**The University of Jordan**

**Faculty: Faculty of Agriculture**

**Department: Department of Horticulture and Crop Science**

**2013-2014/First semester**

**Course Title: Field Exercises in Agricultural Mechanization (0651495)**

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| **Credit hours** | 3 | **Level** | Second year | **Pre-requisite** | Physics |
| **Coordinator/ Lecturer** | Dr. Issa A. GammohEng. Osama Abu Sheikha | **Office number** | 218Mech.W/shop | **Office phone** | 2233722304 |
| **Course website** |  | **E-mail** | i.gammoh@ju.edu.jo | **Place** | Agr. Fac. Research station ( Jordan Valley) |

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| **Office hours** |
| **Day/Time** | **Sunday** | **Monday** | **Tuesday** | **Wednesday** | **Thursday** |
|  | **-----** | **12:30 – 13:30** | **12:00-13:00** | **12:30 – 13:30** | **-----** |
|  | **10:00 – 11:00** | **-----** | **-----** | **-----** | **10:00 – 11:00** |

**Course Description**

Field demonstration and training on operational skills, adjustment, calibration, hitching and maintenance of some, commonly used in Jordan, farm machinery. This includes driving medium power agricultural tractor, attaching drawn and mounted implements and its periodical maintenance; Primary and secondary tillage equipment operation and adjustment; grain drill, transplanter and potato planter; Field crop boom hydraulic sprayer; mowers, rakes, and balers.

**Learning Objectives**

1. To provide practical understanding of theory and principles of Agricultural machines as users and managers
2. To promote technical sense of safe and proper operation, adjustment, maintenance, and effective management of agricultural machines and equipment.
3. To acquire field skills of operating farm tractors and attaching and calibrating some agricultural equipment and machines

**Intended Learning Outcomes (ILOs):**

Successful completion of the course should lead to the following outcomes:

**A. Knowledge and Understanding:** Student is expected to

**A1**- acquire knowledge of safety warnings, cautions, proper use, maintenance and storage of farm machinery.

**A2**- acquire knowledge of different types, configurations, features of common agricultural machines and equipment used on farms in Jordan and worldwide.

**A3-** acquire knowledge and understanding of principles of operation, calibration and good field management and matching of basic agricultural farm machines.

**B. Intellectual Analytical and Cognitive Skills:** Student is expected to

**B1-** select proper machinery for specific agricultural operation,

**B2-** analyze and compare features of different types and configurations of machines used on modern farms.

**B3-** determine the factors affecting capacity and efficiency of a working agricultural machine.

**B4-** determine the factors affecting application rate of working planting and liquid application equipment

**C. Subject- Specific Skills:** Students is expected to

**C1-** drive small and medium-size farm tractors, attach them to different implements, do proper matching adjustments,

**C2-** carry on rear and front tread width adjustment for wheel tractors,

**C3 -** carry on different levels of periodical maintenance for these tractors,

**C4 –** carry on primary and secondary tillage operation with proper adjustment,

**C5-** adjust and calibrate the application rate for a specific type of grain drill, transplanter and potato planter

**C6 -** adjust and calibrate the application rate for a hydraulic field crop sprayer,

**C7 –** attach and adjust a rotary mower, a side-delivery windrower and a rectangular baler to farm tractor.

**D. Transferable Key Skills:** Students is expected to

D1- demonstrate good communication skills with farmers to provide information on the latest machinery in use in the agriculture industry,

D2- supervise operators involved in the mechanization of agricultural operation.

# ILOs: Learning and Evaluation Methods

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| **ILO/s** | **Learning Methods** | **Evaluation Methods** |
| **A**. Knowledge and Understanding (**A1-A3**) | Lectures and Discussions, field demos and exercises, (Reports) | Exam, Quiz,  |
| **B**. Intellectual Analytical and Cognitive Skills (**B1-B4**) | Lectures and Discussions, field demos and exercises | Exam, Quiz, and reports' evaluation |
| **C**. Subject Specific Skills (**C1-C7**) | Practical participation in , field exercises, Demos | Reports' evaluation, Exams |
| **D**.Transferable Key Skills (**D1-D2**) | Discussions, reports | Reports' evaluation**,** exams |

