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| **University of Jordan**  **Faculty of Agriculture** |  | **Dept. Horticulture & Crop Science**  **Semester: 1st . 2018/2019** |

**Plant Breeding** (0651732)

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| **Credit hours** | 3 | **Level** | M.Sc. | **Pre-requisite** |  |
| **Lecturer** | Dr. Monther Sadder | **Office #** | 212 | **Office phone** |  |
| **Course website** |  | **E-mail** | sadderm@ju.edu.jo | **Place** |  |

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| --- | --- | --- | --- | --- | --- |
| **Office hours** | | | | | |
| **Day/Time** | **Sunday** | **Monday** | **Tuesday** | **Wednesday** | **Thursday** |
|  | 9-10 a.m. |  | 9-10 a.m. |  | 9-10 a.m. |

**Course Description:**

The first part of this course focuses on a revision of the under graduate plant breeding course. This includes the basic features of plant reproductive biology and Mendelian genetic principles. A species' reproductive mode—which may be sexual, asexual or a combination of both—is fundamental to the strategies applied to develop superior cultivars. The second part of the course elaborates on breeding schemes (plant genetic resources, selection and hybridization). In addition, detailed breeding systems will be illustrated using real examples for self-pollinating and cross-pollinating crops. Modern breeding technologies such are QTL mapping and GWAS be covered through recently published articles.

**Learning Objectives:**

The course is designed to expose students to the following fields in plant breeding:

1. Basic principles in the genetic improvement as affected by of crop reproductions style.
2. Detailed selection methods applied in breeding programs.
3. Breeding simple traits.
4. Breeding quantitative traits.

**Intended Learning Outcomes:**

1. **knowledge and understanding:** Student is expected to

A1. Understand the differences between qualitative and quantitative traits

A2. Principles in inheritance of both Mendelian and linked traits

A3. Standard techniques applied in breeding programs

A4. Advanced breeding molecular technologies.

1. **Intellectual analytical and cognitive skills:** Student is expected to

B1. Understand the direct interaction between abiotic and biotic stresses on crop yield quality and quantity.

B2. Unique self-pollinated systems for breeding systems

B3. Unique cross-pollinated systems for breeding systems

B4. The ability to illustrate all instructed raw data into clear, meaningful, impressive, and simple flowcharts

1. **Subject-specific skills:** Student is expected to understand

C1. Plant crosses and their implications

C2. Genetic purity and inbreeding

C3. Trait heritability

C4. GWAS and QTLs breeding

C5. Internet specific database search and breeding software, analysis, interpretation and application

1. **Transferable key skills:** Student is expected to

D1. Simple and complex traits as they interact with the surrounding environment

D2. Basic related statistical skills

D3. Genetic and physical chromosome maps (genes and markers).

D4. Internet specific database search and breeding software, analysis, interpretation and application

**ILOs Learning and Evaluation Methods**

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| **ILO/s** | **Learning Methods** | **Evaluation Methods** |
| A1-A4 | Lectures, Discussions, Presentation | Quiz, Exam, Presentation |
| B1-B4 | Lectures, Discussions, Presentation | Quiz, Exam, Presentation |
| C1-C5 | Lectures, Discussions, Presentation | Quiz, Exam, Presentation |
| D1-D4 | Lectures, Discussions, Presentation | Quiz, Exam, Presentation |

**Course Contents**

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| **Content** | **Reference** | **Weeks** | **ILOs** |
| Reproduction in crop plants | Breeding text books | 1 | A1, B1, C1, D1-D3 |
| Selection methods | Breeding text books | 1 | A2-A4, B1, D1-D3 |
| Hybridization methods | Breeding text books | 1 | A2-A3, B3, C2, D1-D4 |
| Self-pollinated crop breeding | Recent articles | 1 | A1, B1, C2-C5, D1-D4 |
| Cross-pollinated crop breeding | Recent articles | 1 | A1, B1, D1-D3 |
| Molecular markers | Recent articles | 2 | A1, B1, D1-D3 |
| Breeding for crop yield | Recent articles | 2 | A1, B3, C1, C3, D1-D4 |
| Breeding for crop quality | Recent articles | 1 | A1, B3, C1, C3, D1-D4 |
| Breeding for biotic stresses | Recent articles | 1 | A1, B3, C1, C3, D1-D4 |
| Breeding for abiotic stresses | Recent articles | 1 | A3, B2, D1-D4 |
| QTL | Recent articles | 2 | A4, B2, C4, D1-D4 |
| GWAS | Recent articles | 2 | A4, B2, C4 |

**Learning Methodology**

## This course will be structured in

## Lectures and discussions,

## Assignments

# Evaluation

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| **Evaluation** | **Point %** | **Date** |
| **Midterm Exam** | 30 | After 10 weeks |
| **Quizes** | 10 | Weekly |
| **Discussion** | 10 | Along the entire course |
| **Presentations** | 10 | As needed |
| **Final Exam** | 40 | Determined by Registration Dept. |

**References and Supporting Material**

* Brown, J., Caligari, P.D.S. and Campos, H.A. 2014. Plant Breeding. 2nd edition, Wiley-Blackwell, UK.
* Acquaah, G. 2012. Principles of Plant Genetics and Breeding. 2nd edition, Wiley-Blackwell, UK.
* A group of recent articles related to plant breeding and related advanced technologies.