هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TPG-153

Course Specification
(Postgraduate)

Course Title:	**Microbial Biodiversity**
Course Code:	**BIOD508**
Program:	**Master's in Biodiversity**
Department:	**Department of Biology**
College:	**Faculty of Science**
Institution:	**University of Tabuk**
Version:	**2**
Last Revision Date:	**18/11/1444 H**

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A. General information about the course:

1. Course Identificationn:

1. Credit hours: 3 Credit Hours (2 Theoretical + 1 Practical)				
2. Course type				
A.	☐University	☐College	☒ Department	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 2/First year)				

4. Course General Description:

This course provides the microbial diversity in marine, freshwater, terrestrial habitats, and systems, and various forms. It focuses on the molecular methods that are used within the field, the importance of microbial diversity in different environments, and the mechanisms that establish and regulate diversity within microbial communities. It also provides laboratory training on methods to study microbial communities including recent metagenomics advances, metatranscriptomics, metaproteomics, and functional metagenomics. Besides, it provides a series of case studies on the meta-omics of environmental and human-associated microbial communities.

5. Pre-requirements for this course (if any):

Principles of Biodiversity (BIOD501).

6. Pre-requirements for this course (if any):

None.

7. Course Main Objective(s):

- Explore, characterize, and quantify the microbial diversity in a certain environment.
- Provide a broader understanding of microorganisms' genetic and functional diversity in various ecosystems.
- Use molecular methods for studying microorganisms from atypical environments.
- Explore the structure and function of an extreme microbiome through genomics.
- Highlight the role of microbial communities in biogeochemical cycles.
- Understand the genetic and functional diversity of microorganisms in different ecosystems.
- Provide more insights into the structural and functional atypical microbial diversity.

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the techniques and methods for studying microbial population composition, function, and the occurrence of individual groups.	**K2**	- Lectures. - Seminars. - Class discussions. - Problem-solving classes. - Self-learning.	- Written exams (Midterm and Final exams). - Quizzes. - Class discussions
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2.0	**Skills**			
2.1	Apply theoretical concepts of genomic-based methods to analyze microbial diversity and its	**S1**	- Lectures. - Practical sessions. - Seminars. - Class discussions. - Problem-solving	- Written exams (Midterm and Final exams). - Quizzes. - Laboratory

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	mechanisms.		classes. - Self-learning. - Individual and group presentations. - Assignments.	reports. - Class discussions. - Individual and group presentations. - Assignments.
2.2	Analyze the structure of DNA in different microbial strains.	**S2**	- Lectures. - Practical sessions. - Seminars. - Class discussions. - Problem-solving classes. - Self-learning. - Individual and group presentations. - Assignments.	- Written exams (Midterm and Final exams). - Quizzes. - Laboratory reports. - Class discussions. - Individual and group presentations. - Assignments.
2.3	Evaluate the effectiveness and accuracy of databases and tools for retrieving and analyzing microbial information.	**S3**	- Lectures. - Practical sessions. - Seminars. - Class discussions. - Problem-solving classes. - Self-learning. - Individual and group presentations. - Assignments.	- Written exams (Midterm and Final exams). - Quizzes. - Laboratory reports. - Class discussions. - Individual and group presentations. - Assignments.
2...				
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate an understanding of the ethical issues and environmental impacts of studying microbial biodiversity.	**V2**	- Class discussions. - Individual and group presentations. - Practical sessions. - Assignments. - Essays.	- Class discussions. - Individual and group presentations. - Laboratory reports. - Assignments.
3...				

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction, Tree of life, Origin of the Life, Mechanisms of microbial evolution.	2
2.	Taxonomy, Phylogeny, and Molecular Chronometer.	2
3.	Analysis of Microbial Diversity.	2
4.	Introduction to microbial communities and metagenomics.	2
5.	Microbial diversity of terrestrial ecosystems (soil, forests, desert, sediment, tundra).	2
6.	Microbial diversity of aquatic ecosystems (Freshwater and Marine).	2
7.	Microbes in extreme environments.	2
8.	Prokaryotic Microbial diversity.	2
9.	Animal virus, and Plant virus diversity.	2
10.	Eukaryotic Microbes in Nature Fungi, Algae, and Protozoa diversity.	2
11.	Microbial interactions: Symbioses, allelopathy, syntrophy, quorum sensing, Enzyme discovery through meta-omics. (Part I).	2
12.	Microbial interactions: Symbioses, allelopathy, syntrophy, quorum sensing, Enzyme discovery through meta-omics. (Part II).	2
13.	Methods of characterizing microbial communities: Cultivation and PCR.	2
14.	Methods of characterizing microbial communities: Genomics, Metagenomics, and Microbial Bioinformatics. (Part I).	2
15.	Methods of characterizing microbial communities: Genomics, Metagenomics, and Microbial Bioinformatics. (Part II).	2
Total		30

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes, Class discussions, Assignments	Distributed over 3-12 weeks	10
2.	Individual or group presentation, Essays	Distributed over 14 weeks	10
3.	Laboratory Reports	Distributed over 14 weeks	10
4.	Midterm Exam	9	20
5.	Practical Exam	16	10
6.	Final Exam	18	40

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
	Total		**100**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	- Ponmurugan, P. and Kumar, J. S. (2020). Microbial Biodiversity, pp. 220. Cambridge Scholars Publishing. ISBN: 9781527548596. - James W. Brown, J. W. (2014). Principles of Microbial Diversity, 1st edition, pp. 406. ASM Press. ISBN-13: 978-1555814427. - Bull, A. T. (2004). Microbial Diversity and Bioprospecting. ASM Press..
Supportive References	- *Journal American Society of Microbiology.* - *The Journal of Microbiology.*
Electronic Materials	- Saudi Digital Library. - UNSEDOC Digital Library. - www.sciencedirect.com.
Other Learning Materials	- None.

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	- A sufficient number of classrooms and well-equipped laboratories are available to accommodate up to 25 students. - Library.
Technology equipment (Projector, smart board, software)	- Data show projectors and a wireless internet connection are available for students and faculties. - Smart blackboard. - Computer Portable PowerPoint presentations.
Other equipment (Depending on the nature of the specialty)	- None.

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	- Students.	- Direct & Indirect.
Effectiveness of student's assessment	- Course instructors & Course coordinator (Teachers).	- Direct.
Quality of learning resources	- Students.	- Indirect.
The extent to which CLOs have been achieved	- Course instructors. - Course coordinator. - Quality Committee.	- Direct & Indirect.
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment *Methods* (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Department of Biology Council**
REFERENCE NO.	**Department Council NO (26)**
DATE	**26/11/1444 H**