**The University of Jordan**

**Faculty of Agriculture Department of Horticulture and Crop Science**

**Program: PH.D Academic year: \_\_\_\_\_\_\_**

**Course title:** Sustainable Agriculture **(**631924**)**

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| Credit hours | 3 | Level | PhD Course | Pre-requisite | 601240 |
| Coordinator/ Lecturer |  | Office number |  | Office phone | 22333 |
| Course website | [Faculty](http://blackboard.ju.edu.jo/webapps/login/) Member Website | E-mail |  | Place |  |

|  |
| --- |
| **Office hours** |
| **Day/Time** | **Sunday** | **Monday** | **Tuesday** | **Wednesday** | **Thursday** |
| **Time** |  |  |  |  |  |

**Course Description:**

This course covers the concept of sustainable agriculture and its importance in food production systems, linkage between agricultural production systems and natural eco-systems and agricultural production systems that are economically feasible ,socially acceptable with positive impact on environment.

**Course Objectives:**

1- Foster students towards understanding of sustainable agriculture and its role in production of safe food.

2- Understand the importance of sustainable agriculture in renewing of natural resources.

3- Develop advance thinking towards pests and weed management.

4- Investigate the importance of sustainability in keeping soil biodiversity and minimizing the environmental impact.

5- Study some successful examples of sustainable farming systems.

6- Compare sustainable farming with conventional one.

**Learning Outcomes:**

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

**A) Knowledge and Understanding: The students should:**

 A1- Figure out the principles and concepts of sustainable agriculture.

 A2- Realize the socio economic and environmental advantages of sustainable system compared with conventional system.

 A3- Be convinced with the urgent shifting into sustainable agriculture and how to proceed.

 A4- Know how to manage the techniques and input factors for sustainable production.

## B) Subject Specific Skills

B1- Proper utilization of biodiversity in general and Plant genetic resources in particular for sustainability

B2- Use of conservation agriculture and selection of the proper methods of soil preparation for sustainability

. B3- Use of good agricultural practices (GAP) that result in high quality products and minimum environmental impact.

B4. Learn indicators needed for monitoring and evaluation of sustainability

## C) Transferable Skills

C1- Adoption of minimum or zero tillage.

C2- Including the soil improving crops, crop rotation, intercropping to sustain sustainability

C3- In-row fermenting process for recycling of organic matters from various sources

C4- Collecting of evolved gases from fermenting process in separate piles as CO2 and Methane.

C5- Utilization of produced organic pesticides from extract of local spp.

1. **Transferable Key Skills:** Student is expected to

D1- Understand the techniques and indicators for success of sustainability.

D2- Conserve and improve use of natural resources (water, organic nutrient sources, biological extracts)

D3- Improving the activity of soil living organisms.

 D4- Development of new selected cultivars that can fit in sustainable agriculture.

# ILOs: Learning and Evaluation Methods

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| **ILO/s** | **Learning Methods** | **Evaluation Methods** |
| **A**. Knowledge and Understanding (**A1-A5**) | Lectures and Discussion of Assignment readings | Exam, Seminars  |
| **B**. Intellectual Analytical and Cognitive Skills (**B1-B3**) | Lectures and Discussion of Assignment readings | Exam, Seminars  |
| **C**. Subject Specific Skills (**C1-C3**) | Lectures and Discussion of Assignment readings | Exam, Seminars  |
| **D**.Transferable Key Skills (**D1-D4**) | Lectures and Discussion of Assignment readings | Exam, Seminars  |

