Course Specification
(Bachelor)

Course Title:	Integrated Coastal Ecosystems
Course Code:	EVS 1366
Program:	Bachelor of Science in Environmental Science
Department:	Biology
College:	Science
Institution:	Imam Mohammed Ibn Saud Islamic University
Version:	1
Last Revision Date:	-

Table of Contents

. General information about the course:

1. Course Identification

1. Credit hours: 3 (2 Lectures + 2 Lab)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 6 /3rd Year)					
4. Course general Description:					
This course provides an examination of the key elements and complex processes (physical, biogeochemical and biological) that shape and influence estuarine and coastal ecology. The course will explore the highly dynamic nature of estuaries and coasts through the study of a wide variety of coastal systems, including coastal lagoons, coastal embayment and river estuaries. Students will examine the effects of catchment development on nutrient and sediment loads and the consequences for biological production and biodiversity. The course will also address issues of ecosystem functioning, appropriate ecosystem monitoring programs and the use of key indicators as a measure of ecosystem health. All lectures are recorded and the practical component is completed within three weeks of the semester. This course has a compulsory field trip component. Details and costs will be advised in the course outline and on the course Blackboard site prior to the start of the semester.					
5. Pre-requirements for this course (if any)**:**					
EVS 1110 EVS 1114					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
To equip students with a comprehensive understanding of coastal ecosystems, emphasizing their structure, functioning, and the complex interactions between terrestrial, marine, and human components. This course aims to foster critical thinking and problem-solving skills by exploring the principles of ecology, conservation biology, and environmental management within coastal contexts. Students will learn to evaluate the impacts of natural and anthropogenic influences on coastal ecosystems and develop integrated approaches for sustainable management and conservation strategies. Through lectures, fieldwork, and					

research projects, students will gain practical and theoretical knowledge, preparing them to contribute effectively to the preservation and restoration of these vital ecosystems.

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**	30
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		60

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Outline the different coastal habitats and the geomorphological and hydrological processes that shape these environments.	K1	Lecture and take-home research assignment	Quizzes, midterm exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.2	Describe the Important Ecological Processes That Operate in Estuaries and the Coastal Zone	K2	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.3	Describe the ecological dynamics, including nutrient cycling, food webs, and biological interactions in estuarine and coastal environments	K3	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.4	Identify Coastal Habitats and the Physical Processes That Contribute to Their Formation	K4	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
2.0	Skills			
2.1	Employ skills of field observation and data collection techniques to measure and interpret physical and ecological parameters	S1	Laboratory and take-home research assignment	Lab reports and Lab exam
2.2	Analyze the Important Ecological Processes that Operate in Estuaries and the Coastal Zone	S2	Laboratory and take-home research assignment	Lab reports and Lab exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.3	Apply analytical tools and models to study and predict ecological processes	S3	Laboratory and take-home research assignment	Lab reports and Lab exam
2.4	Synthesize information about assessments of ecosystem health and management Processes	S4	Laboratory and take-home research assignment	Lab reports and Lab exam
3.0	**Values, autonomy, and responsibility**			
3.1	Share in the discussions on coastal ecosystems and present data effectively	V1	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam
3.2	Show independence and collaborate with a team	V2	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam
3.3	Adhere to ethical practices relevant to sustainable development in coastal environments	V3	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam

C. Course Content

No	List of Topics (Lecture)	Contact Hours
1.	**Module 1: Introduction to Coastal Ecosystems** • **Overview of Coastal Zones:** Definitions, importance, and global significance. • **Types of Coastal Ecosystems:** Beaches, dunes, estuaries, mangroves, coral reefs, salt marshes, and their specific characteristics. •	**4**
2.	**Module 2: Physical Processes Shaping Coastal Ecosystems** • **Coastal Geomorphology:** Formation of coastal landforms, sediment dynamics. • **Hydrological Processes:** Tides, waves, currents, and their effects on coastal shaping. **Climate Influence:** Sea-level rise, temperature changes, and other climatic factors impacting coastal zones.	**4**
3.	**Module 3: Ecological Dynamics and Biodiversity** • **Primary and Secondary Production:** Energy flow, nutrient cycling, and food webs in coastal environments. • **Species Interactions:** Competition, predation, symbiosis in coastal habitats. **Biodiversity Patterns:** Spatial and temporal distribution of species and communities.	**4**
4.	**Module 4: Human Impacts and Coastal Management** • **Anthropogenic Pressures:** Pollution, overfishing, habitat destruction, coastal development. • **Conservation Strategies:** Protected areas, species management, habitat restoration. **Policy and Legislation:** Overview of local, national, and international regulations affecting coastal ecosystems.	**4**
5.	**Module 5: Research Techniques and Data Analysis** • **Field Methods:** Sampling techniques, remote sensing, and GIS applications. • **Laboratory Methods:** Analysis of physical and biological samples. **Data Analysis and Modeling:** Statistical techniques and ecological modeling for data interpretation	**4**

6.	**Module 6: Case Studies and Management Practices** • **Ecosystem Health Assessments:** Methods to assess and monitor ecosystem health. • **Management in NSW:** Review of specific management strategies employed in New South Wales and their outcomes. **Global Case Studies:** Comparisons of management practices and outcomes in different regions of the world	**4**
7.	**Module 7: Ethical Considerations and Future Challenges** • **Sustainable Development:** Balancing ecological health with economic and social needs. • **Ethical Issues:** Considerations in biodiversity conservation, environmental justice, and stakeholder involvement. • **Future Trends:** Emerging issues and innovative solutions in coastal ecosystem management. •	**2**
8.	**Practical Workshops and Field Trips** • **Hands-on Training:** Field trips to various coastal sites for practical experience in data collection and ecosystem observation. • **Interactive Workshops:** Application of tools and techniques in real-world scenarios, including GIS mapping and ecological impact assessments.	**2**
9.	**Capstone Project** • **Research Project:** Students will conduct a group or individual project focusing on a specific issue in coastal ecosystem management, culminating in a written report and presentation	**2**
Total		**30**

No	List of Topics (Lab)	Contact Hours
1.	**Lab 1: Introduction to Coastal Ecosystem Field Techniques** • **Objective:** Familiarize students with basic field equipment and techniques used in coastal research. • **Activities:** Training in GPS usage, sediment sampling, water quality testing, and biological survey methods.	**4**

2.	**Lab 2: Sediment Analysis Techniques** • **Objective:** Teach students how to analyze sediment samples to understand sediment composition, grain size, and deposition patterns. • **Activities:** Sieving, sediment sorting, and microscope analysis of sand, mud, and organic content.	**4**
3.	**Lab 3: Coastal Plant Identification and Zonation** • **Objective:** Study plant species that inhabit different zones of coastal environments and understand their ecological roles. **Activities:** Field trip to local coastal areas for direct plant identification, zonation mapping, and understanding plant adaptations to coastal environments	**4**
4.	**Lab 4: Water Quality Assessment in Coastal Areas** • **Objective:** Evaluate water quality parameters that influence coastal ecosystems using chemical and biological indicators. • **Activities:** Testing for nutrients, pH, salinity, dissolved oxygen, and microbial analysis.	**2**
5.	**Lab 5: Coastal Fauna Surveys** • **Objective:** Conduct surveys to identify and assess the abundance and health of fauna in various coastal habitats. • **Activities:** Use of nets, traps, and visual observation techniques to survey aquatic and terrestrial wildlife.	**2**
6.	**Lab 6: GIS and Remote Sensing Applications** • **Objective:** Introduce Geographic Information Systems (GIS) and remote sensing technologies for mapping and analyzing coastal features. • **Activities:** GIS mapping of habitats, erosion rates, and anthropogenic impacts using satellite images and aerial photographs.	**4**
7.	**Lab 7: Impact of Human Activities on Coastal Ecosystems** • **Objective:** Examine the effects of human interventions like coastal development and pollution on coastal ecosystems. • **Activities:** Field assessments at sites with varying degrees of human impact, data collection on ecosystem health, and impact analysis. •	**2**

8.	**Lab 8: Restoration Techniques for Coastal Habitats** • **Objective:** Learn about various habitat restoration techniques and participate in a local restoration project. • **Activities:** Planting vegetation, stabilizing dunes, restoring oyster reefs, or other habitat restoration activities.	**2**
9.	**Lab 9: Climate Change Effects on Coastal Systems** • **Objective:** Study the impacts of climate change variables, such as sea-level rise and increased storm frequency, on coastal ecosystems. • **Activities:** Modeling exercises, reviewing case studies, and predicting future changes using ecological data.	**2**
10.	**Lab 10: Designing a Coastal Management Plan** • **Objective:** Apply learned techniques and knowledge to propose a management plan for a specific coastal area. • **Activities:** Group projects to assess ecosystem health, identify key threats, and develop integrated management strategies based on scientific data	**4**
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam 1	Around 4th - 5th week	15%
2.	Midterm exam 2	Around 7th - 8th week	15%
3.	Quizzes, Participation, Attendance	During the semester	10%
4.	Lab reports	During the semester	5%
5.	Lab Exam	15th week	15%
6.	Final Exam	16th week	40%
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	1. **"Introduction to Coastal Processes and Geomorphology" by Robin Davidson-Arnott** • Provides fundamental insights into the physical processes that shape coastal environments. 2. **"Estuarine Ecology" by John W. Day, Jr. et al.** • Covers the ecological aspects of estuarine environments, emphasizing interactions between biological communities and the physical environment. 3. **"Coastal Management: Global Challenges and Innovations" edited by Nobuo Mimura and Ian S. F. Jones** • Explores contemporary issues in coastal management with case studies from around the world, discussing innovative solutions and policies.
Supportive References	• **Journal of Coastal Research** • Offers research articles on all aspects of coastal studies, including geomorphology, biology, and management. • **Coastal Management Journal** • Focuses on policy, law, and management practices affecting coastal environments. • **Marine Ecology Progress Series** • Publishes research on marine ecosystems, including coastal and estuarine studies
Electronic Materials	• **NOAA Office for Coastal Management (coast.noaa.gov)** • Provides a wealth of resources, including data tools, training, and information on coastal management practices. • **The Nature Conservancy's Coastal Resilience Network (coastalresilience.org)** • Offers tools and case studies on enhancing coastal resilience against natural disasters and climate change impacts. • **MarineBio Conservation Society (marinebio.org)** • An educational resource with extensive information on marine life and ecosystems.
Other Learning Materials	-

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms and Laboratories
Technology equipment (projector, smart board, software)	Projector and Smart board
Other equipment (depending on the nature of the specialty)	Environment-related instruments

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of Students assessment	Program Leader	Direct
Quality of learning resources	Peer Reviewer	Indirect
The extent to which CLOs have been achieved	Program Leader	Direct
Other	-	-

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Head of Biology Department**
REFERENCE NO.	
DATE	