開課班級: 四熱農二A **授課老師: 歐卡爾** **學分數: 3**

課程大綱:

The course is to provide the basics of aquatic biology on the aspects of natural history and diversity of fish. · Basic anatomy of Fish and Shellfish · Study of food and feeding habits of commercially important fish. · Digestive system, Natural fish food, Types of feeding · Qualitative and Quantitative methods of analysis of stomach contents. · Age and growth determination by direct and indirect methods. · Reproductive biology: maturity stages, gonadosomatic index, pondoral index, fecundity, sex ratio and spawning. · Eggs and larval stages and developmental biology of finfishes and shell fishes. · Tagging and marking of finfish and shellfish. · Behavior and cognition. Schooling, orientation and migration. · Symbiosis and biodiversity

outline:

Biology is the study of life forms and in this undergraduate course the students will be studying life history events of fishes, including shellfishes in the context of fisheries and important aquaculture species. The main aim of this course is to introduce the immensely fascinating world of fish biology, to give advanced information on the unique adaptations of various biological systems of fish and shellfish, to provide basic practical skills in different aspects of aquatic biology such as sampling of fish and shellfish, quantitative meristic and morphometrics, comparative studies on gills, scales, pharyngeal teeth and brain of fishes and to understand the principles of aquatic biology life in freshwater; lentic and lotic environments, freshwater wetlands will be discussed in this course.

教學型態:

課堂教學

成績考核方式:

平時成績:35%
期中考:25%
期末考:40%
其它:%

本科目教學目標:

Students will be trained in the aspects of aquatic biology. Students will be provided with update knowledge of fish and shellfish biology and their issues in management.

參考書目:

1. Dr. Lynwood and S. Smith, 2003. Introduction to fish physiology, Narendra Publishing House, Delhi. 352 pp. 2. Srivastava, C.B.L. 2008. Fish Biology. Narendra Publ. Hse., India, 329 pp. 3. Bone, Q and R.H. Moore. 2008 (Third Ed.). Biology of fishes. Taylor & Francis Group, New York. 4. Helfman, G.S., Collette, B.B., Facey, D.E. and Bowen, B.W. 2009. The Diversity of Fishes. Biology, Evolution and Ecology. John Wiley & Sons Ltd, Oxford

課程進度表：

週次	起訖月日	授課單元(內容)	備註
第1週	2.20~2.27	1.-Introduction to Anatomy- External Anatomy of fish Objective: To introduce the importance of aquatic biology with respect to aquaculture practices. Brief up about the anatomy and structural morphology of fish in the aquatic environment.	8日正式上課。8~12日課程加退選，轉學(系)生、復學生及延修生選課，雙主修、輔系申請，12日申辦抵免學分截止日
第2週	2.27~3.06	Oral-region-associated-structure of fish	
第3週	3.06~3.13	Food-Feeding-Habit-of-Finfishes Objectives: To introduce the oral regions of fish and associated structures and their modification in teeth, and gills, This knowledge is important to understand the food and feeding habits of fish biology.	28日(日)孔子誕辰紀念日/教師節(放假),29日(一)補假
第4週	3.13~3.20	Digestive-System-of-Finfishes Objectives: To understand the mechanisms that control the movement and digestion of food, methods of assessing digestibility of feed, factors affecting digestion and absorption of food nutrients, and feeding processes in fish are discussed. An understanding of feeding habits, feeding mechanisms, and the digestion and absorption processes can help fish farmers and nutritionists maximize the use of feed.	29日成績優異提前畢業者提出申請截止日
第5週	3.20~3.27	Aquatic_system_And_Health Objectives: Introduce the aquaculture system types and their importance in food security. The aquatic system faces several challenges and one such is a disease for proper health management. This lecture discusses the factors for health management in the aquatic system and the importance of stress-driving factors in the aquatic system from the biological point of view,	6日(一)中秋節(放假)，10日(五)國慶日(放假)
第6週	3.27~4.03	Food and feeding habits of fish; objective's introduce the concept of food and adaptations in fish for feeding	14日學生宿舍安全輔導暨複合式防災疏散演練。18日多益測驗
第7週	4.03~4.10	Spring holiday	24日(五)補假，25日(六)光復暨古寧頭大捷日(放假)。
第8週	4.10~4.17	The circulatory system in fish Objective: to introduce the blood circulation system in aquatic animals. The mechanisms of	30日校課程委員會

		blood transport in teleost and gas exchanges.	
第9週	4.17~4.24	MID-TERM_Examination	3~9日期中考試
第10週	4.24~5.01	Haematopoieses and;haematopoietic organs;System-in-Finfishes Objectives: to introduce the blood types and;haematopoietic progenitor cells and to differentiate into mature blood cells: erythrocytes, lymphocytes, thrombocytes, granulocytes, and monocytes. The pronephros, or head kidney, is a basic organ forming the blood elements and is also a reservoir of blood cells.	13日教務會議,16日教師期中成績上網登錄截止日
第11週	5.01~5.08	Migration patterns in fishes Objective: to introduce different types of migration in fish from sea water to freshwater and from freshwater to seawater. The importance of migration with respect to biodiversity in aquatic organisms will be highlighted.	
第12週	5.08~5.15	Introduction to Aquatic Microbiology: Microbes in the aquatic environment Objective:;1. Define the term aquatic microbiology. 2. List the importance of studying aquatic microbiology. 3. Discuss the general impacts of microbes on the aqua industry.	24~28體育運動週。24日校園路跑。27日運動大會夜間開幕，28日運動大會活動，29日101週年校慶活動日，照常上班
第13週	5.15~5.22	Aquatic_microbiology_lecture_2 Objective: Overview of the characteristics of Microbes and;their roles and impact on the aquatic environment (benefits and diseases)	
第14週	5.22~5.29	Antibiotic_resistance_in_aquatic_system Objective: Antibiotic resistance in aquaculture is a growing concern as it can negatively impact human health and the environment.	12日申請停修課程截止日
第15週	5.29~6.05	Mode of action of antibiotic resistance in microbes in aquatic system Objective: Factors responsible for antibiotic resistance in microbes and their control	
第16週	6.05~6.12	THERAPEUTIC Drugs Used in aquatic SYSTEM and THEIR influence on FISH Objective: to introduce the responsible use of drugs in the aquatic system	22日校務會議。25日行憲紀念日(放假)
第17週	6.12~6.19	Sense-Organs-in-Fishes	1日(四)開國紀念日(放假)
第18週	6.19~6.26	FINAL_EXAM	5~11日期末考試，10~11日學生退宿