Biosafety and microbial diversity; Code: PHM 706

A-Basic Information

Programme on which the course is given:	Master's degree of pharmaceutical sciences (Microbiology and Immunology)
Department responsible for offering the course:	Department of Microbiology and Immunology
Department responsible for teaching the course:	Department of Microbiology and Immunology
Academic year:	Pre-Master Courses-2023/2024-second semester
Course title and code:	Biosafety and microbial diversity, PHM 706
Contact hours (credit hours):	Lecture: 3 (3), Total: 3 (3)
Course Coordinator:	**Dr. Ann Ayman Elshamy**

B- Professional Information

1 - Overall Aims of Course

Upon successful completion of this course, the student should have a detailed background on various aspects affecting biosafety including control and protective measures that should be undertaken during genetic modification (modification of the genetic characteristics of a microorganism, plant or animal by inserting a modified gene or a gene from another variety or species), in which a range of techniques is used to transfer DNA in one or more different organisms into another organism, giving it modified or novel genes (transgenes) and hence production of genetically modified microorganism (GMOs). Students should also know issue addressed refereeing to the biosafety which refers to 'the protection of biodiversity from the potential risks posed by living genetically modified organisms resulting from modern biotechnology that can result in extinction of some species and resulted in various environmental harm to other species including human, animals and plants.

Intended Learning Outcomes of Course (ILOs)

a. Knowledge and Understanding:

The students should be able to:

a1. Know various aspects of biosafety and its impact on biological diversity including various advanced agreements

a2. Understand different key possible positive and negative impacts of GMOs on biodiversity in addition to different categories of bioterrorism

a3. Define various precautions that should be undertaken during handling, transport, packaging and identifications of GMOs.

a4. Know various aspects concerning species-species interaction and well as horizontal gene transfer, transgenic plants as well as homologous and heterologous gene recombination

a5. Define different tools used in microbial classifications and phylogenetic analysis

b. Intellectual Skills:

The students should become able to:

b1. predict various negative impacts resulted from accidental release of GMOs in the environment.

b2. Estimate and analyze different methods that are involved in the production of GMOs and the associated impact on biodiversity.

b3. Analyze huge biological data sets including transferable genetic elements, recombinant regions (homologous recombination)

b4. Interpret various aspects of GMOs guidelines as well as various advanced informed agreements that usually implemented to avoid genetic pollution.

d. General and Transferable Skills

The students should be able:

d1. learn independently.

d2. work effectively as a part of a team and as an individual.

d3. retrieve and evaluate information from different sources to improve professional competencies

2 - Course Contents

Topics	No. of hours	Lectures
Biosafety in Microbiological and Biochemical laboratories	6	2
Biodiversity definition, types, socioeconomic value and main threats	6	2
Biodiversity and public health	6	2
Genetically modified organisms and biosafety concerns	6	2
Diversity of extremophiles	3	1
Pathogenic microbial genetic diversity and its impact on human health	6	2
Assessment of taxonomic and functional diversity of microorganisms	6	2
Phenotyping and genotyping of different microorganisms (studying clonal relationships)	6	2
Total	**45**	**15**

3 - Teaching and Learning Methods

1 - Lectures.
2 - Discussion sessions.

5- Student Assessment Methods

- **Works (assignment)** to periodically assess the student knowledge and understanding
- **Oral Exam** to assess skills of analysis, scientific thinking as well as scientific discussion
- **Final written exam** to assess the ability of student to remember and retrieve information as well understanding of the scientific background.

Assessment Schedule

Assessment 1	Activities	Week 7,8,11 and 12
Assessment 2	Oral exam	Week 16
Assessment 3	Final written exam	Week 16

Weighting of Assessments

Activities	10%
Final-written exam	80%
Oral exam	10%
Total	**100%**

6-List of References

1- Course notes: handouts and assignment delivered by instructors

2- Essential books (text books) and websites

1- *Biosafety in the Laboratory: Prudent Practices for Handling and Disposal of Infectious Materials*. National Research Council. 1989. https://doi.org/10.17226/1197.

2- *Biosecurity Challenges of the Global Expansion of High-Containment Biological Laboratories: Summary of a Workshop*. National Research Council. 2012. https://doi.org/10.17226/13315.

3- *Laboratory Biosafety Manual: Third Edition*. World Health Organization. 2004. https://books.google.com.eg/books?id=qVHfjFlNjzwC&pg=PA5&source=gbs_toc_r&cad=2#v=onepage&q&f=false.

4- *Microbial Diversity: Form and Function in Prokaryotes*. Oladele Ogunseitan. 2005. https://onlinelibrary.wiley.com/doi/epdf/10.1002/9780470750490.

5- *Microbial Diversity, Interventions and Scope*. Shiwani Guleria Sharma, Neeta Raj Sharma, Mohit Sharma 2020. Springer. https://doi.org/10.1007/978-981-15-4099-8.

5- Facilities required for teaching and learning

Lecture halls; Data show; computers and internet access, blackboard

Course coordinator: Dr. Ann Ayman Elshamy

Ann Elshamy

Acting Head of the Department: Assoc. Prof. Dr. Sarra Ebrahim Saleh

Sarra Saleh

Course name	Biosafety and Microbial diversity
Code	PHM 706

Course matrix

Course content	a1	a2	a3	a4	a5	b1	b2	b3	b4	d1	d2	d3
Biosafety in Microbiological and Biochemical laboratories												
Biodiversity definition, types, socioeconomic value and main threats												
Biodiversity and public health												
Genetically modified organisms and biosafety concerns												
Diversity of extremophiles												
Pathogenic microbial genetic diversity and its impact on human health												
Microbial diversity and multidrug resistance												
Assessment of taxonomic and functional diversity of microorganisms												
Phenotyping and genotyping of different microorganisms (studying clonal relationships)												

تم الاعتماد فى محضر مجلس قسم الميكروبيولوجيا والمناعة
جلسة رقم (٦) بتاريخ ١٤ / ٢ /٢٠٢٤