Module (Course Syllabus) Catalogue

2023-2024

College/ Institute	Erbil Technical Engineering College	
Department	Highway Engineering Techniques	
Module Name	Tunnel Engineering	
Module Code	TUE702	
Degree	Technical Diploma [ ] Bachelor [x] High Diploma [ ] Master [ ] PhD [ ]	
Semester	Seventh	
Qualification	MSc. Geotechnical Engineering	
Scientific Title	Assistant Lecturer	
ECTS (Credits)	6	
Module type	Prerequisite [ ] Core [x] Assist. [ ]	
Weekly hours	4	
Weekly hours (Theory)	(4)hr Class	(162) Total hrs Workload
Weekly hours (Practical)	( )hr Class	( )Total hrs Workload
Number of Weeks	12, 16 with exams	
Lecturer (Theory)	Ahmed Suad Ali	
E-Mail & Mobile NO.	Ahmed.ali@epu.edu.iq	
Lecturer (Practical)		
E-Mail & Mobile NO.		
Websites		

Course Book

Course Description	Increase student knowledge and learn about the field of tunnel engineering including the principals of tunnel construction from the planning to the end in general. As for managing to learn the main components of tunnel body the forces acting on it the difference between methods used for construction and when to be used, the forces acting on tunnel body the e rating of rock mass as most of the tunnel projects in Kurdistan is built into, the lightening, drainage, geometry, ventilation system, lining used, seismic consideration, and other parts related to the field of tunnel engineering.
Course objectives	• Understand the basics of tunnel engineering • Geometry of tunnel sections (limitations and standards) • Standards and limitations for (lightening, ventilation and derange systems) • Loads acting up on tunnels and the stress produced. • Different between construction methods and when to be used and why • General idea about seismic considerations and the general equations used • Rock mass rating and how those can affect the tunnel body and construction • Investigation, survey and planning for such projects • The risk that encloses such infrastructure projects • Blasting plan and how that can be arranged during the construction • The difference between ordinary transportation project and tunnels when and why we need tunnels
Student's obligation	• To attend the classes regularly with minimum absence. • To participate actively in the class discussion and Q&A session • Study on daily basis to digest the class material • To write note off-handouts • Prepared for sudden Quizzes • Vet through the references provided by the lecturer and to solve as much as possible of homework and exercises for the subjective materials. • Prepare the assignment and the seminar as instructed by the lecturer. • Apply practical part if applicable during the year including some rock tests through reports

<table>
<tr><td>Required Learning Materials</td><td colspan="5">Basically, a handout shall be given to the students at the beginning of the academic year. The page-by-page read shall be performed by the lecturer and to illustrate the points with aide of white board whenever necessary. The video clips that illustrate further the subject material shall be illustrated with the aid of overhead projector.
Some seminars will be held and a case study will be a case of discuss during the study year
If applicable some site visits will be arranged according to the situations.</td></tr>
<tr><td rowspan="11">Evaluation</td><td colspan="2">Task</td><td>Weight (Marks)</td><td>Due Week</td><td>Relevant Learning Outcome</td></tr>
<tr><td colspan="2">Paper Review</td><td></td><td></td><td></td></tr>
<tr><td rowspan="6">Assignments</td><td>Homework</td><td>10%</td><td></td><td></td></tr>
<tr><td>Class Activity</td><td>2%</td><td></td><td></td></tr>
<tr><td>Report</td><td rowspan="4">16%</td><td></td><td></td></tr>
<tr><td>Seminar</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td></td></tr>
<tr><td colspan="2">Quiz</td><td>8%</td><td></td><td></td></tr>
<tr><td colspan="2">Lab.</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Midterm Exam</td><td>24%</td><td></td><td></td></tr>
<tr><td colspan="2">Final Exam</td><td>40%</td><td></td><td></td></tr>
<tr><td colspan="2">Total</td><td>100%</td><td></td><td></td></tr>
<tr><td>Specific learning outcome:</td><td colspan="5">By the end of the current course, the student shall be able to learn the major activities related to the basics and standardized tunnel engineering projects which is the least portion to be learned in order to manage working through tunnel projects in the future. The student will be capable to identify when to use tunnels and where rather than other transportation projects, have a clue about the methods of tunnelling and when they can be used under what circumstances. Learn about the forces and stresses acting upon such body and how to rate the rock that will be used, learn about the blasting plan since it is one of the major parts in construction and what we can handle through and how beside other consideration depending on the standards and references available.</td></tr>
<tr><td>Course References:</td><td colspan="5">▪ Tunnel Engineering Handbook: Elwyn H. King and Thomas R. Kuesel 2nd edt. 2004
▪ A history of tunnels: patrick beaver; 1973
▪ Tunneling and Tunnel Mechanics: Dimitrios Kolymbas, 2005</td></tr>
</table>

	▪**PRACTICAL TUNNEL CONSTRUCTION**: Gary B. Hemphill, 2013 Rock Mechanics: Das, 2013, and some other references which related to subjects

Course topics (Theory)	Week	Learning Outcome
Introduction to tunnel engineering	1	basic terms, general classifications tunnel over view
Site Condition Investigation and Surveying	1	including general idea about site condition investigation, collection and review of data, types of survey in general.
geometric Configurations	2	**cross section requirement, practical and theoretical capacity**
Construction Methods	1	**including general description about the famous methods used in tunnel construction and advantages and disadvantages of those.**
rock mechanics	3	**include the most famous and used rating for rocks since the tunnelling mostly is built through rock, and how to calculate the stress on the tunnel crown**
Tunnelling in Weak Ground	1	**deals with main methods for soft soil and settlement measurement in transvers direction.**
Tunnel lining in general	1	**General view for the main lining of tunnel components and the type on concrete mix used and what is the benefits of that.**
Tunnel Ventilation & Lightening systems	1	**Include general ideas and standards for these systems and their components including fire system approaches.**
Tunnel Blasting	1	**include general idea about blasting and blasting effect as a part of some construction methods.**
Tunnel Drainage system	1	**in general, and how we can use a reasonable system for tunnel.**
Seismic Considerations	1	**general ideas with the most used equations to be used in calculations and to be considered.**
maintains and rehabilitation of tunnel system	1	**types of scheduled maintains and monitoring.**

Practical Topics	Week	Learning Outcome

Questions Example Design: handed out to students

Extra notes:

In spite of the fact that, the topics applied previously sounds rich but the Tunnel Engineering subject is related to different subjects including (soil mechanics, structural analysis, geometric design, surveying, pavement design, fluid mechanics, traffic engineering, management & material technology) courses. A close coordination shall be conducted with those courses lecturers to ensure the full convey of information to the receiver (the student). The topics shall be enriched year by year and kept it in contact with latest technology developed worldwide in the science of Geotechnical Engineering.

External Evaluator

The syllabus listed earlier are scientifically and logically demonstrates the Tunnel subject based on subject matter and are satisfactory.

Assistant Professor Dr. Rizgar Ali Hummadi