Course Description Form

1. Course Name:
Mechanics of tractors performance
2. Course Code:
METP380
3. Semester / Year:
Second semester (spring)/2024-2025
4. Description Preparation Date:
1/2/2025
5. Available Attendance Forms:
Combined (Attendance + distance education)
6. Number of Credit Hours (Total) / Number of Units (Total)
75 hours (30 theoretical hours + 45 practical hours) / 3.5 units
7. Course administrator's name (mention all, if more than one name)
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8. Course Objectives

Course Objectives	- Graduating agricultural engineers and researchers to serve the agricultural sector. - Scientific cooperation with the Directorates of Agriculture and other bodies with the aim of improving agricultural production in terms of quantity and quality. - Investing modern technology in the field of agricultural tractor design in order to develop education, training and research programs. - Qualifying the student to work according to modern production systems that rely on computers and information technology in their work. - Preparing an advanced technical cadre in the field of agricultural tractor design to meet the needs of society.

9. Teaching and Learning Strategies

theoretical: -Interactive lecture. -Brainstorming. -Dialogue and discussion. -Assigning tasks and reports	practical: Assigning the student to solve mathematical problems within a specific period to reveal the student's skill ability. - Assigning the student to solve mathematical problems at home with different degrees of difficulty to detect the change in the student's skill ability.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 Theoretical	a1: Explains and clarifies through lectures	The forces acting on the tractor at rest as well as in motion.	attendance lectures using display devices: data shows, smart boards	Reports, Quizzes, Discussions

	3 Practical	c1: Solve mathematical examples of the forces acting on the tractor while standing and moving	Applications and mathematical problems on the forces affecting the tractor at rest and in motion.	Interactive lecture, dialogue and discussion, field training and practical	Reports, Quizzes, Discussions
2	2 Theoretical	a2: Explains and clarifies through lectures	Soil strength – ultimate traction force.	attendance lectures using display devices; data shows, smart boards	Reports, Quizzes, Discussions
	3 Practical	c2: Solve mathematical examples of soil strength - ultimate traction force.	Applications and mathematical problems on soil strength – maximum traction force.	Interactive lecture, dialogue and discussion, field training and practical	Reports, Quizzes, Discussions
3	2 Theoretical	a3: Explains and clarifies through lectures	The relationship between real thrust force and maximum thrust force.	attendance lectures using display devices: data shows, smart boards	Reports, Quizzes, Discussions
	3 Practical	c3: Solve mathematical examples of slip, real and maximum thrust force, and soil cutting stress	Solving applied mathematical problems about slip, real and maximum thrust force, soil cutting stress	Interactive lecture, dialogue and discussion, field training and practical	Reports, Quizzes, Discussions
4	2 Theoretical	a4: Explains and clarifies through lectures	reports, quizzes, discussions	Interactive lecture, dialogue and discussion, field training and practical	Reports, Quizzes, Discussions
	3 Practical	c4: Apply mathematical examples from the previous topics	reports, quizzes, discussions	Interactive lecture, dialogue and discussion, field training and practical	Reports, Quizzes, Discussions
5	2 Theoretical	a5: Explains and clarifies through lectures	The relationship between sliding and soil displacement.	attendance lectures using display devices: data shows, smart boards	Reports, Quizzes, Discussions
	3 Practical	c5: Solve mathematical examples about the relationship between sliding and soil displacement	Solve applied mathematical problems about the relationship between sliding and soil displacement	Interactive lecture, dialogue and discussion, field training and practical	Reports, Quizzes, Discussions
6	2 Theoretical	a6: Explains and clarifies through lectures	Coefficients (drag – push - rolling resistance) , efficiencies (drag - transport).	attendance lectures using display devices: data shows, smart boards	Reports, Quizzes, Discussions
	3 Practical	c6: Solve mathematical examples of coefficients (Drag - push - rolling resistance), efficiencies (drag - transport).	Solve applied mathematical problems about the efficiency of withdrawal, transfer, and transactions	Interactive lecture, dialogue and discussion, field training and practical	Reports, Quizzes, Discussions
7	2 Theoretical	a7: Explains and clarifies through lectures	Rolling resistance resulting from soil compaction and tire flattening+ Mid-term Exam	attendance lectures using display devices: data shows, smart boards	Reports, Quizzes, Discussions

