



Department of Plant Protection

**College of Agricultural Engineering Sciences
University of Salahaddin**

Subject: Elective- Farm Mechanization

Course Book – (4 Class)

Lecturer's name: Pshtiwan Abdullah Jalil, PhD

Majid Hassan Mustafa, PhD.

Practical Lecturer's name: NA

Academic Year: 2022/2023

Course Book

1. Course name	Elective- Farm Mechanization
2. Lecturer in charge	Pshtiwan Abdullah Jalil, PhD Majid Hassan Mustafa, PhD.
3. Department/ College	Plant Protection Dept./Agricultural Engineering Sciences College.
4. Contact	e-mails: Pshtiwan.jalil@su.edu.krd majid.mustafa@su.edu.krd Tel: 0750 4439693 Tel: 0750 4823304
5. Time (in hours) per week	Theory: 2 hrs
6. Office hours	8:30 – 2:00 from Sunday to Thursday
7. Course code	
8. Teacher's academic profile	<p>Majid Hassan Mustafa, PhD. Obtained Doctor of Philosophy (PhD) in Disease resistance, graduated from Milan university, Italy, 2022. My thesis title was “Brown Rot disease development in peach <i>P. persica</i> L. Batsch): from fungal Biology to high throughput on field phenotyping”. I obtained my Master of Science in Integrated pest management (IPM) of Mediterranean fruit, in Istituto Agronomico Mediterraneo di Bari (IAMB), Italy, 2015. Thesis title “Investigation into Auchenorrhyncha species, putative vectors of "Bois noir" and "Flavescence dorée", in Apulian vineyards using different molecular techniques”. My bachelor’s degree (BSc) in Plant Protection, University of Salahaddin-Erbil, Iraq, 2010. *****</p> <p>Pshtiwan Abdullah Jalil, PhD. Achieved Doctor of Philosophy (Ph.D.) in Entomology/Molecular Insect Taxonomy, accomplished from Salahaddin University, Erbil, Kurdistan Region-Iraq, 2020. My dissertation title was “Taxonomic and molecular study of some flat-headed borers (Coleoptera: Buprestidae) occurring across Erbil Province, Kurdistan Region-Iraq”. I got a Master of Science in Economic Insects on Agricultural crops, entitled “Biological and Ecological Study of the small cabbage white butterfly, <i>Pieris rapae</i> L. (Lepidoptera: Pieridae) on the cabbage and cauliflower crops in Gradarasha Research Station, Erbil Province, Kurdistan Region-Iraq”. In College of Agricultural Engineering Sciences, Salahaddin University, Erbil, 2011.</p>
9. Keywords	Mechanization, Farm operation, Plowing, Cultivating System, Sowing System, Irrigation System, Spraying, Harvesting, and packaging

10. Course overview:

Farm Mechanization is an undergraduate course designed for students in the College of Engineering Agricultural Sciences. The course covers a range of topics related to the principles, applications, and advancements in agricultural machinery and equipment. It aims to provide students with a comprehensive understanding of how mechanization enhances efficiency, productivity, and sustainability in modern farming practices.

The course begins with an introduction to the main concepts and definitions of farm mechanization, emphasizing its importance in agriculture. Students then explore the different power resources available for mechanization, including human, animal, and mechanical power. They learn about the advantages and limitations of each power resource and how to effectively utilize them in agricultural operations.

The course then delves into specific aspects of farm mechanization, such as plowing and tillage, sowing and planting, and plant protection methods. Students study classic and modern machines used in these operations, understanding their selection criteria, operation techniques, and maintenance requirements. They also learn about spraying and dusting techniques and machinery for plant protection, with an emphasis on integrated pest management.

A field visit provides students with practical exposure to real-life farm mechanization systems, allowing them to observe and interact with agricultural machinery in action. The course also covers topics like harvesting and threshing techniques, agricultural robotics, recent farm mechanization in the Kurdistan region of Iraq, and future prospects for improving farm mechanization in the region.

11. Course objective:

Develop a solid understanding of farm mechanization: The primary objective of this course is to provide students with a thorough understanding of the principles, concepts, and applications of farm mechanization. By exploring the various aspects of agricultural machinery and equipment, students will learn about their functions, types, and role in enhancing efficiency and productivity in farming operations.

Foster critical thinking and problem-solving skills: Another key objective of this course is to nurture students' critical thinking and problem-solving abilities. Through lectures, discussions, and practical experiences, students will be encouraged to analyze and evaluate different farm mechanization techniques, considering factors such as field conditions, sustainability, and local context.

12. Student's obligation

As students in this course, it is crucial to prioritize attendance and punctuality for all lectures. By being present and on time, students can actively engage in the learning process, participate in discussions, and benefit from in-class activities. Additionally, students should come prepared for daily quizzes and actively contribute to class discussions to enhance their comprehension

and critical thinking skills. Taking thorough notes during lectures is essential for retaining key information and concepts.

Students are encouraged to regularly consult the course textbook to supplement their learning. The textbook provides additional explanations and details that can deepen their understanding of the subject matter.

