Course Syllabus

1	**Course title**	**Fungal Taxonomy**
2	**Course number**	**0606965**
3	**Credit hours**	**3**
	Contact hours (theory, practical)	Theory 2, Practical 3
4	**Prerequisites/co-requisites**	-
5	**Program title**	☐ BSc ☐MSc **X** PhD of Plant Protection
6	**Program code**	
7	**Awarding institution**	The University of Jordan
8	**School**	School of Agriculture
9	**Department**	Plant Protection
10	**Course level**	☐ BSc ☐ MSc **X** PhD
11	**Year of study and semester (s)**	2021/2022 **X** first ☐second ☐ summer
12	**Other department (s) involved in teaching the course**	None
13	**Main teaching language**	English
14	**Delivery method**	☐Face to face learning X Blended ☐Fully online
15	**Online platforms(s)**	X Moodle X Microsoft Teams ☐Skype ☐Zoom ☐Others……
16	**Issuing/Revision Date**	4th January, 2024

17 Course Coordinator:

Name: Dr. Kholoud M. Alananbeh, Dr. Nida' Salem
Contact hours: 10.00-12.00 Sunday, Tuesday
Office number: 124 / 128
Phone number: 22424, 22358
Email: k.alananbeh@ju.edu.jo; n.salem@ju.edu.jo; nmsalem72@gmail.com

18 Other instructors:

None

19 Course Description:

This course aims to equip students with advanced knowledge of fungal taxonomy, focusing on identification through morphological characteristics using taxonomic keys and molecular techniques, primarily sequencing.

20 Course aims and outcomes:

Aims:

The main objectives of this course are:

1. Understand fungal taxonomy, classification systems, and key morphological and molecular features for identification.
2. Conduct fungal identification using microscopy, molecular techniques (e.g., DNA extraction, PCR, sequencing), and bioinformatics tools to analyze and interpret data.
3. Design and execute fungal taxonomy projects, applying skills to biodiversity conservation, disease diagnosis, and biotechnological challenges.
4. Work collaboratively, communicate findings effectively, and apply ethical principles in fungal research and applications.

B- Students Learning Outcomes (SLOs):

A1- Recognize the taxonomic hierarchy and classification systems for fungi.
A2- Identify fungi based on macroscopic and microscopic features (e.g., spore type, hyphal structure).
A3- Use diagnostic keys for morphological identification.
A4- Understand molecular markers (e.g., ITS regions) and their use in fungal identification and interpret phylogenetic trees and molecular sequence data.

B1- Prepare fungal samples for microscopic examination and identify key morphological characteristics of fungal taxa.
B2- Perform DNA extraction, PCR, and sequencing for fungal identification, and analyse sequence data using bioinformatics tools and databases (e.g., BLAST, UNITE).

C1- Evaluate complex datasets (morphological and molecular) to identify fungi.
C2- Propose solutions to challenges in fungal taxonomy and identification.
C3- Design and execute fungal identification projects using both morphological and molecular methods.
C4- Critically assess scientific literature in fungal taxonomy.

D1- Work effectively in teams during field and lab activities.
D2- Communicate results to both scientific and non-specialist audiences.
D3- Apply taxonomic skills in real-world scenarios, such as biodiversity conservation, disease diagnosis, or biotechnological applications.

Upon successful completion of this course, students will be able to:

1. Demonstrate a depth in understanding of the fundamental knowledge and skills required in the field of Plant Protection sciences, which include weeds, insects, mites, fungi, bacteria, viruses and nematodes.
2. Identify and distinguish harmful and beneficial weeds, insects, mites, fungi, bacteria, and nematodes.
3. Predict the outbreaks of pests and determine the level of infection based on skills gained in the field of Plant Protection Sciences.
4. Recognize different techniques (biological, chemical, cultural, and physical) in pest control.
5. Design and develop appropriate management strategies of pests in an environmentally friendly manner.
6. Participate efficiently in agricultural projects in the field of pest management in various public and private sectors in Jordan and worldwide.
7. Communicate effectively in written, oral, and graphical forms.
8. Employ the gained skills in communication and serving different communities.
9. Commit to ethics and compliance responsibilities for being an agricultural engineer, especially with regard to the agricultural sector, environment and society.

Program PLOs / SLOs of the course	PLO (1)	PLO (2)	PLO (3)	PLO (4)	PLO (5)	PLO (6)	PLO (7)	PLO (8)	PLO (9)
Knowledge and Understanding									
A.1	X								
A.2		X							
A.3	X	X		X					
A.4	X		X						
B.1									
B.2				X					
C.1		X							
C.2				X					
C.3		X	X	X			X	X	X
C.4									
D.1						X	X	X	X
D.2					X	X	X	X	X
D.3		X	X	X	X	X	X	X	X

21. Topic Outline and Schedule:

Week	Lecture	Topic	Intended Learning Outcome (ILOs)	Learning Methods Face to Face (FF) Blended (B) Fully Online (FO)	Platform (MS teams MS), Moodle (M))	Lecturing Synchronous (S) Asynchronous	Evaluation Methods Assignment (A) Exam (E) Presentation (P) Quiz (Q) Report (R)	Resources
1	1.1	Introduction to Fungal Taxonomy		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
	1.1	Historical development of fungal taxonomy		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
	1.2	Importance of fungal taxonomy in research and applied sciences		Face to face		Synchronous	A, E, P, Q	
2	2.1	Key morphological features of fungi: spores, hyphae, fruiting bodies, and colonies		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
	2.2	Use of taxonomic keys and atlases for fungal identification		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
	2.3	Practical: Microscopic and macroscopic techniques, staining methods for fungal structures		Face to face	MS teams	Synchronous	A, E, P, Q	
3	3.1	Major fungal phyla and their distinguishing features		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
	3.2	Introduction to fungal orders, families, and genera		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
	3.3	Practical session: Classification of fungal samples		Face to face	MS teams	Synchronous	A, E, P, Q	
4	4.1	Culturing Techniques for Fungi		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
	4.2	Practical: Preparation of fungal growth media, isolation and purification of fungi, maintenance and storage of fungal cultures		Face to face	MS teams	Synchronous	A, E, P, Q	1,2

5	5.1	olecular Taxonomy of Fungi: basics of olecular techniques in taxonomy		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
	5.2	Phylogenetic analysis and tree construction		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
	5.3	Practical session: DNA extraction and amplification of fungal samples		Face to face	MS teams	Synchronous	A, E, P, Q	
6	6.1	Molecular Markers in Fungal Taxonomy: Overview of commonly used markers: ITS, LSU, SSU, TEF1, etc.		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
	6.2	Applications of molecular markers in species identification and phylogenetics		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
7	7.1	Case studies: Examples of molecular marker usage in fungal taxonomy		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
	7.2	Integration of morphological and molecular data: advantages and limitations		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
8	8.1	Techniques for combining data for accurate fungal identification		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
	8.2	Practical session: Comparing morphological and molecular data		Face to face	MS teams	Synchronous	A, E, P, Q	
9	9.1	Applied aspects of fungal taxonomy: taxonomy in agriculture, medicine, and industry		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
	9.2	Role of fungal taxonomy in biodiversity and conservation		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
10	10.1	Tools and databases for fungal taxonomy: introduction to online tools and databases (MycoBank, GenBank, etc.)		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
	10.2	Use of bioinformatics tools for sequence analysis		Face to face	MS teams	Synchronous	A, E, P, Q	1,2

11	11.1	Practical session: Searching and analyzing fungal sequences in databases		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
	11.2	Advances in fungal taxonomy: Next-generation sequencing (NGS) and its impact on fungal taxonomy		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
12	12.1	Metagenomics and environmental DNA (eDNA) in fungal studies		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
	12.2	Emerging trends and challenges in fungal taxonomy		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
13	13.1 13.2	Practical applications and final project: Fieldwork (Collecting fungal samples, Laboratory (Morphological and molecular analysis of collected samples)		Face to face	MS teams	Synchronous	A, E, P, Q	1,2
14	14.1 14.2	Group project: Taxonomic identification and phylogenetic placement of an unknown fungal sample		Face to face	MS teams	Synchronous	A, E, P, Q	

22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
Midterm Exam	30	wk1-wk8	A,B,C,D	9th week	Face to face
Activities ✓ Homework ✓ Presentation ✓ Research paper ✓ Discussions ✓ Group project/s	30	W7-W15	A,B,C,D	At the end of each topic	Test portal, MS teams Face to face
Final exam	40	W1-W15 All topics	A,B,C,D	Will be announced from register	Face to face

23 Course Requirements

(e.g: students should have a computer, internet connection, webcam, account on a specific software/platform…etc):

Students should have a computer or smart phone with internet connection, and should be familiar with Microsoft teams, Moodle, and zoom.

24 Course Policies:

A- Attendance policies: Students should attend all classes on time. <15%, <20% with a permission ; medical report

B- Absences from exams and submitting assignments on time: Students should not be absent from exams and if they do then a convincing excuse should be provided. Assignments should be submitted on schedule.

C- Health and safety procedures: When in class, students should follow safety measures be wearing masks and keep at least one meter between each other.

D- Honesty policy regarding cheating, plagiarism, misbehavior: Students should be honest with ethical behavior.

E- Grading policy: Mentioned in section 22.

F- Available university services that support achievement in the course: The university provides Microsoft and Moodle platforms and classes for face to face teaching.

25 References:

A- Required book(s), assigned reading and audio-visuals:

Talbot, P. H. B. (1971). Principles of fungal taxonomy.

Frisvad, J. C., Bridge, P. D., & Arora, D. K. (Eds.). (2020). *Chemical fungal taxonomy*. CRC Press.

Gao, C., & Cai, L. (2022). Fungal Taxonomy, Phylogeny, and Ecology: A Themed Issue Dedicated to Academician Wen-Ying Zhuang. *Journal of Fungi*, *8*(12), 1294.

B. Recommended books, materials, and media:

1) MycoBank: https://www.mycobank.org/?utm_source=chatgpt.com
2) Index Fungorum: https://www.indexfungorum.org/?utm_source=chatgpt.com
3) UNITE Database: https://academic.oup.com/nar/article/52/D1/D791/7416391?utm_source=chatgpt.com&login=true
4) Fungal Names: https://nmdc.cn/fungalnames/?utm_source=chatgpt.com
5) MycoKey: https://mycoasia.org/resources/?utm_source=chatgpt.com
6) U.S. National Fungus Collections – Databases: https://www.ars.usda.gov/northeast-area/beltsville-md-barc/beltsville-agricultural-research-center/mycology-and-nematology-genetic-diversity-and-biology-laboratory/docs/us-national-fungus-collections-bpi/us-national-fungus-collections-databases/?utm_source=chatgpt.com
7) NCBI: https://www.ncbi.nlm.nih.gov/

26 Additional information:

Laboratory schedule: included with the topics outline.

Name of Course Coordinator: Kholoud M. Alananbeh Signature: ---------- Date: ----------
Head of Curriculum Committee/Department: ---------- Signature: ----------
Head of Department: ---------- Signature: ----------
Head of Curriculum Committee/Faculty: ---------- Signature: ----------
Dean: ---------- Signature: ----------