**Course Contents**

|  |  |  |  |
| --- | --- | --- | --- |
| **Content** | **Reference No \***  | **Week** | **ILO/s** |
| **Introduction**: theoretical revision of principles of farm machinery.Safety in operating and storing agricultural machines and equipment. | **1,2,3,4** | **W1** | **A1- A3** |
| **Field exercise 1:** Farm tractor component live introducing (IC Engine and its systems, Power train , brake and steering systems, Electrical system Wheels an other components).Operating and driving tractor  | **1, 2, 5, 8, 9****3, 4** | **W2** | **A2, A3, B2****C1** |
| 1. **Continue Field exercise 1:** Operating and driving tractor
 | **3, 4** | **W3** | **C1** |
| 1. **Un announced Quiz #1**
 |  | **during 2nd week or 3rd week** |  |
| 1. **Field exercise 2:** Tractor power outputs live introducing,
2. Hitching drawn and mounted implements on drawbar, 3-PHS, PTO, auxiliary hydraulic and electrical systems**.**
 | **1, 2, 5, 9** | **W4** | **B1, C1** |
| 1. **Field exercise 3:** Rear and front tread width adjustment objectives and types.
2. Practical participation in rear and front tread for a farm tractor .
 | **3, 4, 5** | **W5** | **C2** |
| **Field exercise 4:** management of Preventive and corrective maintenances of a farm tractor, principles and general and specific tips.Carry on some periodical maintenances, Change oil and filters for Engine crankcase, Air oil-bath filter, Fuel system, transmission, hydraulic system. Greasing joints and fittings, cleaning and washing radiators and screens, etc.  | **5, 11****3,4** | **W6** | **A1, A3, C3** |
| **Announced Quiz #2** |  | **End of 6th week** |  |
| 1. **Field exercise 5:** Primary tillage (PT) equipment: design, types and features.
2. Practical participation in PT equipment hitching and adjusting to the tractor
3. Practical tilling a piece of land
 | **1, 2, 6** | **W7** | **A2, B1, B3, C4** |
| 1. **Field exercise 6:** Secondary tillage (ST) equipment: design, types and features.
2. Practical participation in ST equipment hitching and adjusting to the tractor
3. Practical tilling a piece of land
 | **1, 2, 6** | **W8** | **A2, B1, B3, C4** |
| 1. **Midterm Exam**
 |  | **W9** |  |
| 1. **Field exercise 7:** Planting equipment: methods of planting, seed planting equipment, types and principles of operation, components and adjustments, Application rate and factors affecting it.
2. Practical participation in a grain drill hitching, adjustment and calibration the application rate. Building a calibration curve. Field demo
 | **1, 2,7** | **W10** | **A2, A3, B1-B4, C5** |
| 1. **Report # 1on Grain drill adjustment and calibration**
 |  | **Due date : end of week 10** | **D1, D2** |
| **Field exercise 8:** Potato planter, types and principles of operation, components and adjustments, Application rate and factors affecting it.Practical participation in a potato planter hitching, adjustment and calibration. Field Demos | **1, 2, 7** | **W11** | **A2, A3, B1-B4, C5** |
| **Field exercise 9:** Transplanter, types and principles of operation, components and adjustments, Application rate and factors affecting it.Practical participation in a transplanter hitching, adjustment and calibration. Field Demos | **1, 2, 7** | **W12** | **A2, A3, B1-B4, C5** |
| 1. **Report # 2 on potato planter and transplanter adjustment and calibration**
 |  | **End of 12th week** | **D1, D2** |
| 1. **Field exercise 10:** Liquid application equipment ( sprayers) : types and principles of operation, components and adjustments, Application rate and factors affecting it.
2. Practical participation in a hydraulic field crop sprayer: hitching, adjustment and calibration the application rate. Building a calibration curve. Field demo
 | **1, 2, 9, 10** | **W13** | **A2, A3, B1-B4, C6** |
| 1. **Report # 3on Field crop sprayer adjustment and calibration**
 |  | **Due date: 13th week** | **D1, D2** |
| **Field exercise 11: Forage harvesting equipment: (mowers, rakes and balers)** Principles of operations and types of forage making and harvesting equipment,Practical participation in a transplanter hitching, adjustment and calibration. Field Demos  | **1, 2, 12** | **W14** | **A2, A3, B1-B4, C7** |
| 1. **Report # 4on Field crop sprayer adjustment and calibration**
 |  | **Due date: 14th week** | **D1, D2** |
| 1. **Revision and discussions of course materials and reports.**
 |  | **W15**  |  |

