**The University of Jordan**

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

**Program: *2015-2016/Fall semester***

**Course title:** Crop Ecology **(601430)**

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| Credit hours | 3 | Level | PhD Course | Pre-requisite | 304101 |
| Coordinator/ Lecturer | Prof. R. Sharaiha | Office number | 248 | Office phone | 22351 |
| Course website | [Faculty](http://blackboard.ju.edu.jo/webapps/login/) Member Website | E-mail | ramzik@ju.edu.jo | Place |  |

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

**Course Description**

The course present and discuss the nature of agricultural systems.

Crop production: productivity, stability, sustainability, yield variation. Community concepts: monoculture vs. mixed cropping, competition, community change, biomass accumulation, growth rate and analysis. Physical and chemical environment as related to crop communities. Agricultural resources management through the combination of ecological concepts and cropping practices.

**Learning Objectives**

1. to appreciate and understand the structure, functioning and composition of natural ecosystems

2- to illustrate how resource extraction and conservation activities affect structure, functioning, composition and the biological diversity within natural ecosystems.

3- to identify and provide solutions to issues related to conservation of wild lands and biological diversity.

**Intended Learning Outcomes (ILOs):**

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

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

A1- Discuss the domain of crop ecology in relation to other biological sciences and the relevance of ecology to management of agricultural systems.

A2*-* Apply ecological principles to practical problems in sustainable agriculture.

A3-Discuss some current issues in crop ecology which affect agriculture. Examples may include vegetation clearing and land degradation.

A4*-* Have some understanding of fundamentals of scientific research and communication through critical analysis and writing of scientific reports.

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

B1- Able to analyze plant ecology context.

B2- Able to understand the ecosystem concepts and in particular Agro ecosystem.

B3- Familiar with scientific principles of Agro ecosystem including: temperature, light, gases, wind, water and humidity and soil.

B4- Able to understand the cropping systems principles and their application to rotation design and poly cultures (intercropping), permaculture, organic farming, ……etc.

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

C1- Analyze the interactive of all environmental factors and their effects on plants growth.

C2- Be able, in specific manner, to determine the light environmental effect in Agro ecosystem by using certain techniques.

C3- Be capable to explain the role of gained energy, that resulted from the interaction of light x temperature x wind in agro-ecosystem

C4- Understand the role of certain cropping systems in determining the soil physical, chemical and biological characters.

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

D1- Use the techniques of water harvest and how to apply the harvested water in optimum manner.

D2- Maximize the captured energy, from light, during winter time and minimize that during summer time looking for best plants growth.

D3- Manipulate the microclimates in order to improve the agricultural process.

D4- Using cropping systems that improve the soil characters (texture, structure, nutritional status, biological, ……).

D5- Utilization of sustainable Agro-ecosystems reaching to sustainable food systems.

