*	Attendance	Daily oral & exam
Week-5	*2*	Understanding analysis of air transport	*Forecasting Air Transport Demand*	Attendance	Daily oral & exam
Week-6	*2*	Understanding Aircraft design	*Aircraft Characteristics*	Attendance	Daily oral & exam
Week-7	*2*	Monthly exam 1	-	Attendance	Monthly exam
Week-8	*2*	Understanding geometric design	*Geometric Design - Runways*	Attendance	Daily oral & exam
Week-9	*2*	Understanding geometric design	*Geometric Design - Taxiway*	Attendance	Daily oral & exam
Week-10	*2*	Understanding geometric design	*Geometric Design - Apron*	Attendance	Daily oral & exam
Week-11	*2*	Understanding geometric design	*Airport Pavement Design - Rigid Pavement*	Attendance	Daily oral & exam
Week-12	*2*	Understanding geometric design	*Airport Pavement Design - Composite Pavement*	Attendance	Daily oral & exam
Week-13	*2*	Understanding geometric design	*Airport Pavement Design - Flexible Pavement*	Attendance	Daily oral & exam
Week-14	*2*	Monthly exam 2	-	Attendance	Monthly exam
Week-15	*2*	-	*Presentation*	Attendance	Daily oral

11. Course Structure/ Lab

Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1					
Week-2					
Week-3					
Week-4					
Week-5					
Week-6					
Week-7					
Week-8					
Week-9					
Week-10					
Week-11					
Week-12					
Week-13					
Week-14					
Week-15					

12. Course Evaluation

1. **Semester Coursework: 30%, including:**
- Monthly examinations: 20%
- Homework assignments: 5%

• Classroom activities: 5% 2. **Final Examination: 60%**

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	AASHTO, "Guide for Design of Pavement Structures", 1993
Main references (sources)	Horonjeff, R. and Mc-Kelvey , X." Planning and Design of Airports" , 4th edition ,McGrew Hill, 1994
Recommended books and references (scientific journals, reports…)	1- International Civil Aviation Organization (ICAO). International Standards and Recommended Practices, Aerodromes, Annex 14 to the Convention on International Civil Aviation, Volume 1 Aerodrome Design and Operations, 3rd edition, International Civil Aviation Organization, 2004. 2- Alexander T. Wells, & Seth B. Young "Airport planning and Management" 5ed , McGrew Hill, 2004.
Electronic References, Websites	

Course Description Form

1. Course Name:
Railway engineering
2. Course Code:
MS-C202
3. Semester / Year:
Second Semester / 2025-2026
4. Description Preparation Date:
01/09/2025
5. Available Attendance Forms:
Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
30
7. Course administrator's name (mention all, if more than one name)
Name: Dr Mohammed Bally Mahdi Email: engmohbaly@mu.edu.iq
8. Course Objectives

Course Objectives	The Railway Engineering course aims to provide students with fundamental knowledge of railway components and engineering design principles, an understanding of train motion and the forces acting upon them, and the calculation of lateral inclination and safe speed on curves. It also aims to develop the ability to design horizontal and vertical alignments, study operating and safety systems, and prepare engineers capable of efficiently and safely implementing, operating, and maintaining railway lines according to modern engineering standards.

9. Teaching and Learning Strategies	
Strategy	Teaching strategies include in-person lectures, classroom assignments, student discussion groups, exams, and presentations.

10. Course Structure					
Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1	*2*	Introduction to Railway Transportation	Introduction to Railway Transportation	Attendance	discussion
Week-2	*2*	Track Gauge and Components of Railway Track	Track Gauge and Components of Railway Track	Attendance	*discussion*
Week-3	*2*	Rails	Rails	Attendance	*quiz*
Week-4	*2*	Sleepers and Ballast	Sleepers and Ballast	Attendance	*quiz*
Week-5	*2*	Track Geometry – Horizontal Alignment	Track Geometry – Horizontal Alignment	Attendance	*Reports*
Week-6	*2*	Superelevation (Cant)	Superelevation (Cant)	Attendance	discussion
Week-7	*2*	Transition Curves	Transition Curves	Attendance	monthly exam
Week-8	*2*	Vertical Alignment	Vertical Alignment	Attendance	discussion
Week-9	*2*	Train Resistance	Train Resistance	Attendance	discussion
Week-10	*2*	Traction and Hauling Capacity	Traction and Hauling Capacity	Attendance	*quiz*
Week-11	*2*	Points and Crossings (Turnouts)	Points and Crossings (Turnouts)	Attendance	discussion
Week-12	*2*	Railway Signaling and Safety Systems	Railway Signaling and Safety Systems	Attendance	*Reports*
Week-13	*2*	Maintenance of Railway Track	Maintenance of Railway Track	Attendance	discussion
Week-14	*2*	Railway Stations and Yards	Railway Stations and Yards	Attendance	discussion
Week-15	*2*	Revision + Midterm/Final Assessment or Project Presentation	Revision + Midterm/Final Assessment or Project Presentation	Attendance	*monthly exam*