**Learning Methodology**

## The course duration is 16 weeks . One day a week (including holidays that might occur during the semester). Each day consists of:

## 1 hour : Preparation lecture:

## 3 hours : Field exercise.

## Quizzes will be held during lectures time. Each lasts between 5 and 10 minutes.

## Midterm exam will be held on the 9th week. It contains only practical questions and problems.

* Students are divided into working groups (of 2 – 4 students each). These groups work together in the field and report together in one report.

**Evaluation**

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| --- | --- | --- |
| **Evaluation** | **Point %** | **Date** |
| Midterm Exam   | **30** | End of 9th week |
| Reports | **20** | See course content table above |
| Participation and quizzes | **10** | See course content table above |
| Final Exam  | **40** | Assigned by Registrar |

# USEFUL REFERENCES:

There is no specific text book for this course. The following could be useful to refer to while covering different topics of the course:

1. Farm Machinery, A.G. Harris, T.B. Muckle, and J.A. Show.
2. Farm Machinery and Equipment. Smith and Wilkes. 6th edition.
3. Operator's manual, Ford , Newholand, for tractor model 3930
4. Operator's manual, Massey Furgesson for tractor model 240
5. FMO, Tractors. John Deere Publications.
6. FMO, Tillage. John Deere Publications.
7. FMO, Planting. John Deere Publications.
8. FOS, Power Train. John Deere Publications.
9. FOS, Hydraulics. John Deere Publications.
10. FMO, Spraying equipment. John Deere Publications.
11. FOS, Maintenance. John Deere Publications.
12. FMO, Hay and Forage Harvesting. John Deere Publications.

**Notes:**

* ***Note 1*** : Examination, Grades Evaluation and Attendance policy are administered according to UOJ instructions, terms and regulations. For more details on University regulations please visit:

 <http://www.ju.edu.jo/rules/index.htm>

* ***Note 2*** : Course assignments (reports and presentations) are to be completed as instructed. These are interfaced with topics to be covered and the same questions may be used in quizzes or exams. The assignment grade will be reduced by 1/10 of the maximum grade for each day that it is late. Students are divided into groups, where each group member should be prepared to answer for the group.
* ***Note 3*** : Concerns or complaints should be expressed to the module lecturer

**Grading Scale**

* **First option**

Statistical normal distribution of all students' total points will be used for final grading. The Average (AVRG) and standard deviation (STDev) are defined, where the AVRG is graded either "C" or "C+" grade, then the AVRG + 2 or 1.5 STDev is graded as "A". The grade "F" total points are defined (usually between 45 and 50). The grades are then distributed over intervals between "A" and "F". The length of each interval is proportional to the scale weight of each grade

|  |  |
| --- | --- |
| **Scale weight** | **Grade** |
| 0 | F |
| 0.75 | D- |
| 1 | D |
| 1.5 | D+ |
| 1.75 | C- |
| 2-2.49 | C |
| 2.5 | C+ |
| 2.5-2.99 | B- |
| 3 | B |
| 3.5 | B+ |
| 3.75 | A¯ |
| 4 | A |

* **Second** **option**

|  |  |  |  |
| --- | --- | --- | --- |
| **From (%)** | **To (%)** | **Mark** | **Scale** |
| 0 | 44 | F | 0 |
| 45 | 47 | D- | 0.75 |
| 48 | 54 | D | 1 |
| 55 | 60 | D+ | 1.5 |
| 61 | 63 | C- | 1.75 |
| 64 | 66 | C | 2 |
| 67 | 72 | C+ | 2.5 |
| 73 | 75 | B- | 2.5 |
| 76 | 78 | B | 3 |
| 79 | 84 | B+ | 3.5 |
| 85 | 87 | A¯ | 3.75 |
| 88 | 100 | A | 4 |