**The University of Jordan**

**Faculty: Agriculture Department: Hort. and Crop Sc.**

**Program: Master in Hort. and Crop Sc. Academic Year/ Semester:----**

**Course Name: Forage Crops Sc. (601722)**

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| --- | --- | --- | --- | --- | --- |
| **Credit hours** | **3 hrs. weekly** | **Level** | **MSc.** | **Pre-requisite** | **--** |
| **Coordinator/ Lecturer** | **Prof. Hani Saoub** | **Office number** | **213** | **Office phone** | **22377** |
| **Course website** | **--** | **E-mail** | **hanis@ju.edu.jo** | **Place** | **--** |

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

Forage crops require special type of management, depending on their growth habits, environment and utilization. This course will cover the role of forage crops in the farming systems, considering the major concepts pertaining to the establishment and management of improved forage lands. Understanding the factors that affect plant growth and development is essential for successful management, consequently optimum forage production.

**Learning Objectives:**

* Demonstrate the role and concept of grass land farming,
* Discuss physiological and ecological aspects related to forage crops management,
* Identify key factors that affect forage quality and quantity,
* Understand the different utilization methods of forage crops,
* Determine best management practices for raising forages for livestock production.

**Intended Learning Outcomes (ILOs):**

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

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

A1- Understand the physiological bases behind the management practices of forage crops (i.e. time of cutting).

A2- Understand the concept of growing forage crops mixed together (forage mixtures).

A3- Know methods of utilizing forage crops.

A4- Understand the concept of pasture-livestock integrated systems.

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

B1- Explain the advantages and disadvantages of growing forage mixtures.

B2- Analyze the concept of forage crop conservation.

B3- Develop a scientific connection between different cropping systems for forage crop production.

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

C1- Develop an integrated approach for proper management of forage crops.

C2- Improve forage production for different environments.

C3- Develop ways to manage forage crops under different growing conditions.

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

D1- Work effectively to properly manage forage crops fields.

D2- Give recommendations related to optimum management practices.

D3- Explain and solve problems related to forage production under different agricultural systems.

***Students are expected to display personal responsibility to achieve minimum level of meeting deadlines related to the course requirements****.*

# ILOs: Learning and Evaluation Methods

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **ILO/s** | **Learning Methods** | **Evaluation Methods** |
| A. | Knowledge and understanding | Lectures, discussions, homework and assignments. | Exam, Quiz, assignments |
| B. | Intellectual Analytical and cognitive skills | Lectures, discussions, homework and assignments. | Exam, Quiz, presentations, assignments |
| C. | Subject- Specific Skills | Discussions and assignments. | Comprehensive exam |
| D. | Transferable Key Skills | Problem analysis and solution- projects | Research and term paper + written critical thinking scenarios |

**Course Contents**

|  |  |  |  |
| --- | --- | --- | --- |
| **Content** | **Reference**  | **Week** | **ILO/s** |
| 1- Introduction:* Importance
* Forage crops in the farming systems
 | 1, 2,4, 5, 6, 7 | 1 | A1+A2+A3 |
| 2- Key Farming:* Concept
* Germination
* Regulation
* Mechanisms
* Soil seed bank
* Persistence of permanent pastures
 | 3, 7, 8 | 1+2 | A3+A4+B3 |
| 3- Role of legumes in improving marginal lands | 7, 8, 10, 11, 12 | 3 | A2+A3+A4 |
| 4- Forage mixtures:* Principles of compounding crops
* Competition
* Population dynamics
 | 1, 2, 4, 7, 8 | 4 | A2+B1+C2 |
| 5- Competition and forage production:* Advantages
* Principles of compounding crops
* Interspecific competition
* Population dynamics
 | 4, 5, 7, 11 | 5 | A2+B1+C1+C2 |
| 6- Utilization:* Concept
* Which method to choose?
* Why?
 | 1, 2, 4, 5, 6, 9, 13 | 6+7 | A3+B2+B3+C1+C3 |
| 7- Effect of environment:* Temperature, rainfall, soil,..
 | 1, 2, 4, 5, 6, 7, 10, 11, 12 | 8+9+10 | A1+B3+C1+C2+C3+D1+D2+D3 |
| 8- Effect of fertilizer:* Application on forage production (quantity and quality)
 | 1, 2, 4, 5, 6, 7, 10, 11, 12 | 11+12+13 | A1+B3+C1+C2+C3+D1+D2+D3 |
| 9- case study: | JournalsReports | 14+15+16 | B3+C1+C2+C3+D1+D2+D3 |

**Learning Methodology**

## Projects and Assignments

To be determined for each semester separately.

# Evaluation

|  |  |  |
| --- | --- | --- |
| **Evaluation** | **Point %** | **Date** |
| **Midterm Exam**  | 20 | -- |
| **Assignments and homework**  | 20 | -- |
|  **Project – Case study** | 20 | -- |
| **Final Exam**  | 40 | -- |

**Main Reference/s:**

1. Barnes, R.F., C.J. Nelson, M. Collins, and K.J.Moore. 2003. Forages- Volume I: An introduction to grassland agriculture. (6th edition). Wiley, USA.

2. Barnes, R.F., C.J. Nelson, K.J.Moore, and M. Collins. 2007. Forages- Volume II: The science of grassland agriculture. (6th edition). Wiley- Blackwell, USA.

3. Christiansen, S. *et al*. 1993. Introducing ley farming to the Mediterranean basin. ICARDA publications.

4. Dovart, A., C. Yehezkel, and A. Goldman. 1993. Irrigated forage production. Elsevier sc. Publishers, Netherlands.

5. Food and Agriculture Organization (FAO). 2005. Forage legumes for temperate grasslands. FAO, Rome, Italy.

6. Kafi, M., and Ajmal Khan, M. 2008. Crop and forage production using saline waters. Daya publishers house.

7. Langer, R.H.M. 1990. Their ecology and management. 1st edition. Oxford univ. press, Auckland, New Zealand.

8. Osman, A.E. *et al*. 1990. The role of legumes in the farming systems of the Mediterranean areas. ICARDA publications.

9. Park, R.S., and Stronge, M.D. 2005. Silage production and utilization. C.H.I.P.S.

10. Pearson, C.J. and Ison, R.L. 1997. Agronomy of grassland systems. Cambridge univ. press. Cambridge, Great Britain.

11. Pitman, W.D. 2000. Tropical forage plants, development and use (e book).

 http://www.routledge.com.

12. Singh, R.J. 2009. Forage crops. CRC/Taylor andFrancis. Book news, Inc., Portland, Or.

13.Woolford, M.K. 1984. The silage fermentation. 1st edition. Marcel Deker, Inc. New York, USA.

# Scentific journals:

* Advance in Agronomy
* Agronomy Journal
* Australian Journal of Agricultural Research
* Australian Journal of Experimental Agriculture
* Canadian Journal of Plant Science
* Crop Science
* Euphytica
* Field crops Research
* Journal of Range Management
* Journal of Grass and Forage Science
* Journal of Agronomy and Crop Science

**Intended grading scale (optional):**

0-39 F

40-49 D-

50-54 D

55-59 D+

60-64 C-

65-69 C

70-73 C+

74-76 B-

77-80 B

81-84 B+

85-89 A-

90-100 A

\**Remember – you earn grades, professors merely assign them.*

**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.
* For more details on University regulations please visit:

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