**Course Contents**

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| **No. of lecture (s) /Week** | **Subject** | **Sources** | **ILOs** |
| 1, 2 (1st wk) | Understanding agricultural sustainability-Far miming and agriculture -General definition-Farming practices and systems- Conventional and industrial agricultural system-Important qualities for shifting to greater sustainability. - Priorities and indicators for agricultural sustainability  | Chapter1, pp. 15-42. In: Towards Sustainable Agricultural Systems in the 21st Century. 2010 | *A1 & A2 & A3 A4 & B3 & B4 & C1 & C4& C5& D1& D2 & D3 & D4* |
| 3,4,5, 6 (1st & 2nd wks) | A PIVOTAL TIME IN AGRICULTURE-Natural resource scarcity-Land availability -Water availability -Climate change-Environmental degradation-Water quality-Air quality-Soil quality-Reduced genetic diversity-Economic concerns-Social concernsApproach to improving sustainability | Chapter 2, pp. 43-74. In: Towards Sustainable Agricultural Systems in the 21st Century. 2010 | *A2 & A3 A4 & B1 & & B2& B3 & B4 & C1 & C2 & C3 & C5& D2 & D3 & D4* |
| 7,8,9, 10, 11, 12(3rd & 4th wks) | IMPROVING PRODUCTIVITY AND ENVIRONMENTAL SUSTAINABILITY-Soil management -Conservation tillage*-Impact of conservation tillage, soil physical properties, organic matter, microbial activity and diversity, erosion.**-Disadvantages of conservation tillage*-Cover cropping- Crop and vegetation diversity management-Crop rotation-Intercropping-Plant breeding and genetic modification-Water use management-Nutrient management-Weeds, Pests and Disease management- Efficiency of animal production | Chapter3, pp. 83-163. In: Towards Sustainable Agricultural Systems in the 21st Century. 2010 | *A1 & A2 & A3 A4 & B1 & & B2& B3 & B4 & C1 & C2 & C3 & C4& C5 & D1& D2& D3 & D4* |
| 13,14,15,(5th wk) | ECONOMIC AND SOCIAL DIMENTIONS OF THE SUSTAINABLE FARMING PRACTICES-Economic security-Socioeconomic aspects -Food security, safety, quality and other socioeconomic dimensions | Chapter4, pp.189-210. In: Towards Sustainable Agricultural Systems in the 21st Century. 2010 | *A1 & A2 & A3 A4 & B1 & B3 & B4 & C2 & C4& C5& D2 & D4* |
| 17, 18,19(6thwk) | Examples of farming system types for improving sustainability-Organic cropping system: principles and practices, environmental sustainability, nutrient cycling, soil and water quality, weeds, greenhouses and gas emission-Economic impact-Social impact-Alternative live stock production system- Perennial agricultural system | Chapter5,pp.222-258. In: Towards Sustainable Agricultural Systems in the 21st Century. 2010 | *A1 & A2 & A3 A4 & B1 & & B2& B3 & B4 & C1 & C2 & C3 & C4& C5 & D1& D2& D3 & D4* |
| 20(7th wk) | **First hour exam.** |  |  |
| 21, 22, 23, 24, (7th & 8thwks) | Drivers and constraints affecting the transition to sustainable farming practices-Agricultural markets as contextual factor-Emerging markets-Grades, standards and certification labels-Public policy as contextual factor- knowledge institution as contextual factor - Stakeholder and social movements | Chapter6, pp.271-336. In: Towards Sustainable Agricultural Systems in the 21st Century. 2010 | *A1 & A2 & A3 A4 & B1 & & B2& B3 & C1 & C2 & C3 & C4& C5& D1 & D2& D3 & D4* |
| 25, 26, 27, 28, 29, 30, 31, 32, 33(9th & 10th & 11th wks) | Illustrative case studies in Alternative Agricultures- Examples of farms-New case studies of production challenges and management-Manure and nutrient management -Natural resources, energy and climate change | Chapter7, pp.353-492. In: Towards Sustainable Agricultural Systems in the 21st Century. 2010 | *A1 & A2 & A3 A4 & B1 & & B2& B3 & B4 & C1 & C2 & C3 & C4& C5 D1& D2& D3 & D4* |
| 34(12th wk) | **Second hour exam.** |  |  |
| 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48(12th& 13th 14th& 15th & 116th wks) | Seminars in Special Topics- Water Harvest- In- row fermenting of organic matters- Zero Tillage- Organic pesticides-Soil Micro-organisms-Food Quality and Safety-Crop Production and Sustainable Food Security-Strategies for Increasing Crop Productivity-Climatic Variation and Crop Growth-Biotechnology and Crop Productivity and Sustainability-Sustaining the Green Revolution: New Paradigms-IMPLICATIONS OF Biodiversity Convention and World Trade Agreement on -Research and Development Collaboration.-Sustainability of Farming Systems: Emphasis on the Dry Areas.-Soil Conservation and management and Sustainable Agriculture.-Water: Valuing precious Resources (GEF Reports)-Land, Water and Food Production: Moving Toward Sustainability (GEF Reports)-Emerging Biologically Based Technologies for Plant Disease Management-Emerging Trends in Management of Pest Insects-Molecular Strategies for Management of Environmental Stress -Programs for drought Managing Stress: Is there a Productive Future? | Scientific Articles | *A1 & A2 & A3 A4 & B1 & & B2& B3 & B4 & C1 & C2 & C3 & C4& C5 D1& D2& D3 & D4* |

**Learning Methodology:**

 The course will be structured in lectures, seminars and discussions. The course comprises overviews, from general understanding to expert knowledge on key topics, and learning is based mainly on lectures as well as independent learning through assignments and hold seminars.

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| **Evaluation** | **Point %** | **Date** |
| First Exam | 15% |  |
| Second Exam | 15% |  |
| First Term Paper | 10% |  |
| Second Term Paper | 10% |  |
| Class Participation | 10% |  |
| Final Exam | 40% |  |
| Total | 100% |  |

**Main Reference:**

1. Committee on Twenty-First Century Systems Agriculture 2010. Towards Sustainable Agriculture Systems in the 21st Century. First Edition. The National Academies Press and distribution.USA.

**References:**

* Scientific Articles

**Intended Grading Scale (Optional)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **From**  | **To**  | **Scale** | **Mark** | **Result** |
| 0 | 67 | 2 | C | Fail |
| 68 | 70 | 2.5 | C+ | Good |
| 71 | 73 | 2.75 | B- | Good |
| 74 | 79 | 3 | B | Very Good |
| 80 | 82 | 3.5 | B+ | Very Good |
| 83 | 85 | 3.75 | A¯ | Excellent |
| 86 | 100 | 4 | A | Excellent |

**Notes:**

* Concerns or complaints should be expressed in the first instance to the module lecturer; if no resolution is forthcoming, then the issue should be brought to the attention of the module coordinator (for multiple sections) who will take the concerns to the module representative meeting. Thereafter, problems are dealt with by the Department Chair and if still unresolved the Dean and then ultimately the Vice President. For final complaints, there will be a committee to review grading the final exam.

**Important Regulations:**

* 1. Attendance and departure of students on time to have full 50 minute lecture.
	2. Check the frequency of students regularly and at the beginning of the lecture, if number of absent lectures for any student comes close to max. Then he is reminded.
	3. Not allowed for students to speak together during the running of lecture but to ask the instructor.
	4. Close of the Mobile
	5. The instructor is ready to answer any question out of office hours if presented in the office.
	6. Reminding of Exams dates one week before.
* For more details on University regulations please visit:

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