13. Forms of teaching

Effective teaching is essential for providing students with a well-rounded and interesting education. To give students a well-rounded learning experience, we will use the following teaching methods in our classes:

1- PowerPoint presentations: To offer a summary of each course, we will utilize data show presentations in the form of PowerPoint slides. The lecturer will give extra in-depth information through narration, while the slides will define the process of each lesson.

2- Using a whiteboard: A whiteboard is also necessary for teaching and explaining different topics.

3- Field visits: to machinery companies in Erbil city.

14. Assessment scheme

Students must pass two monthly exams; each will be 20 marks. While the final exam is worth 60 marks.

15. Student learning outcome:

By the end of this course students should be able to:

- Demonstrate a comprehensive understanding of farm mechanization principles and concepts.
- Effectively utilize different power resources for agricultural mechanization.
- Select and operate appropriate machinery for various farming tasks.
- Apply techniques for plowing, tillage, sowing, planting, Spraying, and harvesting.
- Safely operate and maintain agricultural machinery.
- Evaluate the benefits and challenges of agricultural robotics in farming.
- Analyze and propose strategies for improving farm mechanization in the Kurdistan region of Iraq.

16. Course Reading List and References:

▪ Key references:

- 1) Basavaraj, D. S. and Jayan, P. R. (2020) Textbook of Farm Machinery and Power Engineering, NEW INDIA PUBLISHING AGENCY. NIPA GENX Electronic Resources & Solutions Pvt. Ltd.
- 2) Bock, A.-K. et al. (2020) 'Farmers of the Future', Luxembourg: Publications Office of the European Union, 10(6), p. 680650. doi: 10.2760/5237.
- 3) Chen, G. (2018) Advances in Agricultural Machinery and Technologies, CRC Press & Taylor & Francis Group.
- 4) Diao, X., Takeshima, H. and Zhang, X. (2020) An Evolving Agricultural Paradigm of Mechanization Development.
- 5) Dogra, R. (no date) 'Farm-Machinery-And-Equipment-Ed5th.pdf'.
- 6) FAO (2022) FAO statistical databases, The State of Food and Agriculture 2022. Available at: <https://www.fao.org/faostat/en/>.
- 7) ICAR (2016) 'Farm Power and Machinery Farm Power and Machinery', e-Course For B.Sc (Agriculture) and B.Tech (Agriculture). Available at: [www.AgriMoon.Com/Farm Power and Machinery](http://www.AgriMoon.Com/FarmPowerandMachinery).
- 8) Kutz, M. (2019) Handbook of farm, dairy and food machinery engineering. Academic Press.
- 9) Pascuzzi, S. and Santoro, F. (2022) 'Farm Machinery and Processes Management in Sustainable Agriculture', in XI International Scientific Symposium 2022. Springer, pp. 5–453. doi: 10.24326/fmpmsa.2019.1.1.
- 10) Raju, P. S., Chauhan, O. P. and Bawa, A. S. (2011) 'Postharvest Handling Systems and Storage of Vegetables', in Handbook of Vegetables and Vegetable Processing.
- 11) SMITH, H. P. (1955) 'Farm Machinery and Equipment', Soil Science, 80(2), p. 164. doi: 10.1097/00010694-195508000-00012.

17. The Theoretical Topics:

Lecturer's name

Lecture 1: Introduction to the course, Main concepts, and definitions

Dr. Pshtiwan Abdullah Jalil

Lecture 2: Benefits of Mechanizing Farms

Lecture 3: Advantages and disadvantages of farm mechanization

Lecture 4: Problems of farm mechanization

Lecture 5: Types of Available power resources for Farm Mechanization

Dr. Majid Hassan Mustafa (2 hrs each)

Lecture 6: Plowing and Tillage Classic and modern machines.

Lecture 7: Sowing and Planting Techniques and Machines.

Field visiting

Lecture 8: Plant Protection: Spraying and Dusting Sprayer

First Exam

Lecture 9: Harvesting and Threshing Techniques and Machines.

Lecture 10: Agricultural Robotics

Lecture 11: Recent Farm Mechanization in the Kurdistan Region of Iraq

Lecture 12: How to improve farm mechanization in Kurdistan region of Iraq- Future prospects.

Lecture 13: *Second Exam*

19. Examinations:

1. **Definitions**, Define the following terms: Tillage, Thresher, Planter, Agri Robots, Transplanters
2. **Explanations**, such as:
 - What is the difference between a duster and a sprayer?
 - What are the factors to be considered when choosing a sprayer?
 - What are the advantages of using Agricultural robotics?
 - Enumerate 5 Types of Agricultural Robots that were used in agricultural farms successfully (examples).

20. Extra notes:

- When an exam postponed by a student, whatever be the reason, he/she has to do the exam within one week. It is the student's responsibility to contact the subject lecturer and the department presidency with the frame time to rearrange for an alternative exam. Failure to do so in a timely fashion may result in a zero grade for the missed exam.

21. Peer review

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I thereby approve that the course is comprehensive and cover all aspects of the course. The subject is arranged sequentially which enables the students to learn gradually step by step.

Name:

Degree:

Specialty:

Signed:

Date: