



Course Specification

— (Postgraduate Programs) عبد المحسن بن عبد العزيز آل سعود

Course Title: Bioextinction and Bioinvasion of Alien Species

Course Code: BIO-6024

Program: Master of Science in Applied Biology (Biodiversity, Wildlife Conservation & Management)

Department: Biology عبد المحسن بن عبد العزيز آل سعود

College: Science

Institution: Imam Mohammad Ibn Saud Islamic University

Version: 1

Last Revision Date:



عبدالمطعم بن أبي الطموزي رحمه الله ورحمتهما الناصر

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عبدالمطعم بن أبي الطموزي رحمه الله ورحمتهما الناصر





A. General information about the course:

1. Course Identification:

1. Credit hours: 2(Lecture 2 + Lab 0)

2. Course type

A. ☐ University ☐ College ☐ Department ☒ Track

B. ☐ Required ☒ Elective

3. Level/year at which this course is offered: (Undetermined level)

4. Course General Description:

Humans have caused an unprecedented redistribution of the earth's biota. Both incidentally and deliberately, we continue to disperse an ever-increasing array of species across previously insurmountable environmental barriers. The consequences of successful introductions are almost always detrimental to ecosystem function, biodiversity, and ecosystem service, and invasion is ranked as one of the major natural disasters today.

In the course 'Bioextinction and Bioinvasion of Alien Species', will study non-native alien species and the factors that lead to their population explosions and negative ecological impacts in the newly colonized area, including the extinction of other vulnerable taxa. It will make explicit connections between fundamental concepts in ecology and evolutionary biology, topics specific to extinction/invasion ecology, and the idiosyncratic details surrounding particular invasive species. The main goal is thus to emphasize the ecological importance of species invasion/extinction and to further discuss sociological, economic, and associated issues.

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

Basic concepts in environmental science and tools considered in biomonitoring through license courses:

- Biodiversity and Ecosystem Ecology (Bio-251).
- Environmental Impact Assessment (Bio-252).

6. Co-requisites for this course (if any):

7. Course Main Objective(s):

This course focuses on competencies, skills, and knowledge that will be required for scientific research on biological invasions and risk analysis of alien species. After successful participation in the course, students will be able to:

- contribute in a multidisciplinary team to a scientific sound report and oral presentation on a risk assessment of an alien species that synthesizes the current body of knowledge on their invasion biology.
- explain contemporary ecological theories and concepts of biological invasions within the context of environmental risk assessment and management of alien species.
- perform a climate and habitat match of alien species and reflect critically on uncertainties of species sensitivity modeling.



- use indicators for analyses of pathways for introduction, spread, population establishment, and impacts of alien species.
- identify high-impact invaders and understand their invasion biology.
- apply scientific sound protocols for environmental risk assessment of alien species.
- evaluate the effectiveness of management measures for biological invasions and extinctions.

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	-	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	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	30

B. Course Learning Outcomes, Teaching Strategies, Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	To know the principal causes of natural background extinctions	1.1	Two credits weekly lectures	-Quizzes -Presentations -Assignments



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
				-written exams
	- To know the causes of five big extinction events that happened in the past	1.1	Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
1.2	- To learn about how rate of extinction is a crucial determinant of global biodiversity at any point in time	1.2	Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
2.0	Skills			
2.1	- To formulate scientific questions based on the state of knowledge. Students can then develop hypotheses, test them with suitable methods, and reflect the results in scientific discourse.	2.1-2.2	-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.2	- To independently describe and evaluate the possible impacts exerted by invasive species.	2.3	-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.3	- To formulate management strategies to minimize bioextinction.	2.1-2.2	-Two credits weekly lectures -Tutorials	-Presentations -Reports
3.0	Values, autonomy, and responsibility			
3.1	- To work together with a small group to prepare and deliver a presentation. - To write a scientific report following guidelines on format and structure, incorporating feedback from the draft into the final copy.	3.3	Group discussions	-Presentations -Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.2	To analyze and manipulate scientific data.	3.3	Group discussions	-Presentations -Reports

