Course Specification
(Bachelor)

Course Title:	Sustainable Fisheries and Aquaculture
Course Code:	EVS 1352
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

A. General information about the course:

1. Course Identification

1. Credit hours: 3 (Lecture 2+ Lab 2)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 5/ 3rd Year)					
4. Course general Description:					
Wild-captured fisheries and aquaculture are the biggest protein sources globally, providing more than 3 billion individuals essential nutrition. This protein is sourced from fish, elasmobranchs, crustaceans, molluscs, and algae harvested by commercial, recreational, and Indigenous fisheries and cultivated through aquaculture practices. This course examines the key aspects that impact the spread and number of specific species, crucial for comprehending their use in fishing practices. These factors consist of an evaluation of the life cycle phases, demographic composition, habitat preferences, and feeding interactions of the specified species. This data, in addition to farming techniques, is vital for the success of aquaculture operations. Students will examine methods utilized in fisheries science and analyze human activities' effects on managing wild-harvest fisheries. The discussion will focus on emerging trends such as transitioning from wild-harvest extraction to aquaculture production and more comprehensive ecosystem management. The program includes interactive learning sessions, labs for both wet and computer work, field trips, and workshops. The field study and off-University workshop will occur during the mid-trimester break. After the course, students will have the essential skills needed to get ready for careers in coastal-focused research and industry.					
5. Pre-requirements for this course (if any)**:**					
EVS 1111					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
By taking a Sustainable Fisheries and Aquaculture course, students can help promote the sustainable harvesting and production of fish and shellfish, as well as the evaluation and control of human influence and environmental changes. They can also engage in pioneering research on aquatic ecosystems, the characteristics					

of their inhabitants, and how they affect the world's climate. This course is centered on the responsible use of the aquatic environment and its resources, as well as the promotion of sustainable aquaculture production.
The focus is on fisheries, oceanography, and the administration of aquatic resources, tackling the issues linked to sustainable fisheries and aquaculture, and the preservation of healthy ecosystems amidst changing environments.

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 main features of the biology of fisheries and aquaculture	**K1**	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.2	State modern methods to gather, compile, and analyze ecological and biological data.	**K2**	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.3	Explain how fishing and aquaculture are practiced.	**K3**	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
1.4	Describe the management strategies applied to aquaculture and fisheries.	**K4**	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
2.0	**Skills**			
2.1	Summarize methods commonly used in critically evaluating the life cycles of fish, crustaceans, molluscs, and algae and explain their limitations.	**S1**	Laboratory and take-home research assignment	Lab reports and Lab exam
2.2	Formulate arguments concerning the effects of aquaculture and fishing.	**S2**	Laboratory and take-home research assignment	Lab reports and Lab exam
2.3	Use focused exercises, online discussions, and digital presentations to communicate scientific information to the audience effectively.	**S3**	Laboratory and take-home research assignment	Lab reports and Lab exam
2.4	Employ knowledge in ecosystem management to find solutions for environmental issues related to fisheries practices and aquaculture.	**S4**	Laboratory and take-home research assignment	Lab reports and Lab exam
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate the ability to work independently and cooperate in teamwork.	**V1**	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.2	Show the ability to communicate fisheries-related information to various audiences in an accurate, compelling, and logically supported manner, via writing and talks.	**V2**	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam
3.3	Share in the discussion of literature articles in the field of aquaculture, and argue specific problems using scientific evidence.	**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 (lectures)	Contact Hours
1.	Introduction to Fisheries and Aquaculture: - Nutritional Value of Fish and Its Impact on Human Health - Growing Importance of Fish Availability and Demand in local and Global Food Systems - Marine ecosystems and climate change - Fisheries and Aquaculture: Income Generation, Livelihood Security, and Contributions to Food Security - Opportunities and challenges in aquaculture for food security	**4**
2.	Fisheries and Aquaculture in Saudi Arabia - The Size and Composition of Local Marine Fisheries - Characterization of Local Aquaculture Practices - Types and volume of imports of fishing and aquaculture products - Alignment of the Kingdom's Fisheries and Aquaculture Strategies with Saudi Vision 2030 - Regulated Fish Species and Establishment of Marine Protected Areas in the Kingdom - Challenges and Opportunities in Local Fisheries and Aquaculture	**4**

3.	Terrestrial "inland" fish, shrimp aquaculture, from hatchery to harvest - Hatchery management, Egg Collection , Handling and fertilization, sex determination and controlling , disease prevention - Breeding, fish and shrimp nutrition , Automated Feeding Systems and Alternative Protein Sources, health management, transport and stocking. - Rearing, impact of pond design , depth, aeration system and light. - Harvesting , covenantal methods and Autonomous Underwater Vehicles and Precision Harvesting Systems	**4**
4.	Water quality in terrestrial aquaculture , Recirculating aquaculture systems and Remote Monitoring Systems	**4**
5.	Aquaponics and Biofloc systems	**2**
6.	Marine Aquaculture	**2**
7.	algal culturing	**2**
8.	Genetics for Aquatic Conservation: Fisheries and Biodiversity Management	**2**
9.	Precision Breeding**:** Gene editing techniques and CRISPR	**2**
10.	Fisheries systems – management and modeling and oceanography	**2**
11.	Recreational fishing; Biological impacts, management, and human dimensions	**2**
Total		**30**

No	List of Topics (labs)	Contact Hours
1.	Laboratory operations, safety, and reporting techniques	**8**
2.	Water quality tests in aquaculture, chemical analysis	**4**
3.	Water quality tests in aquaculture, microbial analysis	**4**
4.	Water quality tests in aquaculture, toxicity tests	**4**
5.	Diagnostic Methods for Nematode Infections in Fish Tissues	**4**
6.	Diagnostic Methods for bacterial Infections in Fish and shrimp	**4**
7.	Diagnostic Methods for Viral Infections in Fish and shrimp	**2**
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, and 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	Ahmed, M. & Lorica, M.H. 2002. Improving developing country food security through aquaculture developmentlessons from Asia. Food Policy, 27(2): 125–141. Allen, R. 2010. International management of tuna fisheries: arrangements, challenges and a way forward. FAO Fisheries and Aquaculture Technical Paper. No. 536. Rome, FAO. 45 p Naylor, R.L., Goldburg, R.J., Primavera, J.H., Kautsky, N., Beveridge, M.C., Clay, J., Folke, C., Lubchenco, J., Mooney, H. & Troell, M. 2000. Effect of aquaculture on world fish supplies. Nature, 405(6790): 1017– 1024. Boyd, C.E., Tucker, C., McNevin, A., Bostock, K. & Clay, J. 2007. Indicators of resource use efficiency and environmental performance in fish and crustacean aquaculture. Reviews in Fisheries Science, 15: 327–360. Branch, T.A. 2008. Not all fisheries will be collapsed in 2048. Marine Policy, 32(1): 38–39. Dunham, R.A., Majumdar, K., Hallerman, E., Bartley, D., Mair, G., Hulata, G., Liu, Z., Pongthana, N., Bakos, J., Penman, D., Gupta, M., Rothlisberg, P. & Hoerstgen-Schwark, G. 2001. Review of the status of aquaculture genetics. In R.P. Subasinghe, P. Bueno, M.J. Phillips, C. Hough, S.E. McGladdery & J.R. Arthur, eds. Aquaculture in the Third Millennium, pp. 137–166. Technical Proceedings of the Conference on Aquaculture in the Third

	Millennium, Bangkok, Thailand, 20–25 February 2000. Rome, FAO, and Bangkok, NACA.
Supportive References	Serrano, P.M. 2005. Responsible use of antibiotics in aquaculture. FAO Fisheries Technical Paper. No. 465. Rome, FAO. 97p. Sharma, C. & Rajagopalan, R. 2013. Marine protected areas: securing tenure rights of fishing communities. Land Tenure Journal, 1. Muir, J. 1999. Aquaculture and poverty: full baskets or empty promises? Perspectives from DFID Aquaculture Research Programme. Paper presented at the Fifth Fisheries Development Donor Consultation, 22–24 February. Rome, FAO.
Electronic Materials	None
Other Learning Materials	None

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)	Fishing-related instruments

F. Assessment of Course Quality

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