Module (Course Syllabus) Catalogue

2025-2026

College/ Institute	Erbil Technology College	
Department	Road Construction	
Module Name	Road Construction Equipment	
Module Code	RCE301	
Degree	Technical Diploma ■ Bachelor ☐ High Diploma ☐ Master ☐ PhD ☐	
Semester	3	
Qualification		
Scientific Title		
ECTS (Credits)	5	
Module type	Prerequisite ☐ Core ■ Assist. ☐	
Weekly hours	3	
Weekly hours (Theory)	(3)hr Class	(135)Total hrs Workload
Weekly hours (Practical)	(0)hr Class	(0)Total hrs Workload
Number of Weeks	14	
Lecturer (Theory)	Firas Fawzi Jirjees	
E-Mail & Mobile NO.	firas.jirjees@epu.edu.iq	
Lecturer (Practical)	Firas Fawzi Jirjees	
E-Mail & Mobile NO.	firas.jirjees@epu.edu.iq	
Websites		

Course Book

Course Description	This course is one of the major courses for the second year students in road construction department and aims to introduce students to the kinds of construction equipment (especially those used in road construction) and studied in detail with focusing on main job performed by each of them, the following points represent main course articles: 1. All facilities are held on the ground that must be prepared by the proper equipment and designs should be prepared for any project and that sometimes require the improvement of soil properties within the process of road construction. Differences in the quality of the ground material and design levels makes equipment selection vary accordingly. 2. The possibility of owning or renting the equipment in projects have special economic and feasibility studies that must be considered before making a decision as there are special specifications for each type of machinery used in road works where we must choose the proper equipment to achieve high efficiency, quality and economical in cost and speed of delivery. 3. Tunnel construction requires the use of certain equipment and technologies, the selection of proper technologies and equipment should consider all the parameters affecting the construction process. 4. Asphalt plant is a group of high-tech equipment, there is two main types depending on the production quality and speed of production. **Official Course language is: English language** **Passing score is: 60 out of 100** **Course weekly hours: 3 hours (2 theoretical + 1 Tutorial)** **Score distribution: 60% (during the year evaluations and exams) + 40% (end of the year exams)**
Course objectives	This course is prepared to provide a comprehensive understanding about the main principles of equipment used in road construction in such a way that the tutees will gain theoretical and practical experience that enable them to work after graduation according to scientific approach also to achieve the following objectives: a) Knowledge of engineering fundamentals in the selection of construction equipment and machinery to clarify the difference between the standard and special machines. b) Feasibility account to own and operate the machines for making the right decision in owning or leasing and calculate the cost of the depreciation of the machines. c) Introduce all kinds of machinery and equipment used in road construction and the

	main function of each of them and how to select the right ones to certain work. Students will be able to decide on number of the machines needed to complete certain work to achieve maximum efficiency. d) Site visits to road projects under construction or while maintenance.
Student's obligation	a) Students should attend the theoretical lectures (2 hours weekly) and also should attend the tutorial lectures (1 hour weekly). b) Students requested to match deadlines for submitting their reports and assignments given by the lecturer. c) Students should be ready for unannounced short quizzes from previous lectures. d) Students are requested to provide detailed reports for the scientific visits arranged to the projects under construction. e) Students should prepare themselves for the semester's major exams both the theoretical and practical parts (announced exams). f) Missed classes will not be compensated including the quizzes and the scheduled assignments.
Required Learning Materials	

Evaluation

Task		Weight (Marks)	Due Week	Relevant Learning Outcome
Paper Review				
Assignments	Homework	**10%**	3-14	1, 2,4
	Class Activity	**2%**	3-14	1- 6
	Report	**16%**	3-14	1, 3, 4, 5, 6
	Seminar		7	5
	Essay			
	Project			
Quiz		**8%**	3, 5, 7, 13	1-6
Lab.				
Midterm Exam		**24%**	9, 10	
Final Exam		**40%**	15,16	
Total		**100%**		

Specific learning outcome:	1- Identify the engineering basis in the selection of road construction equipment (machinery). 2- Calculate the cost of owning and operating of equipment for making the right decision in owning or leasing. 3- Study the new technologies for soil stabilizations as well as tunneling and to know the equipment used for this purpose.