C. Course Content:

No	List of Topics	Contact Hours
1.	<u>Chapter 1: Biodiversity-ecosystem functioning–Ecosystem Services</u> 1. Ecosystem functions related to biodiversity 2. Definition of Ecosystem Services 3. Importance of biodiversity-ecosystem functioning for the supply of Ecosystem Services (direct and indirect) 4. Methods of valuation	3
2.	<u>Chapter 2: Biodiversity loss and its consequences</u> 1. Estimates of extinction rates worldwide and in Saudi Arabia 2. Analysing and discussing causes of extinction 3. Summarising causes of vulnerability to extinction and consequences 4. Changing of the environment and loss of gene pool and ecosystem services and livelihood	2
3.	<u>Chapter 3: Invasive alien species</u> 1. What are invasive alien species? 2. How many invasive alien species are there? 3. Drivers of change in nature affecting invasive alien species 4. What are the impacts in the context of invasive alien species?	3
4.	<u>Chapter 4: Biological invasion process</u> 1. Transport 2. Introduction 3. Establishment 4. Spread 5. The management-invasion continuum	2
5.	<u>Chapter 5: Theories and concepts of invasion biology</u> 1. Spread, establishment, and impacts of alien species 2. Climate and habitat match of alien species 3. Biology of high-impact invaders 4. Risk assessment of alien species 5. Management of biological invasions	3

6.	Chapter 6: Socioecological Context 1. Characterizing stakeholders and biological invasion stages 2. Perceptions and values 3. Ethics and invasive alien species	2
7.	Chapter 7: Conceptual basis for the invasive alien species assessment 1. Literature review 2. Key issues in the discussion of biological invasions	2
8.	Chapter 8: Bioinvasion and bioextinction: case studies 1. Ecological Control of Pests 2. Red Sea and Mediterranean Sea	3
Total		30

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam-1	Around 5 th -6 th week	20%
2.	Midterm exam-2	Around 8 th -9 th week	20%
3.	Assignments, presentations, attendance, data search, participation	Throughout the course duration	20%
4.	Final exam	13 th week	40%

*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	• Biodiversity: An Introduction by Gaston and Spicer, 2nd ed. (2004) • The Challenges of Biodiversity Science by Loreau (2010) • Kull, C. A. (2018). Critical Invasion Science: Weeds, Pests, and Aliens. In R. Lave, C. Biermann, & S. N. Lane (Eds.), The Palgrave Handbook of Critical Physical Geography (pp. 249–272). Springer International Publishing. • Bellard, C., Cassey, P., & Blackburn, T. M. (2016). Alien species as a driver of recent extinctions. Biology Letters, 12(2), 20150623.
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	• Pimm, S. L., Jenkins, C. N., Abell, R., Brooks, T. M., Gittleman, J. L., Joppa, L. N., Raven, P. H., Roberts, C. M., & Sexton, J. O. (2014). The biodiversity of species and their rates of extinction, distribution, and protection. <i>Science</i>, 344(6187), 1246752. • Gurevitch, J., & Padilla, D. K. (2004). Are invasive species a major cause of extinctions?. <i>Trends in ecology & evolution</i>, 19(9), 470-474. • Smith, K. F., Sax, D. F., & Lafferty, K. D. (2006). Evidence for the role of infectious disease in species extinction and endangerment. <i>Conservation biology</i>, 20(5), 1349-1357.
Supportive References	
Electronic Materials	• USDA National Invasive Species Information Center: http://www.invasivespeciesinfo.gov/ • Florida: https://www.invasivespeciesinfo.gov/us/florida • US Forest Service Invasive Species Program: http://www.fs.fed.us/invasivespecies/ • US Geological Service Non-Indigenous Aquatic Species: http://nas.er.usgs.gov/ • International Union for the Conservation of Nature (IUCN) Invasive Species Specialist Group: http://www.issg.org/ • Florida Natural Areas Inventory – Invasive Species: https://www.fnai.org/invasivespecies.cfm • Center for Aquatic and Invasive Plants, University of Florida: https://plants.ifas.ufl.edu/ • Florida Exotic Pest Plant Council: https://www.fleppc.org/ • Florida Invasive Plant species mobile field guide: http://www.plantatlas.usf.edu/flip/
Other Learning Materials	YouTube videos and AI tools

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector, smart board

Items	Resources
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of students assessment	Faculty	Direct
Quality of learning resources	Faculty	Direct
The extent to which CLOs have been achieved	Faculty	Direct
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	BIOLOGY DEPARTMENT COUNCIL
REFERENCE NO.	23
DATE	23/8/1445