**The University of Jordan**

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

**Program: Ph.D. in Horticulture & Crop Science *2018-2019 Spring semester***

**Course title: Breeding Horticultural Crops (0601934)**

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| Credit hours | 3 | Level | Ph.D. Course | Pre-requisite | 601240 |
| Coordinator/ Lecturer | Prof. Mahmoud Kasrawi | Office number | 215 | Office phone | 22335 |
| Course website | [Faculty](http://blackboard.ju.edu.jo/webapps/login/) Member Website | E-mail | kasrawi@ju.edu.jo | Place |  |

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

**Course Description:**

This course covers the application of breeding methods and techniques for the improvement of horticultural characteristics of vegetables, fruit trees and ornamental crops.

**Course Objectives:**

1- Understanding of advanced genetic concepts required for plant improvement.

2- Figure out the most recent methods of plant improvement starting from simple pollination methods up to the production of hybrid seeds.

3- Utilization of plant breeding methods in producing new cultivars with specific characters (pest resistance, salt tolerability, adapted to water shortage, parthinocarpic hybrids, early fruiting cultivars….etc.).

4- Induction of male flowers from hybrid cultivars for the purposes of new hybrids development.

**Learning Outcomes:**

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

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

 A1- Recognize the importance of genetic concepts in plant breeding and realize

 How much genetics characters are related to plant breeding.

 A2- Identified the wide range of genetic variation and how to be used in plant

 breeding.

 A3- Understand the highly sophisticated methods used for the improvement of the major crops.

 A4- Utilization the new plant breeding techniques in solving the evolved problems that related to various cultivation systems.

## B) Subject Specific Skills: subject specifics skills, with ability to assist plant breeders in doing the following:

 B1- Development of inbreed parental genotypes after that can be maintained and used in new cultivars improvement.

B2- Grow a crossing blocks for the major parental genotypes and conducted crossing (including emasculation and pollination) following proper procedures for the production of improved crops.

B3- Handle segregating populations and advance generations and select individuals with combined desirable traits.

## C) Transferable Skills

C1- Train technicians in how use breeding for hybridization, pest resistance and other desirable characters.

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

D1- Versed in the techniques of Hybridization.

D2- Able to use genetic resources for development of diseases tolerability cultivars.

D3- Skillful in involving the genes characters in the adaptation of new produced cultivars to microclimate and soil stress.

D4- Able to collect, conserve and use the propagules in development of Asexual cultivars.

# ILOs: Learning and Evaluation Methods

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| **ILO/s** | **Learning Methods** | **Evaluation Methods** |
| **A**. Knowledge and understanding (**A1-A4**) | Lectures and DiscussionsAssignment readings | Exams, Seminars  |
| **B**. Intellectual Analytical and Cognitive Skills (**B1-B3**) |  Lectures and DiscussionsAssignment readings | Exams, Seminars  |
| **C**. Subject Specific Skills (**C1**) | Lectures and DiscussionsAssignment readings | Exams, Quiz, |
| **D**. Transferable Key Skills (**D1-D4**) | Lectures and DiscussionsAssignment readings | Exams, Seminars  |