11. Course Structure/ Lab					
Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1					
Week-2					
Week-3					
Week-4					
Week-5					
Week-6					
Week-7					
Week-8					
Week-9					
Week-10					
Week-11					
Week-12					
Week-13					
Week-14					
Week-15					

12. Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
13. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	A Textbook of Railway Engineering by S. P. Aror S. C. Saxena
Main references (sources)	• Railway Engineering (2nd Edition) by V Profillidis • Fundamentals of Railway Design by Ma Guerrieri
Recommended books and references (scientific journals, reports…)	Infrastructure Design, Signalling and Security Railway
Electronic References, Websites	Academic journals and conference papers

Course Description Form

1. Course Name:
Advanced Pavement material
2. Course Code:
MS-C203
3. Semester / Year:
First Semester / 2025-2026
4. Description Preparation Date:
01/09/2025
5. Available Attendance Forms:
Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
30
7. Course administrator's name (mention all, if more than one name)
Name: Atheer Muhammed Ali Jasim Email: atheer.muhammed@mu.edu.iq
8. Course Objectives

Course Objectives	The Advanced Pavement Materials course is designed to deepen understanding of modern materials used in road and airfield pavements and how their properties affect performance. Its main objectives typically include: 1. Understand Material Behavior: Develop advanced knowledge of the physical, chemical, and mechanical behavior of pavement materials such as asphalt binders, asphalt mixtures, concrete, and aggregates. 2. Evaluate Material Properties : Learn laboratory and field ,testing methods to characterize materials (e.g., rheology .(stiffness, durability, fatigue, rutting resistance 3. Apply Performance-Based Design: Use performance-related specifications and mechanistic– empirical concepts to select and design pavement materials for different traffic .and environmental conditions 4. Analyze Distress Mechanisms: Understand the causes of ,common pavement distresses (rutting, fatigue cracking thermal cracking, moisture damage) and how material .selection influences them 5. Promote Sustainability and Cost Efficiency: Assess life-cycle performance, environmental impacts, and economic .considerations in selecting pavement materials

	6. Integrate Materials with Pavement Design: Relate material properties to structural pavement design and long-term .performance prediction

9. Teaching and Learning Strategies

Strategy	An Advanced Pavement Materials course strategy is the structured plan used to teach students how modern pavement materials are designed, tested, and applied in real-world road engineering. It .typically combines theory, laboratory work, and practical case studies

10. Course Structure

Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1	*2*	Analyze pavement material performance and failure mechanisms	*Pavement types*	Attendance	**Assignment**
Week-2	*2*	Understand advanced properties of asphalt and concrete materials	*Pavement materials*	Attendance	**Assignment**
Week-3	*2*	Interpret laboratory test results	*aggregates characteristics*	Attendance	**Assignment**
Week-4	*2*	Select suitable pavement materials for different climates	*Asphalt characteristics*	Attendance	**Assignment**
Week-5	*2*	Design advanced asphalt or concrete mixes	*Manufacture, laying and compaction of asphalt*	Attendance	**Quizze**
Week-6	*2*	Apply modern mix design methods	*Types, properties and design of asphalt mixes,*	Attendance	**Quizze**
Week-7	*2*	Apply modern mix design methods	*Types, properties and design of asphalt mixes,*	Attendance	**Quizze**
Week-8	*2*	Apply modern mix design methods	*Types, properties and design of asphalt mixes,*	Attendance	**Quizze**
Week-9	*2*	Propose sustainable pavement solutions	*Sustainability and recycling procedures,*	Attendance	**Quizze**
Week-10	*2*	Propose sustainable pavement solutions	*Latest developments in asphalt pavement technology*	Attendance	*seminar*
Week-11	*2*	Use laboratory and numerical tools in pavement analysis	*Assessment of traffic loading,*	Attendance	*seminar*

Week-12	*2*	Design advanced asphalt mixes	*Structural design of asphalt pavements,*	Attendance	*Homework*
Week-13	*2*	Evaluate sustainability and durability of pavements	*Pavement performance,*	Attendance	*Homework*
Week-14	*2*	Select suitable pavement materials for different climates	*Skid resistance and surface texture*	Attendance	*Report*
Week-15	*2*	Predict pavement distress mechanisms	*Thin surfacing and other surface treatments,*	Attendance	*Report*

11. Course Structure/ Lab

Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1					
Week-2					
Week-3					
Week-4					
Week-5					
Week-6					
Week-7					
Week-8					
Week-9					
Week-10					
Week-11					
Week-12					
Week-13					
Week-14					
Week-15					

12. Course Evaluation

1-Two Quizzes 10% (20), 2- Two seminars 5%(10), 3-Final Exam 70% (70)

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Athanassios Nikolaides. Highway. Engineering. Pavements, Materials and Control of Quality kolaides.
Main references (sources)	Athanassios Nikolaides. Highway. Engineering. Pavements, Materials and Control of Quality kolaides.

