

Module (Course Syllabus) Catalogue 2023-2024

College/ Institute	College of Engineering		
Department	Highway Engineering		
Module Name	Geotechnic for highway		
Module Code	GFH203		
Degree	Technical Diploma <input type="checkbox"/>	Bachelor <input type="checkbox"/>	
	High Diploma <input type="checkbox"/>	Master <input checked="" type="checkbox"/>	PhD <input type="checkbox"/>
Semester	2 nd (second)		
Qualification	MSc		
Scientific Title	Assistant Lecturer		
ECTS (Credits)	6		
Module type	Prerequisite <input type="checkbox"/>	Core <input checked="" type="checkbox"/>	Assist. <input type="checkbox"/>
Weekly hours	3		
Weekly hours (Theory)	(3) hr Class	(162)Total hrs Workload	
Weekly hours (Practical)	(0)hr laboratory		
Number of Weeks	15		
Lecturer (Theory)	Zina M. Dawood & Ahmed S. Ali		
E-Mail & Mobile NO.	Zina.dawood@epu.edu.iq Ahmed.ali@epu.edu.iq		
Lecturer (Practical)	N/A		
E-Mail & Mobile NO.	N/A		
Websites	N/A		

Course Book

<p>Course Description</p>	<p>This course is a postgraduate course. Studying geotechnics in highway engineering is essential for understanding the behaviour of soil that can support the loads imposed by roads, ensuring stability. It aids in planning earthwork activities and optimizing construction practices for a solid and stable highway base. Geotechnical knowledge is crucial for assessing and mitigating slope instability and preventing landslides along highways. Additionally, it informs material selection and considers environmental factors, contributing to the overall safety, durability, and sustainability of highway infrastructure. In summary, geotechnics plays a pivotal role in addressing challenges and making informed decisions for the successful completion of highway construction projects.</p>
<p>Course objectives</p>	<p>Knowledge of the strain-stress relationship is fundamental to understanding how materials, such as pavement materials, behave under load. This is crucial for designing durable and safe highway structures. Also, to consider the strain-stress behavior of materials when designing highway components, such as bridges, tunnels, and overpasses.</p> <p>Seismic Design: In seismically active regions, understanding waves is essential for designing highway structures that can withstand seismic forces, ensuring the safety of the infrastructure during earthquakes.</p> <p>Slope Stability: Highways often traverse hilly terrain. Retaining walls are used to support soil and prevent landslides or slope failures. Knowledge of retaining wall design is essential for ensuring the stability of highway structures. In urban areas, where space is limited, retaining walls can be used to create level surfaces for highways by supporting or holding back soil.</p>
<p>Student's obligation</p>	<p>Attending the lecture is a fundamental part of the course. You are responsible for material presented in the lecture whether or not it is discussed in the textbook. You should expect questions on the exams to test your understanding of concepts discussed in the lecture and in the homework assignments.</p> <p>It can be beneficial to study with a group. This type of cooperative learning is encouraged; however, be sure that you have a thorough understanding of the concepts besides the mathematical steps used to solve a problem. You must be able to work through the problems on your own.</p> <p>In addition, the students should write a scientific project and prepare a nice presentation that can be discussed on campus.</p>
<p>Required Learning Materials</p>	<p>books, handouts, folders, stationery, printing, and copying facilities.</p>

Evaluation	Task		Weight (Marks)	Due Week	Relevant Learning Outcome
	Paper Review				
	Assign	Homework	5%	4	Cognitive skills
		Attendance	5%	15	
		Report	5%	2	Writing skills
	Quiz		15%	2	understanding skills
	Midterm Exam		20%	2	Knowledge and understanding skills
	Final Exam		50%	1	Knowledge and understanding skills
	Total		100		
Specific learning outcome:	<ol style="list-style-type: none"> 1. Strain-stress relationship is fundamental to understanding how materials, such as pavement materials, behave under load. 2. Seismic Design: In seismically active regions, understanding waves is essential for designing highway structures that can withstand seismic forces, ensuring the safety of the infrastructure during earthquakes. 3. Retaining walls are used to support soil and prevent landslides or slope failures. Knowledge of retaining wall design is essential for ensuring the stability of highway structures. 4. Liquefaction soil behavior under earthquake effects. 				
Course References:	<p>Useful references:</p> <ol style="list-style-type: none"> 1. Advanced Soil Mechanics, by Braja M. Das, third edition, CRC Group, 2008. Or newer editions for all 2- Principles of Soil Dynamics, by Braja M. Das and G. V.Ramana, second edition, 2011. 3- Fundamentals of Soil Dynamics, by Braja M. Das, 1983,Elsevier. 4- Geotechnical Engineering Handbook, by Braja M. Das, J. Ross Publishing, 2011. 5- Principles of Foundation Engineering, by das 				

	6- Dynamics of Structure and Foundation – A Unified Approach, by Indrajit Chowdhury and Shambhu P. Dasgupta, 2009, CRC Press, Balkema. 7- Magazines and review (internet)	
Course topics (Theory)	Week	Learning Outcome
Introduction to Geotechnical Engineering & Stresses and Strains in a Soil Mass	1	Foundation Eng. description
Three dimensional problems	2	Knowledge skills
Mechanical behaviour of road materials	3	Knowledge skills
Rock mechanics	4	Knowledge skills
Nature and Type of Dynamic Loading on Soils	5	Knowledge skills
Fundamentals of Vibration	6	Knowledge skills
Waves in Elastic Medium	7	Knowledge skills
Earthquake and Ground Vibration	8	Knowledge skills
Lateral Earth Pressure on Retaining Walls	9	Knowledge skills
Liquefaction of Soil	10	Knowledge skills
Railway Track Foundation Design	11	Knowledge skills
Climate Change Effect	12	Knowledge skills
Practical Topics	N/P	Learning Outcome
Questions Example Design <ol style="list-style-type: none"> 1. Stress-strain distribution 2. Influence of soil parameters on liquefaction potential. 3. Calculate the increase in vertical soil stress under the road. 		

Extra notes:

External Evaluator

I reviewed the Course Module of Geotechnics for Highway and all the contents compatible with the academic program 2023-2024. Good Luck for our dear MSc students.



Dr. Saad Khalis Essa

Ph.D. MODES (Modelling and Design of Engineering Systems)

Civil Engineering