**Course Contents**

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| **No. of lecture (s) /Week** | **Subject** | **Sources** | **ILOs** |
| 1 (1st wk) | Role of Plant Breeding in Agriculture.  | Chapter 1, pp. 1-10. in Fehr, W. R. 1993. | *A1 & A2 & B1 & C1 & D1 & D2 & D3* |
| 2, 3 (1st wk) | Quantitative Inheritance | Chapter 6, pp. 80-94. in Fehr, W. R. 1993. | *A1 & A2 & A4 & B1& B3 & C1 & D2 & D3* |
| 4,5(2nd wk) | Heritability. | Chapter 7, pp. 95-105. in Fehr, W. R. 1993. | *A1 & A2 & A3 & A4 & B1& B2&B3 & C1 D1 & D2 & D3* |
| 6, 7(2nd & 3rd wks) | Inbreeding | Chapter 8, pp. 106-114. in Fehr, W. R. 1993. | *A1 & A2 & A3 & A4 & B1& B2&B3 & C1 & D1 & D2 & D3* |
| 8(3rd wk) | Heterosis | Chapter 9, pp. 115-119. in Fehr, W. R. 1993. | *A1 & A2 & A3 & A4 & B1& B2&B3 & C1 & D1 & D2 & D3* |
| 9, 10, 11(3rd & 4th wks) | Recurrent Selection | Chapter 15, pp. 172- 198. in Fehr, W. R. 1993. | *A1 & A2 & A3 & B1& B2 & B3 & C1 & D1 & D2 & D3* |
| 12, 13, 15(4th& 5th wks) | Maximizing Genetic Improvement | Chapter 17, pp. 219- 246. in Fehr, W. R. 1993. | *A1 & A2 & A3 & A4 & B1& B2&B3 & C1 & D1 & D2 & D3* |
| 16, 17, 18( 6th wk) | Genotype x Environmental Interaction | Chapter 18, pp. 247- 260. in Fehr, W. R. 1993. | *A2 & A3 & A4 & B1& B2 &B3 & C1 & D1 & D3* |
| 19, 20(7th wk) | Breeding for Pest Resistance | Chapter 21, pp. 304- 314. in Fehr, W. R. 1993. | *A1 & A2 & A3 & A4 & B2& B3& C1 & D1 & D2*  |
| 21(7th wk) | Bulk Method | Chapter 22, pp. 315- 318. in Fehr, W. R. 1993. | *A1 & A2 & A3 & A4 & B1& B2&B3 & C1 & D1 & D2& D3* |
| 22(8th wk) | **One Hour Exam** |  |  |
| 23, 24(8th wk) | Single Seed Descent Method | Chapter 23, pp. 319- 327. in Fehr, W. R. 1993. | *A1 & A2 & A3 & A4 & B1& B2&B3 & C1 & D1 & D2 & D3* |
| 25(9th wk) | Mass Selection in Self- Pollinated Population | Chapter 24, pp. 328- 331. in Fehr, W. R. 1993. | *A1 & A2 & A3 & A4 & B1& B3 & C1 & D1 & D2 & D3* |
| 26(9th wk) | Pedigree Method | Chapter 25, pp. 328- 331. in Fehr, W. R. 1993. | *A1 & A2 & A3 & A4 & B1& B2 & B3 & C1 & D1 & D2 & D3* |
| 27, 28, 29(9th & 10th wks) | Homozygous Lines from Double Haploid | Chapter 27, pp. 347- 359. in Fehr, W. R. 1993. | *A1 & A2 & A3 & A4 & B1& B2&B3 & C1 & D1 & D2 & D3* |
| 30, 31, 32(10th & 11th wks) | Backcross Method | Chapter 28, pp. 360- 376. in Fehr, W. R. 1993. | *A1 & A2 & A3 & A4 & B1& B2&B3 & C1 & D1 & D2 & D3* |
| 33(11th wk) | **One Hour Exam** |  |  |
| 34(12th wk) | Development of Asexually Propagated Cultivars | Chapter 30, pp. 381- 387. in Fehr, W. R. 1993. | *A1 & A2 &B3 & C1 & D4* |
| 35(12th wk) | Development of Self pollinated Cultivars | Chapter 31, pp. 388- 400. in Fehr, W. R. 1993. | *A1 & A2 & A3 & A4 & B1 &B3 & C1 & D1 & D2 & D3* |
| 36, 37(12th & 13th wks) | Development of Hybrid Cultivars | Chapter 34, pp. 428- 438. in Fehr, W. R. 1993. | *A1 & A2 & A3 & A4 & B1& B2&B3 & C1 & D1 & D2 & D3* |
| 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48(13th & 14th & 15th & 16th wks) | Seminars in Special Topics | Scientific Articles | *A1 & A2 & A3 & A4 & B1& B2&B3 & C1 & 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. Fehr, W.R. 1993. Principles of Cultivar Development. Vol. 1. Theory and Technique. Macmillan Publishing Company. USA. 536 pages.

**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 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>