Recommended books and references (scientific journals, reports…)	1. Yoder and Witzack, Principles of Pavement Design, John Willey and Sons, October 1975 2. Yang H. Huang, Pavement Analysis and Design, PH, 2nd Edition, 2004. 3. Paul Croney and David Croney, "The Design and Performance of Road Pavements", McGraw Hill, U.S.A., 1998. 4. "AASHTO Guide for Design of Pavement Structures 1993", AASHTO, American Association of State Highway and Transportation Officials, U.S.A., 1993. 5. Oglesby Clarkson H., "Highway Engineering", John Wiley & Sons Inc., U.S.A., 1975.
Electronic References, Websites	https://t.me/+dvca_ٖGjlrkzZTVi

Course Description Form

1. Course Name:
Highway Route Location and Planning
2. Course Code:
MS-C204
3. Semester / Year:
Second Semester / 2025-2026
4. Description Preparation Date:
01/09/2025
5. Available Attendance Forms:
Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
٣٠
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Yousif A. Mousa Email: yousif.mousa@mu.edu.iq
8. Course Objectives

Course Objectives	This unit prepares students with the skills to analyze, plan, and select optimal highway routes through several alternatives by considering topographical, environmental, economic, and social factors. It emphasizes the application of modern design standards, GIS tools, and sustainability principles to develop efficient, feasible, and context-sensitive transportation corridors. Moreover, the principles of horizontal and vertical alignment of highways are also covered, including the geometric design elements required to ensure safety, comfort, and efficiency in highway operation such as curvature, gradients, stopping sight distances, and transition elements.

9. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation theoretically and practically, while at the same time refining and expanding their critical thinking skills. This will be achieved through lectures, interactive tutorials, and by considering fieldwork. Lectures are provided first as a pdf (e.g., in Google class), before being explained in the class. Then, students are given some examples to work on with some help

10. Course Structure

Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1	٢	Introduction to Highway Surveys and Route Location	Introduction to Highway Surveys and Route Location	*Attendance*	Daily Quiz
Week-2	*2*	Principles of Highway Location and Alignment	Principles of Highway Location and Alignment	*Attendance*	Discussion

Week-3	*2*	- Highway Earthwork: Concepts and Methods	- Highway Earthwork: Concepts and Methods	*Attendance*	Daily Quiz and Report
Week-4	*2*	Preparation of Highway Final Plans	Preparation of Highway Final Plans	*Attendance*	Daily Quiz
Week-5	*2*	Fundamentals of Transportation Planning	Fundamentals of Transportation Planning	*Attendance*	Daily Quiz
Week-6	*2*	Transportation Planning Process and Models	Transportation Planning Process and Models	*Attendance*	Reports
Week-7	*2*	Evaluating Transportation Alternatives: Methods and Criteria	Evaluating Transportation Alternatives: Methods and Criteria	*Attendance*	Daily Quiz
Week-8	*2*	Case Studies in Transportation Alternatives Evaluation	Case Studies in Transportation Alternatives Evaluation	*Attendance*	Discussion
Week-9	*2*	Geometric Design of Highways: Fundamentals	Geometric Design of Highways: Fundamentals	*Attendance*	Daily Quiz and Report
Week-10	*2*	Geometric Design – Horizontal Alignment	Geometric Design – Horizontal Alignment	*Attendance*	Daily Quiz
Week-11	*2*	Geometric Design – Vertical Alignment	Geometric Design – Vertical Alignment	*Attendance*	Discussion
Week-12	*2*	*Exam*	*Exam*	*Attendance*	Exam
Week-13	*2*	Integration of Horizontal and Vertical Alignments in Highway Design	Integration of Horizontal and Vertical Alignments in Highway Design	*Attendance*	Daily Quiz
Week-14	*2*	Presentation	Presentation	*Attendance*	Exam
Week-15	*2*	Final Review	Final Review	*Attendance*	Discussion

11. Course Structure/ Lab

Week	*Hours*	*Required Learning Outcomes*	*Unit or subject name*	*Learning method*	*Evaluation method*
Week-1					
Week-2					
Week-3					
Week-4					
Week-5					
Week-6					
Week-7					
Week-8					
Week-9					
Week-10					
Week-11					
Week-12					
Week-13					
Week-14					

Week-15					

12. Course Evaluation

Daily quizzes (5%)
Exams (15%)
Project (10%)
Final exam (70%)

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Garber, N. J., & Hoel, L. A. (2009). *Traffic & High Engineering* (4th ed.)
Main references (sources)	Walker, J., & Witschel. (2020). *Surveying for civil mine engineers*. Springer International Publishing
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	