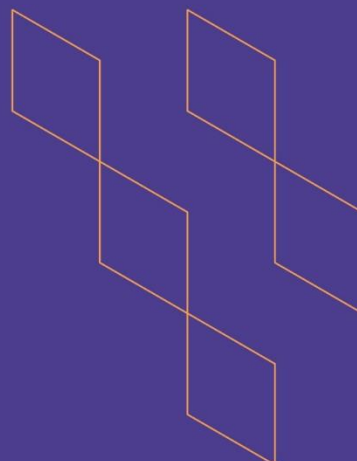




T-104
2022

Course Specification



Course Title: Aquaculture engineering and production system
Course Code: APAC1603
Program: Aquaculture Technology
Department:
College: Applied College
Institution: Umm Al-Qura University
Version: 2
Last Revision Date: December 2024



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A. General information about the course:

Course Identification

1. Credit hours: 3 hours

2. Course type

a. University ☐ College ☐ Department ☒ Track ☐ Others ☐

b. Required ☒ Elective ☐

3. Level/year at which this course is offered:

1st Semester

4. Course general Description

This course introduces the aquaculture production systems and their functions and characteristics. It familiarizes the students with the categories of the aquaculture production systems. Furthermore, it enumerates the types of aquacultures by production systems. Finally, this course touches upon the Recirculating Aquaculture Systems (RAS). It familiarizes the students with the various types of machineries employed in the aquaculture operations, such as aerators, air jets, harvesting machines, transformers... etc. It also introduces students to site selection preferences and pond construction. Furthermore, it provides details of the nutritional aspect of aquaculture and the value of correct feed and feeding procedures.

5. Pre-requirements for this course (if any): None

6. Co- requirements for this course (if any): None

7. Course Main Objective(s)

- ❖ Gain knowledge on the various types of culture systems.
- ❖ Identify various production methods encountered in the field.
- ❖ Understand the advantages and disadvantages of each production system.
- ❖ Relate to the type of production system currently in place.
- ❖ Be familiar with the various types of machineries employed in the operation from life support systems to monitoring tools and aquaculture products.
- ❖ Obtain operational knowledge of these machineries' tools and products.
- ❖ Obtain a general picture of the nutritional aspect of aquaculture and the value of correct feed and feeding.
- ❖ Understand the major nutrients required by aquatic organisms and their benefits and interactions.



- ❖ Learn the various types of feeding techniques employed based on the behavior of the cultured species.
- ❖ Learn the correct storage and management of feed and feed products.

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom		90%
2.	E-learning		10%

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45 h
2.	Laboratory/Studio.	
3.	Field	
4.	Tutorial	
	Total	45 h

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	Describe functions and characteristics of all aquaculture systems.	K4	-Lectures -Discussions -Presentations	-Oral presentations -Quizzes -Assignments -Final exam
1.2	List the categories of aquaculture production systems.	K4	-Lectures -Discussions -Presentations	-Oral presentations -Quizzes -Assignments





Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
				-Final exam
1.3	Describe the types of aquacultures by production Systems	K4	-Lectures -Discussions -Presentations	-Oral presentations -Quizzes -Assignments -Final exam
1.4	Understand the Recirculating Aquaculture Systems (RAS)	K1	-Lectures -Discussions -Presentations	-Oral presentations -Quizzes -Assignments -Final exam
1.5	Describe the various types of machineries employed in the operation	K2	-Lectures -Discussions -Presentations	-Oral presentations -Quizzes -Assignments -Final exam
1.6	Recognize operational knowledge of these machineries, tools and products	K2	-Lectures -Discussions -Presentations	-Oral presentations -Quizzes -Assignments -Final exam
1.7	Describe Feeding Habits and Digestive Physiology of Fishes.	K3		
1.8	Identify Dietary Nutrients Requirement and Interaction, Proteins/Amino Acids, Lipid/Fatty Acids, Carbohydrates, Vitamins and Minerals	K1	-Lectures -Discussions -Presentations	-Oral presentations -Quizzes -Assignments -Final exam
1.9	Describe the feeding techniques.	K5	-Lectures -Discussions -Presentations	-Oral presentations -Quizzes -Assignments -Final exam
2.0	Skills			



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	Develop oral presentation	S2	-Lectures -Discussions -Presentations	-Oral presentations -Quizzes -Assignments -Final exam
2.2	Communicating personal ideas and thoughts	S3	-Lectures -Discussions -Presentations	-Oral presentations -Quizzes -Assignments -Final exam
2.3	Demonstrate assertiveness of decision	S2	-Lectures -Discussions -Presentations	-Oral presentations -Quizzes -Assignments -Final exam
3.0	Values, autonomy, and responsibility			
3.1	Work independently and as part of a team	V2	-Lectures -Discussions -Presentations	-Oral presentations -Quizzes -Assignments -Final exam
3.2	Demonstrate responsibilities and accountability	V3	-Lectures -Discussions -Presentations	-Oral presentations -Quizzes -Assignments -Final exam

C. Course Content

No	List of Topics	Contact Hours
1.	<p>Characteristics and categories of aquaculture production Systems</p> <ul style="list-style-type: none"> • Open Systems • Semi-Closed Systems • Closed Systems • Hybrid Systems • Extensive System versus Intensive Systems • Integrated multi-trophic aquaculture (IMTA) and Agri-Aqua systems. 	6
2.	<p>Types of aquacultures by production Systems</p> <ul style="list-style-type: none"> • Cage Culture in fresh water and production marine areas. • Ocean cage cultures • Flow- throw raceways • Ponds 	6
3.	Recirculating Aquaculture Systems (RAS)	3
4.	<p>Introduction to machineries and equipment used in aquaculture.</p> <p>Aerators – air jets – harvesting machines – transformers – generators set – pumps – air blows – water quality test probes and kits- graders, transportation, and vaccination tools.</p>	3
5.	<p>Automation knowledge</p> <p>Basics operation – equipment protection - AI-driven monitoring - remote operation technologies, and automation trends in aquaculture production</p>	6
6.	<p>Products used in aquaculture.</p> <p>Liming materials – disinfectants – fertilizers – probiotics – chemicals – other materials</p>	6
7.	<p>Dietary Nutrients Requirement and Interaction</p> <ul style="list-style-type: none"> • Proteins/Amino Acids • Lipid/Fatty Acids • Carbohydrates • Vitamins • Minerals 	3
8.	Feeding Habits and Digestive Physiology of Fishes	3
9.	<p>Importance of Feeds.</p> <ul style="list-style-type: none"> • Types of Feeds (Including specialized feeds) • Qualities of Good Feeds • Manufactured Feed Ingredients • Feed Management and Storage 	3
10.	<p>Management of feeding aquaculture species</p> <ul style="list-style-type: none"> • Feeding strategies in pond culture • Feeding management • Feeding, water quality, and the environment 	3
11.	<p>Economics of feeding</p> <ul style="list-style-type: none"> • Cost of producing feeds • Economic efficiency of feeds 	3
Total		45



D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Participation		10%
2.	Periodical Exam(s)	3	10%
3.	Reflection and Reports	5	10%
4.	Mid Term Exam	7	20%
5.	Final Exam	16	50%

*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	<ul style="list-style-type: none"> – Aquaculture production systems / editor, James Tidwell. ISBN 978-0-8138-0126-1. 2012 – Lekang O (2020) Aquaculture Engineering 3rd edition. Wiley-Blackwell (ISBN: 978-1119489016) – Hardy, Ronald W., and Sadasivam J. Kaushik, eds. Fish nutrition. Academic press, 2022. ISBN978-0-12-819587-1 – Millamena, Oseni M., Relicardo M. Coloso, and Felicitas P. Pascual. Nutrition in Tropical Aquaculture: essentials of fish nutrition, feeds, and feeding of tropical aquatic species. – Aquaculture Department, Southeast Asian Fisheries Development Centre, 2002. ISBN971-8511-58-X
Supportive References	
Electronic Materials	<p>https://onlinelibrary.wiley.com/doi/book/10.1002/9781118250105</p> <p>https://archive.org/details/aquacultureprinc0000tvrp</p> <p>https://www.researchgate.net/publication/281647951_Aquaculture_Principles_and_Practices</p>
Other Learning Materials	Multi- media associated with the textbook and the relevant websites

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms are already provided with data show.
Technology equipment (projector, smart board, software)	Projectors
Other equipment (depending on the nature of the	





Items	Resources
specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect: regular surveys to evaluate teaching effectiveness and course relevance Direct: CLO's assessment
Effectiveness of student's assessment	Peer review	Direct: Annual review of course content by faculty members and external experts
Quality of learning resources	Students	Indirect: regular surveys to evaluate quality of learning resources
The extent to which CLOs have been achieved	Peer review	Direct: Annual review of course content by faculty members and external experts
Other		

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

Assessment Methods (Direct, Indirect)





G. Specification Approval Data

COUNCIL /COMMITTEE	Umm Al-Qura University Council
REFERENCE NO.	851141114462/190390
DATE	446/11/22