ILOs: Learning and Evaluation Methods

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

**Course Contents**

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| **No. of lecture (s) /Week** | **Subject** | **Sources** | **ILOs** |
| 1  (1st wk) | Introduction | Chapter 1, pp. 3-14. in Gliessman S.R. 1998 | *A1& A2& B1& B4* |
| 2, 3  (1st wk) | agricultural systems | Chapter 2 pp. 17-30. in Gliessman S.R. 1998 | *A1& A2& B1& B4* |
| 4, 5  (2nd wk) | Community | Chapter 15 pp. 213-226. in Gliessman S.R. 1998 | *A2 & A5 & B1 & C1 & D3 & D5* |
| 6, 7  (2nd & 3rd wks) | Stability | Chapter 16 pp. 227-246. Gliessman S.R. 1998 | *A1 & A2 & B1 & B2 & B3& B4 &C4 & D1&D4 & D5& D6* |
| 9, 10, 11, 12, 13, 14, 15  (3rd , 4th & 5th wk) | Plant Development:  1-Development rate  2-Determinate and indeterminate crops  3-Development stages  4-Natural distribution of photoperiodic response  5- Interaction of day length and vernalization  6-Thermal and Photothermal units  7-Seed germination and dormancy | Chapters 3, 13, 14, pp. 31-40, 177-212 . in Gliessman S.R. 1998 | *A2 & A4 & A5 & B1 & C1 & D3 & D5* |
| 16, 17, 18  (6th wk) | Aerial environment  1-Radiation concept  2-Temperature  3-Microclimates | Chapters 4, 5, 6, 7, 18 pp. 41-98. in Gliessman S.R. 1998 | *A1 &A2 & A3& A5& B2& B3 & C2 & C3& D2& D3* |
| 19, 20, 21, 22, 23, 24  (7th & 8th wks) | Soil resources  1-Soil formation and properties  2-Organic matter in soil  3-Water in soil  4-Water and plant growth  5-Soil aeration  6-Soil temperature  7-Influnce of temperature on soil and plant | Chapters 8, 9, 10, 11 pp. 99-148, 269-281. in Gliessman S.R. 1998 | *A4 & B3 &C3 & C4 & D3 & D4* |
| 25  (9th wk) | First Midterm Exam |  |  |
| 26, 27, 28, 29, 30, 31, 32, 33  (9th , 10th 11th wks) | Water relation  1-Evapotranspiration  2-Evaporation from dry soil  3-Crop water balance  4-Reponses of crop to water deficit  5-Relation between crop growth and water use | Chapters 6, 9 pp. 71-84, 117- 133. in Gliessman S.R. 1998 | *A2 & A3 & A4 & A5& B2&B3& C2& C3 &C4 & D3& D4* |
| 34, 35, 36, 37  (12th & 13th wks) | Soil management | Chapters 8, 9, pp. 99-133. in Gliessman S.R. 1998 | *A4 & B3 & C4 & D4* |
| 38 (13th wk) | Second Midterm Exam |  |  |
| 39, 40, 41, 42  (13th & 14th wks) | Strategies for rain fed agriculture  1-Cropping pattern for water use  2-Soil fertility  3-Plant density and arrangement | Chapters 6, 9 pp. 71-84, 117- 133. in Gliessman S.R. 1998 | *A2 & A3 & A4 & A5& B2&B3& C2& C3 &C4 & D3& D4* |
| 43, 44, 45, 46, 47, 48  (15th & 16th wks) | Water management and Discussion of reports | Chapters 6, 9 pp. 71-84, 117- 133. in Gliessman S.R. 1998 | *A2 & A3 & A4 & A5& B2&B3& C2& C3 &C4 & D3& D4* |

**Learning Methodology:**

The course will be structured in lectures, discussions, assignments and reports. 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.

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| **Evaluation** | **Point %** | **Date** | |
| First Midterm Exam | 20% |  | |
| Second Midterm Exams | 20% |  | |
| Discussion reports | 10% |  | |
| Final Exam | 50% | |  |

**References:**

1. Gliessman, S.R. 1998. Ecological processes in sustainable agriculture. Ed. E. Engles. Sleeping Bear Press. U.S.A.
2. Cox, G.W. and Atkins, M.D. 1979. Agricultural ecology – an analysis of world food production systems. W.H. Freeman and Company, San Francisco, U.S.A.

3- Crop ecology: Productivity and management in agricultural systems by

R. S. Loomis and D. J. Connars- Cambridge University Press 1996

**Intended Grading Scale (Optional)**

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| --- | --- | --- | --- | --- |
| **From (%)** | **To (%)** | **Scale** | **Mark** | **Result** |
| 0 | 44 | 0 | H | Fail |
| 45 | 47 | 0.75 | D- | Fail |
| 48 | 54 | 1 | D | Accepted |
| 55 | 60 | 1.5 | D+ | Accepted |
| 61 | 63 | 1.75 | C- | Good |
| 64 | 66 | 2 | C | Good |
| 67 | 72 | 2.5 | C+ | Good |
| 73 | 75 | 2.75 | B- | Very Good |
| 76 | 78 | 3 | B | Very Good |
| 79 | 84 | 3.5 | B+ | Very Good |
| 85 | 87 | 3.75 | A¯ | Excellent |
| 88 | 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 the 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>