	3 Practical	c7: Solve mathematical examples of rolling resistance	Solving applied mathematical problems about the rolling resistance resulting from soil compaction and tire flattening.	Interactive lecture, dialogue and discussion, field training and practical	Reports, Quizzes, Discussions
8	2 Theoretical	a8: Explains and clarifies through lectures	Methods used to determine the location of the center of gravity of the tractor (suspension - balancing - weight).	attendance lectures using display devices: data shows, smart boards	Reports, Quizzes, Discussions
	3 Practical	c8: Solve mathematical examples of determining the center of gravity of a tractor	Solving applied mathematical problems about determining the center of gravity of the tractor	Interactive lecture, dialogue and discussion, field training and practical	Reports, Quizzes, Discussions
9	2 Theoretical	a9: Explains and clarifies through lectures	Forces affecting the machine while working with the agricultural tractor, methods of attaching agricultural machinery to the tractor	attendance lectures using display devices: data shows, smart boards	Reports, Quizzes, Discussions
	3 Practical	b1: Field tests methods of attaching agricultural machines and the forces affecting on them	Field practice on attaching agricultural machines and the forces affecting on them	Interactive lecture, dialogue and discussion, field training and practical	Reports, Quizzes, Discussions
10	2 Theoretical	a10: Identify the devices and equipment used in mechanical inspection and testing of tractor	A field visit to workshops laboratories specialized in the inspection and safety of tractor	A lecture by technicians	Reports about the visit
	3 Practical	b2: The student is shown the devices and equipment used in mechanical inspection and testing of the tractor	Skills in using devices and equipment used in mechanical inspection and testing of the tractor	Interactive lecture, dialogue and discussion, field training and practical	Reports, Quizzes, Discussions
11	2 Theoretical	a11: Explains and clarifies through lectures	Stability of tractor (Longitudinal stability and transverse stability)	attendance lectures using display devices: data shows, smart boards	Reports, Quizzes, Discussions
	3 Practical	c9: Solve mathematical examples of the stability of a tactor	Solve mathematical problems about stability and the moments that act on turning the tractor	Interactive lecture, dialogue and discussion, field training and practical	Reports, Quizzes, Discussions
12	2 Theoretical	a12: Explains and clarifies through lectures	Transmission systems (The mechanics of the clutch system).	attendance lectures using display devices: data shows, smart boards	Reports, Quizzes, Discussions
	3 Practical	b3: Field tests how the three points hatches system works	Field exercise on how the three points hatches system works	Interactive lecture, dialogue and discussion, field training and practical	Reports, Quizzes, Discussions
13	2 Theoretical	a13: Explains and clarifies through lectures	Types of gearboxes and methods of gearing.	attendance lectures using display devices: data shows, smart boards	Reports, Quizzes, Discussions
	3 Practical	c10: Solve mathematical examples about the speed of a tractor from the revolutions per minute	Solving mathematical problems about the speed of a tractor based on revolutions per minutes and the number of teeth of the transmission gears	Interactive lecture, dialogue and discussion, field training and practical	Reports, Quizzes, Discussions

14	2 Theoretical	a14: Explains and clarifies through lectures	reports, quizzes, discussions	attendance lectures using display devices: data shows, smart boards	Reports, Quizzes, Discussions
	3 Practical	c11: Apply mathematical examples from the previous topics	reports, quizzes, discussions	Interactive lecture, dialogue and discussion, field training and practical	Reports, Quizzes, Discussions
15	2 Theoretical	a15: Explains and clarifies through lectures	Mechanism of operation of the differential system - types of final reduction systems+ Hydraulic system.	attendance lectures using display devices: data shows, smart boards	Reports, Quizzes, Discussions
	3 Practical	b4: The student experiences the process of driving, braking, and pulling agricultural machinery in the field	Practical and field practice for driving, braking and pulling agricultural machinery	Interactive lecture, dialogue and discussion, field training and practical	Reports, Quizzes, Discussions

11. Course Evaluation

Seq.	Evaluating style	date	marks	Relative weight
1	Final report: theoretical + practical	Theoretical: Week 13 Practical: week 13	7 theoretical + 6 practical	%١٣
2	Monthly test 1	Week:4	4 theoretical + 2 practical	%٦
3	Monthly test 2	Week:14	10 theoretical + 5 practical	%١٥
4	Quizzes	Week:12	4 theoretical + 2 practical	%٦
5	Final practical test	The week of the theoretical exam	٢٠	%٢٠
6	Final theoretical test	The week of the Practical exam	٤٠	%٤٠
	the total		١٠٠	%١٠٠

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Mechanics of tractor performance. Dr. Shaker Hantoush Aday.
Main references (sources)	Basics of using agricultural machinery. Saad Eddin Muhammad Amin
Recommended books and references (scientific journals, reports...)	Basics of tractors and agricultural equipment. Dr. Lotfi Hussein.
Electronic References, Websites	https://www.youtube.com

Assistant Lecturer:
Saleh Sabri Ali Al-Slevani

Lecturer:
Husain Abed Hamood

Assistant professor
Mothana Abed Al-malik Noori

Head of the Scientific Committee:
Professor Dr. Adil Ahmed Abdullah

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Assistant Professor Nofal Issa Mohamed