	4- Recognize different types of equipment and machinery used in projects of roads constructions and their main functions and specifications and they should be able to select which is the most suitable in performing a specific task during project implementation (in terms of less cost, better quality, less time, less labor demands). 5- Knowledge of the production process and main units (high-tech equipment) of Asphalt Plant (Asphalt Factory). 6- Knowledge of tunnels construction equipment and main construction technologies.
Course References:	1- Highway Design Manual, Republic of Iraq, Road & traffic Division, 1982. 2- Douglas D. Gransberg, Calin M. Popescu and Richard C. Ryan, 2006. Construction Equipment Management for Engineers, Estimators and Owners, CRC Press Taylor & Francis Group, 2006. 3- Earth Roads, John M. Morris MBE, Granfield University, Second Edition, 1995. 4- هندسة التبليط الاسفلتي، نامق حويز احمد – محمد حسين رسول، الطبعة الثالثة المنقحة، 2013م. 5- Internet reference. https://www.kaushikengineeringworks.com/top-7-road-construction-equipment-tools-and-their-uses/ https://theconstructor.org/construction/heavy-construction-equipment-types/26305/ 6- Short videos for road construct and road equipment from internet. https://www.youtube.com/results?search_query=road+construct+and+road+equipment

ECTS:

Y. H. R.

Erbil Polytechnic University
Erbil Technology College
Road Construction Department
Program: Technical Diploma (120 ECTS)

Select: Min.
1 ECTS = 27 working hours

Total No. of Weeks/Semester: 20 weeks

Lecturer Name: Firas Fawzi Jirjees

Module Name: Road Construction Equipment | ECTS = 5 | Theory: 2 | Practical: | Tutorial: 1

Module Code: RCE301 | Group: All

ECTS Workload Calculation Form

Activity	S	Description		Activity Type	No.	T.F. Range Min	T.F. Range Max	Specefic T. F.	Time Factor	Workload
Course		Theory	In class	f	12				2	24
	1		Online	f	0				2	
	2	Preparation (1-2) * Theory Hr.		h	12	2	4	3	3	36
	3	Practical		f	12					
	4	Preparation (1-1.5) * Practical Hr.		h	12					
	5	Tutorial		f	12	1	1		1	12
	6	Preparation (0.5-1.5) * Tutorial Hr.		h	12	0.5	1.5	1	1	12
Site Visists and Lab Experiments	7	Scientific/Field Trips		f	1	2	6	6	6	6
	8	Practical/Lab Reports		h						
Assignment	9	Homework		h	3	1	4	3	3	9
	10	Report		h	2	1	4	2	2	4
	11	Seminar		h	1	2	10	8	8	8
	12	Paper		h						
	13	Essay		h						
	14	Project/Poster		h						
Assessment	15	Quiz		h	3	1	2	2	2	6
	16	Mid Term	Theory	f	1				1	1
	17		Preparation (1.5-3) * Theory Hr.	h	1	3	6	6	6	6
	18		Practical	f	1					
	19		Preparation (1-2) * Practical Hr.	h	1					
	20	Final	Theory	f	1				2	2
	21		Preparation (3-5) * Theory Hr.	h	1	6	10	9	9	9
	22		Practical	f	1					
	23		Preparation (2-4) * Practical Hr.	h	1					

Face to face hours (f)/12 week	4.4	Face to face hours (f)	45
Home hours (h)/16 week	6.8	Home hours (h)	90
Total hours/16 week	10.1	Total hours	135
ECTS (Total hours 135 / 27) ≈ 5		Accept	5

(Min. 12 weeks active lecturing (Including Min Term exams with no stoppingof lectures)+ 3 weeks Final & Re-sit Exams (Including one week break inbetween)

Select time factor range from (Min., Av. or Max) in cell J2, if necessary write specefic time factor in column J.

f: Face to face activity hours h: Household activity hours

Firas Fawzi Jirjees

Lecturer Name and Signature

Department Head Signature and Stamp

Course topics (Theory)	Week	Learning Outcome
✓ Define the term “Road” and illustrate the Hierarchy of roads according to their functions and capacities. ✓ History of the evolution of road construction in terms of raw materials and methods of implementation of the roads. ✓ Engineering bases in the selection of construction equipment (standard and special equipment)	1	1
✓ Illustrate some methods used in calculating depreciation of the machinery.	2	2
✓ Calculate the cost of owning and operating road construction machinery	3	2
✓ Soil stabilization equipment, benefits and describe the process of soil stabilization using lime, cement and asphalt.	4	3
✓ Selecting soil preparation Equipment ✓ The use of Tractors in road construction projects. ✓ Bulldozers types and uses in road construction projects	5	3, 4
✓ Scrapers types, sizes and uses in road construction projects, how to improve Scraper productivity? ✓ Shovels (loaders) and Excavators uses in road projects and how to calculate the productivity of such equipment.	6	3, 4
✓ Dump trucks uses in road projects. Define the number of trucks needed to perform certain work and find the efficiency of dump truck and excavation equipment based on equipment work cycle.	7	4
S3-Mid Term Exam	8	1, 2, 3, 4
✓ Motor Grader uses in roads construction projects. ✓ Water Truck ✓ Soil Compaction Process ✓ Types and uses of Rollers-Compactors such as sheep’s foot, steel wheel, pneumatic tire, vibration rollers, etc.	9	4
✓ Asphalt distribution truck ✓ Asphalt paver main functions, parts and specifications.	10	4
✓ Cold milling machine main functions in road maintenance process. ✓ Core Drilling Machine ✓ Road marking machine	11	4
✓ Asphalt (HMA) production plant, types, units and layout.	12	4, 5
✓ Tunnels: the purpose of constructing tunnels, mechanical tunnels digging, machinery, tunnels ventilation	13	4, 6
S3-Final Exam (First attempt)	14	1, 2, 3, 4, 5, 6

Questions Example Design

Q1/A) Define the following:

1- Soil Stabilization

2- Standard Equipment

Q1/ B) What are the types of Asphalt Plants? Draw a typical layout of each type.

Q2/ A new road project need an excavation work, the given data are:

- Only one excavator of 4 m^3 bucket capacity is excavating a normal soil in this site.
- Material Coefficient = 1.
- The average work cycle time of the excavator is 120 seconds for a rotation angle of 90-degrees.
- The available dump trucks capacity is 20 m^3
- The average work cycle time of the dump trucks is 18 minutes including (hauling trip, dumping and return trip) and excluding the loading time.

Calculate the following:

1- The optimum number of dump trucks needed at this site?

2- The dump trucks operation efficiency (%)?

3- The excavator operation efficiency (%)?

Note: show the equipment work cycle graphically

Q3/ Choose the correct answer:

1) A shovel with a bucket capacity of 2 m^3 can make 25 work cycle in 1 hour to load the dump trucks with hard rocks (material coefficient = 0.75). The shovel productivity is equal to..... per hour

(a) 50 m^3 (b) 37.5 m^3 (c) 84 m^3 (d) 105 m^3

2) One of the factors that helps to improve the productivity of the Scraper is .....

(a) Wetting the soil (b) Using vibration (c) Uphill loading (d) Compacting soil

3) .....is a controlled-access road that designed exclusively for high-speed vehicular traffic.

(a) Arterials (b) Railways (c) Freeways (d) Collectors

4) If the purchase price of Excavator is $115,000 (the estimated useful life is 7 years and the scrap value is estimated at $10,000), then the annual depreciation is.....

(a) $16,428 (b) $20,000 (c) $17,333 (d) $15,000

5) The..... is used for cutting, spreading, leveling of material and produce a precise finished grade.

(a) Drum mixer (b) Sheep's foot roller (c) Bulldozer (d) Motor grader

6) The ..... is the path through the project on which any delay will cause the completion of the entire project to be delayed.

(a) Shortest Path (b) Earliest time (c) Critical Path (d) Latest time

7) ..... are used for the quick, highly precise and efficient removal of asphalt and concrete pavements.

(a) Scrapers (b) Cold milling machines (c) Bulldozers (d) Motor Graders

8) When using Tunnel Boring Machines (TBM) in metro tunnel digging then the tunnel cross section is most likely.....

(a) Rectangular (b) Square (c) Circular (d) Horseshoe

Q4/ Calculate the cost per hour to own and operate a Crawler Bulldozer.

The given data are:

- The total cost of the Bulldozer= $ 150,000.
- The Bulldozer diesel engine capacity =320 hp.
- The Bulldozer estimated hours of operation per year = 1200 hours.
- Estimated Bulldozer useful life (n) = 6 years.
- The annual value of major repairs = 15% of the total cost of the Bulldozer
- The annual value of investment (taxes, insurance, parking, etc.) = 10% of the average value of the Bulldozer during its useful life.
- The cost of fuel per hour = $ 0.04 / per horsepower.
- The cost of oil and minor repairs per hour = $ 0.01 / per horsepower.
- The operator's (driver) salary = $ 1500 per month.

Q5/ Answer the following (short answers):

A) What are the methods used for soil compaction (ways of compaction)?

B) What is the sequence of a complete work cycle of the Scraper?

C) List three different methods of tunnel construction technologies.

Extra notes:

I have no notifications

External Evaluator

The course book prepared by my colleague is properly arranged and covers the main requirements of the lesson. The lecturing procedures are identified properly. The assessment scheme and forms of teaching are arranged in a way that the student could understand clearly. It can be said that student will be satisfied with this course book and it promises a good outcome.

Name: Signature:

Academic title: