

104 學年度第 2 學期校課程委員會議

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各系(所)新增課程中英文摘要

一、農學院

(一) 植物醫學系：

昆蟲分子遺傳學

2 選

楊永裕

本課程說明分子遺傳的概念，並描述分子技術如何解決與昆蟲有關的基本和應用問題。第二個部份則是介紹昆蟲分子遺傳研究的議題，例如族群生態的分子遺傳學、系統分類學、基因體學與害蟲管理。

Insect molecular genetics

2 E

Y Y Yang

This course is to explain the concepts of molecular genetics, and demonstrate how molecular techniques can solve basic and applied problems about insects. Part II is intended to introduce the topics of insect molecular research, e.g. molecular genetics of insect population ecology, systematics, genome, and pest insect management.

植物蟲害診療實習

1 選

陳文華

本課程內容包括各種主要植物害蟲之鑑定，害蟲危害過程及遺留痕跡的診斷，自田間採集蟲害標本，攜回實驗室，在解剖顯微鏡下觀察，依照圖鑑比對特徵來確認害蟲種類。

Practice of Diagnosis and Management of Insect pests

3 E

W H Chen

Introduce the identification of insect species and the diagnosis of insect infestation on crops. Students learned to collect samples from various parts of plants from the field, examine symptoms and excreta caused by insects. Pests are studied under dissecting microscope and compared with identification keys.

(二) 水產養殖系：

校外實習(1)

2 選

本課程內容主要是讓學生有機會至其他水產相關研究機構或私人企業進行實務操作，以提升學生之實務經驗及技能，達到學理及實務並重之目的，並可使學生提早瞭解產業脈動，做為就業前之準備。

Extracurricular Intern(1)

2 E

This aims of the course are to provide the practice opportunities for students at other aquaculture related organizations and private companies. The output goal is to enable improved students' real experiences and skills in aquaculture which will help to fulfilling interaction between theory and practice, understating the industry dynamic and preparation for employment.

校外實習(2)

2 選

本課程內容主要是讓學生有機會至其他水產相關研究機構或私人企業進行實務

操作，以提升學生之實務經驗及技能，達到學理及實務並重之目的，並可使學生提早瞭解產業脈動，做為就業前之準備。

Extracurricular Intern(2)

2 E

This aims of the course are to provide the practice opportunities for students at other aquaculture related organizations and private companies. The output goal is to enable improved students' real experiences and skills in aquaculture which will help to fulfilling interaction between theory and practice, understating the industry dynamic and preparation for employment.

(三) 森林系：

森林微生物生態

2 選

吳羽婷

本課程之目的，在使學生瞭解森林生態系其實存在著豐富的物種，除了地上部植群動物外，其實還有著扮演生態系極重要地位的微生物。這些肉眼看不見的微生物包括原核生物細菌和真核生物真菌主宰環境裡養分的循環。此外，更與植群有著密不可分的關係包括固氮菌、菌根菌、腐生菌甚至是引起森林危害的病原菌等。近來更有研究指出，森林裡的大氣中也存在著所謂的氣生微生物，對於其生態功能也是未知。此課程將介紹真核和原核生物的細胞構造和演化、分類和已知的生態功能。希望藉由此課程可以讓學生更了解森林微生物的重要性。

Forest Microbial Ecology

2 E

Y.T. WU,

The objective of this course is to introduce the microbial diversity in forest ecosystem. Except the plants and animals aboveground, forest ecosystem also harbors diverse microbes with the vital ecological importance. The microbes including prokaryotic bacteria and eukaryotic fungi are not able to be observed by human naked eyes and they mediate the nutrient cycling in the environment. In addition, the microbes also play important role influencing aboveground such as symbionts (nitrogen fixer and mycorrhizal fungi), saprophytes and pathogens which might cause severe forest disaster. Currently, a few studies have revealed the existence of air-borne microbes, however, their function still remains unknown. The course will be started with the introduction of cell structure, evolution, taxonomy and ecological function of bacteria and fungi. The students will learn more about the microbes in the forest ecosystem.

林木菌根

2 選

吳羽婷

本課程之目的，在使學生瞭解林木菌根的分類、構造、功能以及應用。課程內容包括：菌根之功能及在生態系之重要性，囊叢枝內生菌根之共生真菌，囊叢枝內生菌根之感染、發育與形態解剖構造，囊叢枝內生菌根之礦物營養生理與生態，內生菌根菌接種源之生產，外生菌根之共生真菌，外生菌根之構造、形態發生及分類，外生菌根之生長與生理，外生菌根菌代謝物的產生，外生菌根植物之生長與碳素代謝作用，外生菌根礦物質養分吸收之生理，外生菌根菌接種源之生產與應用，針葉樹之外內生菌根。

Mycorrhizal Symbiosis

2 E

Y.T. WU,

The objective of this course is to introduce the taxonomy, structure and application of

tree mycorrhizae. The course contents included are: the function of mycorrhizae and their importance in ecosystem, the symbiont in VA mycorrhizae, the infection, development and morphology of VA mycorrhizae, the physiology of mineral nutrient and ecology of VA mycorrhizae, production of VA mycorrhizal inoculum, the symbiont in ectomycorrhizae, the structure, morphology and classification of ectomycorrhizae, growth and physiology of ectomycorrhizal fungi, production of metabolites by ectomycorrhizal fungi, growth and carbon metabolism of ectomycorrhizal plants, physiology of nutrient uptake by ectomycorrhizae, production and application of ectomycorrhizal fungus inoculum, ectomycorrhizae in conifers.

林木菌根實習

1 選

吳羽婷

本實習之目的，在使學生上完正課實際瞭解林木菌根的構造、功能以及應用。實習內容包括：囊叢枝內生菌根菌孢子分離、囊叢枝內生菌根染色觀察、內生菌根菌接種及繼代培養、外生菌根菌分離、外生菌根菌構造觀察、繼代培養和太空包培養及外生菌根菌環境復育的應用。

Practice of Mycorrhizal Symbiosis

1 E

Y.T. WU,

The objective of this experimental course is to let the students carry out the isolation of AMF spores, AM observation, AM spores inoculation and subculture of AM spores. In terms of ectomycorrhizae, they will operate how to isolate fungal species from mycorrhiza, ectomycorrhizal observation, subculture on medium as well as on bulk bag. At final, students will also learn how to apply ectomycorrhizal on remediation and reforestation.

(四) 食品科學系：

產業實習

9 必

為結合課堂教育，強化學生「學以致用」能力，本課程以實地實作模式，讓學生至食品相關產業實習，了解產業的實務工作內容，學習相關專業知識及實務操作技術，並培養正確的工作態度及學習解決問題的能力，讓學生早日進入企業界，培養學生成為具有專業技能與實作經驗之人才。

Industry Internship

9 R

In order to apply the classroom education to the industry, students will go to the food related industries for their internship. The students will understand the operation and learn the knowledge and techniques of food industry. They will also realize the correct working attitude and problem-solving skills. Through this practical training course, the students will be trained as a qualified personnel with professional knowledge and working experience.

(五) 食品生技碩士學位學程在職專班：

食品生技研究法

3 必

探討和食品研究相關之方法與技術、包含實驗的設計、結果的闡釋及論文寫作技巧等一系列的課程。其主要目的在於使學習者在食品領域中熟悉一般的研究方法與技術，並學得基本實驗設計原理應用到實際的食品問題。同時也可深入了解目前食品研究領域中的最新動向。從適當的實驗設計到資料的分析與解釋並將成果發表作一貫式的養成訓練，乃此課程安排的終極目標。

Methodology for Food Research**3 R**

Describe experimental designs, general techniques and methodologies in related to Food Researches. To understand the basic principles of experimental design and be able to apply them to realistic food problems. Also to have a familiarity of general techniques and methodologies in a specific field. To have a knowledge of the state of the art of current research efforts relating to carbohydrates, lipids, proteins, and other components in foods. To be able to design an appropriate experiment to solve the problems we proposed. To be able to collect, analyze and interpretate the data and able to organize the results and have a paper publication.

食品生技風險管理**3 必**

本課程講授食品安全風險評估訓練課程。課程會先簡介風險分析 (risk analysis)，風險分析之內容包括風險評估 (risk assessment)、風險管理 (risk management) 及風險溝通 (risk communication) 三個部分，接著針對風險評估進行介紹，並講授風險評估之定量技術—Stochastic modeling。此外，本次課程亦會分別介紹微生物性及化學性風險評估，並舉實例探討。

Risks management of food**3 R**

The course content will first cover frameworks for food safety risk analysis, and continue with a discussion of national food safety risk management. The workshop will emphasize quantitative risk assessment, and will use quantitative microbiological risk assessments as a platform to discuss basic concepts of food safety risk assessment and focus on the application of statistical tools and quantitative risk assessment methods. Participants will be trained in basic concepts involved in conducting risk analysis in order to be gain skills necessary to conduct risk analyses following the completion of the workshop.

食品生技產業技術**3 選**

本課程為發展食品生技產業，需與各領域知識一併應用，如加強生物技術研發創新性，分析市場發展趨勢，瞭解我國特色食品研發大量生產、外銷國際所需之技術，加強國際及學研合作，以提升產業競爭力。

Food Technology and Food Biotechnology Industry 3 E

This course that development of food Biotechnology industry requires the interdisciplinary knowledge including biotechnology and industry manufacturing, tendency of marketing. This curriculum is designed to fulfill the interdisciplinary trainings with food technology, food developing, food marketing, and industrial manufacturing, as well as other skills such as project management and regulation for biotechnology industry.

食品生技產業發展趨勢**3 選**

本課程內容主要介紹國內外食品生物技術產業的現況與發展、新穎保健食品的開發與應用、基因改造食品的過去與未來、台灣食品生技產業的規範與智財權、以及經營策略等。

Development Tendency of Food Biotechnology Industry 3 E

This course will provide an overview of global food biotechnology businesses, critical developments of novel healthy foods and genetically modified foods, regulations and

intellectual property protections of food biotechnology businesses, and strategy and management for running a food biotechnology business.

食品法規和食品衛生與安全

2 選

本課程包括食品衛生相關法規之內涵、特色及適用範圍，並介紹食品良好作業規範之精神、執行方法，讓學生瞭解食品工廠之設立、經營管理相關之規定。衛生安全即講授食品從生產原料，經加工過程、包裝，直到人類攝食為止之各階段過程中，確保人類食生活上之衛生與安全的問題；食品與微生物、食品之腐敗、食物中毒、食品添加物，經口傳染病、人畜共通傳染病、食品與寄生蟲、食品之放射線能污染、食品衛生上之對策以及食品法規等。

Food Law and Food Hygiene and Safety

2 E

This course offers to cover the history, phylosophy of food safety related Acts, Laws and Regulations. Emphasis on the background of food regulation and laws. Help the students to understand the regulations and laws required for a food processing and related company. Food hygiene and safety is to teach the means necessary for ensuring the hygiene and safety of human being , the food at all stages from its growth, products or processing, packaging, until its final consumption. It contains food and microorganisms, food deterioration, food poisoning, food additives, oral infection, zoonosis, food and parasite, food and sanitary insects, contamination of radiation substance, the measurememt of food hygiene and the laws and regulations of food.

二、 工學院

(一)車輛工程系：

智慧型機器人

3 選

楊榮華

智慧型機器人為高度跨領域技術之整合科技，其基本技術範圍涵蓋機械、電機、電子與資工等工程領域。為了讓學生有效提升對智慧型機器人跨領域技術之學習，本課程以智慧型機器人實務開發所必須使用到的理論與技術，分門別類加以整理與介紹。這些理論與技術涵蓋：運動機制、致動器、感測器、機器視覺、機器聽覺、輪式與雙足式機器人控制、導航和機器手臂等。以智慧型機器人實務開發為標的，將相關基礎理論與技術分別來介紹。

Intelligent robot

3 E

Jung-Hua Yang

Intelligent robot is a highly cross-field integrated technology which covers the fundamental techniques of mechanics, electronics, and computer sciences. In order to efficiently improve the graduate students' learning capability of the cross-field technology arising from intelligent robot systems, this course is trying to categorize and present all the relevant theories as well as practical technologies. The content includes kinematic mechanism, actuators, sensors, machine visions, navigation, artificial intelligence, and control techniques. In addition, some human-like robot such as biped walking robots and other walking based mechanisms are also given.

高等動力學

3 選

陳立文

本課程主要教授力學之限制條件、牛頓動力學、剛體運動學、剛體運動學以及 Lagrangean 力學在動力分析之應用。

Intermediate Dynamics

3 E

Li-Wen Chen

This course discusses the theories of constraints, Newtonian mechanics, rigid body kinematics and kinetics and Lagrangean mechanics and their applications in dynamic analysis.

車輛實務講座

3 選

蔡建雄

本課程主要分成設計實務與發展實務兩個部分：(1)教導學生如何使用現代化的設計工具來設計與分析引擎、馬達、底盤與懸吊；(2)教導學生如何測試賽車性能、賽車的開車技術與輪胎選配的技术性問題

Vehicle practice seminar

3 E

Chien-Hsiung Tsai

This course is focused on design and development practice of racing car. (1) how to implement the modern design tool utilizing in design of engine, motor, chassis, and suspension; (2) how to test the performance of racing car, handle the racing car, and match the tyres.

三、 管理學院

(一)高階經營管理碩專班：

追求卓越專題

3 選

黃允成

本課程透過對中外大企業家、大科學家、大藝術家及各行各業傑出人物之生平介紹與探討，學習其寶貴的人生經驗與奮鬥歷程，從中獲得啟發，進而產生知識內化與見賢思齊效果。大企業家包括張忠謀、王永慶、張榮發、郭台銘、松下幸之助、比爾蓋茲、安迪葛洛夫、巴菲特、薩克伯(臉書創辦人)、馬雲(阿里巴巴創辦人)、嚴長壽、施振榮、高清愿、…等等。大科學家包括愛因斯坦、愛迪生、居禮夫人、牛頓、法拉第、阿基米德、費曼、伽利略、…等等。大藝術家包括朱銘、達文西、梵谷、…等。各行各業傑出人士包括大前研一、證嚴法師、星雲法師、彼得杜拉克、…等等。

Abstract of In Search Of Excellence

3 E

Yun-Cheng Huang

The purpose of this course is to realize how the excellence people overcame the difficulties and created an outstanding achievement. The main persons are discussed in this course are as follows:

- (1) Great entrepreneurs: Morris Chang, Yong-qing Wang, Rong-fa Zhang, Terry Guo, Konosuke Matsushita, Bill Gates, Andy Grove, Warrant Buffet, Mark Zuckerberg, Jack Ma, Stanley Yen, Stan Shih, Ching-yuen Kao.
- (2) Great scientists: Albert Einstein, Thomas Edison, Marie Curie, Isaac Newton, Michael Faraday, Archimedes, Richard Feynman, Galileo Galilei.
- (3) Great artist: Ming Zhu, Leonardo da Vinci, Vincent Van Gogh.
- (4) Distinguished persons: Kenichi Ohmae, Cheng Yen, Hsing Yun, Peter Drucker.

(二)企業管理系：

全球營運與供應鏈管理

3 選

陳啟政

這個課程的目標將涵蓋不僅高層次供應鏈策略和觀念，而且要給學生對必要的分析工具以解決供應鏈有具體了解。此目標即開此課程能對下列領域及相互關係有認知：(1)供應鏈的策略性角色，(2)供應鏈績效的主要策略性驅動要素，(3)供應鏈分析之方法。學習對每個公司好的供應鏈設計、規劃與營運之策略重要性，以此引導同學能了解好的供應鏈管理如何成為競爭優勢，然而其弱點如何傷害一公司之績效，這是學習目標。在此策略性框架，我們將確認設施、庫存、運輸及資訊是供應鏈績效的主要驅動因子。

Global Operations and Supply Chain Management

3 E

Chee-Cheng Chen

The goal of this course will be to cover not only high-level supply chain strategy and concepts, but also to give students a solid understanding of the analytical tools necessary to solve supply chain problems. The objective is to create a course that would develop an understanding of the following key areas and their inter-relationships:

- 1.The strategic role of the supply chain
- 2.The key strategic drivers of supply chain performance
- 3.Analytic methodologies for supply chain analysis

The objective is to learn the strategic importance of good supply chain design, planning, and operation for every firm that leads students to be able to understand how good supply chain management can be a competitive advantage while weakness in the supply chain hurt that performance of a firm.

(三)工業管理系：

職業安全衛生法規**3 選**

課程主旨在針對勞工安全衛生的原理原則與相關的法規建立基本概念，以利學生在未來工作中能夠遵循有關的法規並注重個人與工作環境的安全衛生。

Occupational Safety And Health Act**3 E**

The course objective is aimed at providing basic principles and regulations related to labor safety and health for the students. Under the guide they would pay attention to their safety and health for personal and environmental sake and follow relevant regulations in their future career.

職業安全衛生概論**3 選**

本課程針對學生未來工作中可能面臨的安全與衛生問題，提供所需要的相關基本原理，尤其在安全管理與安全工程方面特別強調。課程分為四部份：第一部份係安全管理，範圍包含概論、法規、教育訓練、災害預防、損失控制、自動檢查等；第二部份係工業衛生，範圍包含工業衛生概論、毒性物質的危害、作業環境測定、及健康檢查等；第三部份係安全控制，範圍包含危害控制、安全評估、緊急應變與事故處理、機械、電機、壓力、及溫度危害、火災與爆炸防止、以及個人防護具等；第四部份係心理與行為，範圍包含工作倫理與態度、職災傾向、人因工程、零災害理念、預知危險活動、及員工協助方案等。

Introduction to Occupational Safety and Health**3 E**

This course is intended to serve the basic needs of students whose future professional work requires a sound knowledge of the fundamental principles of safety, particularly those relative to management and engineering. The course is divided into four parts: Part I: Safety management, including basic principles of accident prevention, management leadership, hazard recognition, safety program management, accident investigation, and occupational safety and health statutes ; Part II: Industrial hygiene, including fundamentals of industrial hygiene, industrial toxicology, and medical and health surveillance system ; Part III: Hazard and stresses control, including industrial noise, fundamentals of machine and power tool guarding, personal protective equipment, fire and explosion protection and prevention, radiation safety, heat and temperature safety, and pressure safety ; Part IV: Psychological and behavioral aspects of safety performance, including attitudes, work ethic, human behavior, acceptance of risk, accident proneness, history and development of the safety movement.

健康事業管理**3 選**

由於全民健保與公共衛生政策的推展，民眾平均壽命增加，隨著人口老年化的趨勢，民眾對健康的需求日益增加，因此，健康週邊服務日益受到重視，健康相關產業也蓬勃發展。健康產業是以促進健康、疾病預防與治療為主的產業型態，型態包括：醫療院所、長照機構、藥局、保健食品及運動休閒等相關產業。本課程將針對健康產業型態、特色、管理模式與發展趨勢做詳細分析介紹與探討，課程範圍包括：醫院及基層診所營運管理、長期照護機構管理、藥局、醫療器材、醫藥物流及運動休閒產業等相關健康產業管理的介紹。本課程透過課堂授課、期末報告與參訪相關健康產業，讓學生將能對健康產業運作模式有深入瞭解。

Health Industry Management**3 E**

Due to the successful implementation of universal health insurance and public health policies, average life expectancy has risen substantially in Taiwan. With the growing needs of healthcare, health-related services have received greater attention and emphasis, and the health industry has experienced a dramatic boom in recent years. The health industry refers to the business field that aims to promote health, prevent diseases, and provide medical treatment. Institutions that fall into this field include clinics and hospitals, long-term care facilities, pharmacies, health food stores, as well as sports and

leisure centers, etc. This course introduces different types of businesses in the health industry. Information and analysis will be provided regarding business characteristics, management styles, and future development. Topics to be surveyed include the management of hospital and clinic operations, long-term care facilities, pharmacies, healthcare equipment, pharmaceutical logistics, the sports and leisure industry, etc. Classes will be conducted through lectures, final project reports, and site visits, all geared toward a more in-depth understanding of health industry operations.

運籌管理專題

3 選

本課程在探討物流領域中，與管理有關之專業課題，藉以培養學生規劃、分析、經營、管理與控制之基本素養。本課程包括如下之主題：一、整體物流系統之規劃與分析。二、物流中心區位選擇。三、訂單處理系統分析。四、存貨管理與分析。五、揀貨方法分析。六、倉儲系統分析。七、路線規劃分析。八、搬運系統分析。九、物流資訊系統分析。十、經營績效評估。

Special Topics in Logistics Management

3 E

Students will learn advanced technology concepts on manufacturing system, tools and techniques for designing, evaluating and implementing manufacturing systems. They have to discuss and analyze work redesign, standard time measurement and man-machine relationship through the real case from factories and know the way of increase productivity.

(四)景觀暨遊憩管理研究所：

景觀暨遊憩規劃特論

3 必

盧惠敏

景觀暨遊憩規劃特論課程目的在高階規劃設計人才的培養，著重思考的獨立性、規劃設計技術的前瞻性、理論方法應用之整合性、與研究發展能力之開創性。建立遊憩環境之景觀與建築規劃設計核心能力、同時培養規劃設計前之企劃能力以及空間環境經營管理能力。強調的是景觀與遊憩結合之景觀暨遊憩規劃領域，聚焦建立景觀暨遊憩管理研究所之核心能力與關鍵技術。相關的主題包括遊憩區如國家公園、文化遺產、城鄉地區、校園、社區等的規劃設計理論與實踐。

Landscape architecture and recreation planning 3 Hueimin Lu

The purpose of this course is to train the students the higher ability of the planning and design, focus on the independence of thinking, the prospective of the techniques of planning and design, the integration of applying the theoretical method, and the creativity of the research ability. It is to build up the core ability of architectural and landscape planning and design on recreational environments. It is to emphasize on the integration of landscape and recreation on the field of planning and focus on the core ability and key techniques of the graduate institute of landscape and recreation to provide the related knowledge of theory and practice as well as the ability of research and analysis. The related themes to for theory and practice include planning and design of national parks, cultural heritage site, city and rural, campus and community.

傳閱附件 1-4--本校各學院所屬各系(所)課程中英文摘要-人文暨社會學院

四、 人文暨社會學院

(一)客家文化產業研究所：

客家餐飲與實作

3 選

1. 客家餐飲介紹（含基本烹調觀念、衛生管理、器具使用、客家食材、客家飲食文化介紹等）。
2. 傳統、現代創意客家料理廚藝實作課程：傳統經典客家美食（四炆四炒）、創新客家料理、醃製類料理、米食類料理。
3. 客家特色餐廳及特色產業參訪研習。

Hakka repast and implementation

3 E

1. Basic concepts of cooking, health management, basic cooking utensils, Hakka food culture, Hakka cuisine, introduction of hakka common ingredients and so on.
2. Traditional, modern and creative Hakka cooking implement courses: classic Hakka food (four stewed four fried), innovation of Hakka food, pickled food, grain cuisine.
3. Taiwan Hakka specialty restaurants and characteristic industry study visit.

客家文化產業實習

2 選

本課程主要目的在培養學生有關客家文化產業之實務經驗與能力。課程內容包括：客家文化產業機構之參觀、見習、服務及參與經營等實務經驗，在專業實習後，每位學生應撰寫一份實習報告。

Hakka Cultural Industry Internship

2 E

The object of this course is to cultivate students to possess practical experiences and competence of relevant Hakka cultural industry. The contents of this course include visiting, practical training, service and participation of business in Hakka cultural industry. Every student will be demanded to submit a practical report after practical training.

文化資產與數位科技

2 選

此課程介紹應用 2d、3d 數位科技及其他運用科學方法進行文花資產與其保存環境的的監測與保存技術。

Special Topics on Cultural Heritage and Digital Technology

2 E

This course is to introduce the 2 D and 3D technologic way to preserve the cultural heritage and control its preserving environment.

(二)應用外語系：

西洋文學概論

2 選

本課程將介紹西方重要的文學經典作品，將從西方文明的兩個重要源頭開始談起，首先介紹希臘文化中最具代表性的希臘羅馬神話故事以及著名的荷馬史詩、希臘悲、喜劇，繼而介紹希伯來文化的代表《聖經》，接著帶領學生賞析中世紀與文藝復興時期歐洲文學的經典，包括但丁的《神曲》、塞萬提斯的《唐吉訶德》以及莎士比亞的十四行詩。

Introduction to Western Literature

2 E

This course aims to introduce students to canons of the West, starting with Greek mythologies, tragedies, comedies, and Homer's epics. After having a brief glimpse at the marvels of Hellenic culture, students will have access to the two representative works of Hebraism and the most influential works to

Western civilization, that is, the Old Testament and the New Testament. Masterpieces from the Middle Age and the Renaissance such as The Divine Comedy, Don Quixote, and William Shakespeare's sonnets will also dazzle the students with their insights into life journey, medieval chivalry, and poetic art.

美國文學

2 選

本課程介紹美國文學的重要作品及作家。透過閱讀小說、詩歌與戲劇，本課程讓學生認識美國文學的獨特性，從早期在文化上與殖民母國的連結，獨立建國後歷經種族衝突的過程，到逐漸建立屬於自己的文學特色，並開始展現多元文化的美學。本課程也將探討美國文學裡出現的許多重要主題，例如種族衝突、美國精神、女性意識、多元文化等議題。

Introduction to American Literature

2 E

This course aims to introduce students to:

1. The important works of American literature
2. The features and periods of American literature
3. The important themes in American literature

筆譯練習：(中譯英)

3 選

本科目之教學重點為 (1)使學生瞭解中譯英筆譯練習之種類與要素；(2)訓練學生中譯英筆譯之技巧；(3)培養學生從事筆譯工作之專業態度；(4)引導學生涉略不同領域之專業背景知識，並針對不同專業領域之文章進行翻譯練習。

Translation Practice (Chinese-to-English Translation)

3 E

This course aims at (1) helping students understand the types and elements of Chinese-to-English translation; (2) training students to become familiar with the skills of Chinese-to-English translation; (3) developing students' professional attitudes toward jobs related to translation; and (4) guiding students to get more professional background knowledge about different fields. Texts regarding different professional fields will be selected as practice materials.

跨文化溝通

2 選

本課程將設定為全英語授課的課程，鼓勵本校外籍生修課，將課堂創造成自然的跨文化情境，讓學生透過彼此的討論與觀察，進一步理解課程將講授的課題與文化造成溝通技巧的差異。授課內容包含：為何需要了解跨文化溝通、禮貌與文化議題、跨性別的溝通就是一種跨文化溝通、流行文化與溝通、不同文化下的身體語言，以及以下情境下的跨文化溝通議題，如：跨國工作職場與商業互動技巧、跨國求學遭遇的文化衝突、不同文化如何透過媒體廣告語言進行產品銷售，以及最後如何增加自己的跨文化溝通技巧。本課程將提升學生的文化敏銳度，並了解其對語言選擇的影響。

Cross-Cultural Communication

2 E

This course is meant to be an all-English course, inviting overseas students to be enrolled to help create a naturally cross-cultural contexts for all students with different cultural background to discuss and understand each others' cultural diversity in relation to communication patterns and strategies. Cross-cultural communication is defined not only by national diversity but also social diversity as derived from gender as well as various communication contexts, such as conflicts, media, business and education. Students will be given lecture to have initial understanding important theories and concepts in cross-cultural communication and eventually put what they know into practice in the future when they have to communicate with people from different social and cultural backgrounds. Their awareness and sensitivity as to how to use language with polite and adequate manners are expected to increase upon the completion of the course.

國際禮儀

2 選

本課程旨在培養學生具備國際禮儀的知識與內涵，使學生能以禮待人，並能在各個場合有自信且優雅展現個人之優質專業品質並提升服務品質與企業形象。

International Etiquette

2 E

This course aims to cultivate students to be familiar with the knowledge and skills of international etiquette as well as to enable students to perform their jobs with proper manners and thus to promote the professional quality and service and the corporate's public image.

傳閱附件 1-5--本校各學院所屬各系(所)課程中英文摘要-國際學院

五、國際學院

(一)國際學院：

永續發展趨勢

2 選

本課程介紹環境政策與管理對經濟發展與開發建設之影響，可達到永續發展之效能。從自然經濟資源、氣候、環境、能源、交通運輸、產業與人口結構等作整體性的政策思考與規劃，以達環境保護與經濟發展兼顧之永續發展目標。

Trends in Sustainable Development

2 E

The objective of this course is to provide students to understand the environmental management, domestic environmental policy and global environmental protection topic. The subjects of the course will include : Environmental management and policy ; Environmental economics ; Risk assessment ; Ecological balance ; National environmental policy ; Environmental impact assessment ; Sustainable development ; The issue on environmental protection and International Conventions .. etc. This course introduces environmental policy management for the enterprise development process, to prevent environmental pollution. From climate, transportation, industrial structure, and diverse environment in which the integrity of reference for thinking and planning.

(二)熱帶農業暨國際合作系：

台灣特色農業

3 選

農業可以提供食物支持經濟的活絡與發展，從農民到人民豐富供給在地經濟和商業活動。在課程中我們將談論台灣當地的農產與食物的故事，例如穀類、豆類、水果、蔬菜、花卉和特種作物。介紹台灣特色農業，主要突顯台灣在地農作物，幫助學了解本地的食物生產系統，如產銷制度等，提供相當的知識鼓勵學生探索新的食物與農產。

Featured Agriculture in Taiwan

3 E

Agriculture can provide an abundant supply of food, economic resiliency for local economies and financial success for farmers and peasants, all without exploiting people or nature. In the courses we will to talk the stories about the local foods in Taiwan, such as the grains, legumes, fruits, vegetables, flowers and other specialty crops. To highlight the widespread production of crops in Taiwan. Introduce the specialty agriculture in Taiwan, help students to organization our local food system. Provide adequate training for us to explore new foods.

植物生理學

3 選

本課程在使學生獲得有關植物生理學之基本知識，課程內容包括植物生理之概念、植物之吸水及蒸散作用、礦物營養及養分之吸收輸送、光合作用、呼吸作用、氮素、脂質及其他二次代謝物之代謝。

Plant Physiology

3 E

The purpose of this course is to acquaint students with knowledge of basic principles and the application of plant physiology on the agricultural system. The contents include: Introduction of concepts in plant physiology, the process of water absorption and transpiration, absorption and translocation of mineral, nutrient, photosynthesis, respiration, metabolism of nitrogen, lipid and secondary metabolites.

傳閱附件 1-6--本校各學院所屬各系(所)課程中英文摘要-獸醫學院

六、 獸醫學院

(一) 獸醫學系：

大動物臨床診療實習(1)

1 選 李旭薰

經由本課程之修習，學生可獲得大動物臨床診療之實際經驗，並了解產業之現況，將增進學生於畢業後從事相關產業服務與研究之動力。

Clinical Practice in Large Animal (1)

1 E HSU-HSUN, LEE

In this course, student has to join the clinical work in the dairy farm. Student will learn the clinical skills of large animal diagnosis and treatment. In addition, student will know the real situation of dairy cow industry

乳牛生產醫學(1)

2 選 李旭薰

經由本課程之修習，學生可獲得乳牛生產醫學之相關知識，並透過實際案例之參與了解生產醫學的應用價值與施行方式，可讓學生獲得對於整體醫療之能力。

Production Medicine in Dairy Cow (1)

2 E HSU-HSUN, LEE

In this course, we provide the opportunity for the student has more exposure to the application of bovine production medicine. In addition, student will know the advances of bovine production medicine by case studies in dairy cow.

臨床大動物外科學

2 選 李旭薰

經由本課程之修習，學生可獲得大動物臨床外科之實作技巧經驗，並了解最新之大動物外科技術。

Production Medicine in Dairy Cow (1)

2 E HSU-HSUN, LEE

In this course, we provide the opportunity for the student has more exposure to the operations on the living cow. The surgical operations include the demonstration or practice of Dehorning, Castration, Herniorrhaphy, Laparotomy and exploration, Rumenotomy, Abomasopexy, and Cesarean section.

大動物臨床診療實習(2)

1 選 李旭薰

經由本課程之修習，學生可獲得大動物臨床診療之實際經驗，並了解產業之現況，將增進學生於畢業後從事相關產業服務與研究之動力。

Clinical Practice in Large Animal (2)

1 E HSU-HSUN, LEE

In this course, student has to join the clinical work in the dairy farm. Student will learn the clinical skills of large animal diagnosis and treatment. In addition, student will know the real situation of dairy cow industry.

乳牛生產醫學(2)

2 選 李旭薰

經由本課程之修習，學生可獲得乳牛生產醫學之相關知識，並透過實際案例之參與了解生產醫學的應用價值與施行方式，可讓學生獲得對於整體醫療之能力。

Production Medicine in Dairy Cow (2)

2 E HSU-HSUN, LEE

In this course, we provide the opportunity for the student has more exposure to the application of bovine production medicine. In addition, student will know the advances of bovine production medicine

by case studies in dairy cow.

大動物超音波學特論

2 選 李旭薰

經由本課程之修習，學生可獲得大動物超音波學之實際應用能力，並了解超音波應用於大動物繁殖與疾病之益處。

Advanced Study in Large Animal Ultrasonics

2 E HSU-HSUN, LEE

In this course, we provide the opportunity for the student has more exposure to the application of ultrasound on the living cow. In addition, student will know the advances of ultrasound in large animal reproduction and diseases diagnosis.

傳閱附件 2--機械工程系 105 學年度四年制產學攜手合作專班課程規劃案

13.四年制 機械工程系(產學攜手合作專班)**(一)教育目標**

- 1.應用機械專業知識，解決精密機械與綠能工程問題之能力。
- 2.具工作熱忱、社會責任感與守法之人文素養。
- 3.培養國際觀、終身學習與團隊合作之能力。

(二)校定共同必修科目

中 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		第三學年		第四學年		備 註
		上	下	上	下	上	下	上	下	
通識課程 General Education	12	2	2	2	2	2	2			通識課程中法學緒論、行政法、法律與生活及勞工法規四者至少需選修一門。 通識選項課程： 人文學科：2 門 社會科學：3 門 自然與生命科學：1 門
國文 Chinese	4	2	2							國文(閱讀與寫作)(1) 國文(閱讀與寫作)(2)
大一英文 Freshman English	4	2	2							大一英文(1) 大一英文(2)
英語聽講練習 101~102 English Listening & Speaking Practice	2			1	1					英語聽講練習 101 英語聽講練習 102
憲法 Constitution	2							2		
體育 Physical Education	4	1	1	1	1					一年級： 大一體育(1)、 大一體育(2) 二年級： 體育選項(需修讀不同興趣體育課程)
生活服務教育 Student Life Service Education	0					0	0			
通識教育講座 Lectures on General Education	1								1	各系依序開課，開課學期不定
外語實務 Foreign Language Proficiency Test	0			0						畢業前修畢 通過標準依「外語實務課程實施要點」規定
合 計	29	7	7	4	4	2	2	2	1	

(三) 學院共同必修科目

文 科 目 名 稱	學 分 數	第一學年		第二學年		第三學年		第四學年		備 註
		上	下	上	下	上	下	上	下	
工程倫理與法規 Ethics and Law in Engineering	1						1			
合 計	1	0	0	0	0	0	1	0	0	

(四)專業必修科目

文 科 目 名 稱	學 分 數	第一學年		第二學年		第三學年		第四學年		備 註
		上	下	上	下	上	下	上	下	
產業實務實習(1) Professional practice(1)	4	4								為週一到週四在 配合廠商處進行 實習
普通物理學(1) General Physics (1)	3	3								
普通物理學實驗(1) General Physics Lab. (1)	1	1								
能源概論 Introduction to Energy	3	3								
產業實務實習(2) Professional practice(2)	4		4							為週一到週四在 配合廠商處進行 實習
基礎數學 Fundamental mathematics	3		3							
熱學工程概論 Introduction of Thermal Engineering	3		3							
工程圖學實習 Engineering Graphics Practice	1		1							
產業實務實習(3) Professional practice(3)	4			4						為週一到週四在 配合廠商處進行 實習
靜力學 Statics	3			3						
電腦輔助機械製圖與實習 Computer-Aided Mechanical Drawing and Practice	3			3						
工程材料 Materials of Engineering	3			3						
產業實務實習(4) Professional practice(4)	4				4					為週一到週四在 配合廠商處進行 實習
材料力學 Mechanics of Materials	3				3					
材料實驗 Fundamental Experiments in Materials	1				1					
工廠實習 Practical Training in Factory	1				1					
機械製造 Manufacturing Processes and Systems	3				3					
產業實務實習(5) Professional practice(5)	4					4				為週一到週四在 配合廠商處進行 實習

文 科 目 名 稱	學 分 數	第一學年		第二學年		第三學年		第四學年		備 註
		上	下	上	下	上	下	上	下	
電腦輔助機械設計與實習(1) Elements of Mechanism and Practice (1)	3					3				
應用電子學與實習 Application Electronics and Practice	3					3				
精密量測與實習 Precision Measurement and Practice	3					3				
產業實務實習(6) Professional practice(6)	4						4			為週一到週四在 配合廠商處進行 實習
電腦輔助機械設計與實習(2) Elements of Mechanism and Practice(2)	3						3			
電腦數值控制工具機與實習 Computer Numerically Controlled Machine Tools and Practice	3						3			
產業實務實習(7) Professional practice(7)	4							4		為週一到週四在 配合廠商處進行 實習
自動控制與實習 Automatic Control and Practice	3							3		
工廠管理 Factory Management	3							3		
可程式控制器與實習 Programmable Controller and Practice	3							3		
進階電腦數值控制工具機實習 Advanced computer numerical controlled machine tools internship	1							1		
產業實務實習(8) Professional practice(8)	4								4	為週一到週四在 配合廠商處進行 實習
模具學 Mold Theory	3								3	
電腦整合製造 Computer Integrated Manufacturing	3								3	
機電系統整合與實習 Mechatronics and lab	3								3	
車銑複合加工實習 CNC Turning and Milling Complex Machines internships	1								1	
合 計	98	11	11	13	12	13	10	14	14	

機械工程系(產學攜手合作專班)

Department of Mechanical Engineering

一、必修科目 Required Courses

22746~22753 產業實務實習(1)~(8) 4,必

落實學生學以致用，並加強縮短四技學程的學生學用落差，而進行培育相關實務工作經驗之一系列實習課程。

22746~22753 Professional practice(1)~(8) 4,R

Through this course, students can apply their knowledge to implement and cultivate a series of relevant practical work experience in this internship programs.

05022 普通物理(1) 3,必

一、力學：

- 1.等加速運動
- 2.牛頓運動定律
- 3.靜平衡
- 4.功與能
- 5.線動量
- 6.轉動運動
- 7.轉動功與能

二、熱力學：

- 1.第零定律
- 2.熱與功
- 3.第一定律
- 4.第二定律

05022 General Physics (1) 3,R

1.Mechanics：

- (1).Uniformly Accelerated Motion
- (2).Newton's Laws of Motion
- (3).Static Equilibrium
- (4).Work and Energy
- (5).Linear Momentum
- (6).Motion in A Circle
- (7).Rotational Work Energy and Momentum

2.Thermodynamics：

- (1).The Zeroth Law of Thermodynamics
- (2).Temperature and The Kinetic of Gases
- (3).The First Law of Thermodynamics
- (4).The Second Law of Thermodynamics

05023 普通物理實驗(1) 1,必

- 1.基本量測
- 2.自由落體
- 3.單擺
- 4.摩擦係數
- 5.力的分解
- 6.碰撞
- 7.表面張力
- 8.固體比熱
- 9.液體比熱
- 10.線膨脹

05023 普通物理學實驗(1) 1,R

General Physics Lab. (1)

- 1.Fundamental measurement
- 2.Free falling body
- 3.Single pendulum
- 4.Friction
- 5.Components of force
- 6.Collision
- 7.Surface tension
- 8.Specific heat of solid

9. Specific heat of liquid

10. Linear expansion

22396 能源概論

3,必

人類的永續發展之重大因素之一便是能源，包括：化石燃料、核能及再生能源。但是，因為地球資源貯存量有限，如果沒有適當的能源節制及恰當的再生能源技術，進而有效的能源管理政策，不但有害於經濟的發展，也會造成能源缺乏，引起全球人類與社會衰退。

提升能源環保技術及管理的基本步驟是奠定具有整體觀的能源環保之教育，具有科技、管理、經濟整體觀，因此本課程之內容涵蓋了過去、現在及未來的能源技術、能源種類、能源經濟及管理問題、等等。本課程探討各議題加以說明，並指出未來的可能展望。對我國的能源現況加以分析，也探討近代能源之環保議題，因此應用範圍極廣。本課程主要的內容為：

- 1 簡介
- 2 能源概論
- 3 化石燃料
- 4 核能
- 5 太陽、風與地熱能
- 6 水力發電與海洋能
- 7 生質能
- 8 氫能與燃料電池
- 9 發電科技
- 10 能源與環境

22396 Introduction to Energy 3,R

Energy is the key issue of whether human race and all the other lives can be sustained or not in earth for the future. Energy resources usually includes: fossil fuel, nuclear power, and renewable energy. However, since the energy stored in earth is limited, it can be dissipated very quickly and inefficiently if governments/citizens of countries are not aware of the basic ideas and do not have a good knowledge or policy of energy usage management. An inefficient way (or, in a wrong way) of the energy usage will definitely bring in the result of economy recession or depression, civilization development backward, and even to the disaster of human races annihilation.

Therefore, in this course, we provide the knowledge of energy education from different prospects and point of views, introduce the idea and techniques of how to preserve and use energy efficiently. Also the issues of environment protection related with energy usage and storage methods. Main subjects discussed will be:

1. fossil fuel
2. nuclear energy
3. solar, wind, geothermal energy
4. hydraulic energy (hydroelectric power、marine current and Tidal energy)
5. bioenergy(biofuel)
6. hydrogen energy and fuel cell
7. basic principle of electric generation
8. issues of environment protection

22222 基礎數學 3,必

本基礎數學課程是針對幾個學習微積分所需理解的重要概念而設計。這門課程可提供學生代數與三角函數紮實的基礎。主要的內容包含了線性、多項式、片斷、指數、對數與三角函數的觀念介紹。此外，簡單的矩陣運算亦會在課程中介紹。學生將會學習如何以符號、圖型和數值方法來操作這些函數。

22222Fundamental mathematics 3R

This fundamental math course focuses on various topics that are important to the study of calculus. Through this course students will acquire a solid foundation in algebra and trigonometry. The topic is placed on understanding the concepts of linear, polynomial, piecewise, exponential, logarithmic, and trigonometric function. In addition, simple matrix operation will be covered in this course. Students will learn to work these functions in symbolic, graphical, and numerical form.

22394 熱學工程概論**3, 必**

本課程要旨為介紹介紹熱力學與熱傳學中的基本概念、各種現象及實際工程上的應用，並以有限元素軟體輔助教學實習。內容包含：基本概念，特性與狀態，熱力學第一定律，熱力學第二定律、熱機原理(封閉循環: Carnot Cycle, Otto Cycle, Diesel Cycle，內燃機/四衝程引擎,外燃機，冷凍原理)，熱傳學中的熱傳導(擴散方程式、穩態分析、散熱片、暫態分析)、對流理論簡介(強制與自然對流)。本課程同時教授學生利用電腦以及計算(數值)方法，配合商用有限元素軟體 COSMOS/M 與 Gambit-ANSYS/Fluent 將熱傳學中的實際工程問題，在電腦中進行視覺性的探討與整合分析。本課程教學重點在於如何在電腦中建模、切割網格、設定合理的邊界條件、求解、分析結果。應用：散熱片分析和設計原理、IC 封裝/電子產品之散熱、殼管式熱交換器之對流熱傳分析、內燃機之散熱分析，輻射熱傳和相變化:雷射切割的分析(材料的融化)。

練習的實際工程問題包含:

1. 散熱片設計
2. IC 封裝/電子產品之散熱
3. 殼管式熱交換器之對流熱傳分析
4. 內燃機之散熱分析

22394 Introduction of Thermal Engineering 3, R

The purpose of this course is to give undergraduate students a solid knowledge about the basic principles of thermal engineering, which involves knowledge of thermodynamics and heat transfer. The contents of this includes: fundamental concepts, first and second laws of thermodynamics, thermodynamic cycles and heat transfer principles. Also included in this course is an introduction of software as ANSYS/FLUENT which help students use the computer/numerical methods to solve real world heat transfer problems.

The contents of heat transfer include:

- 1.Introduction of heat transfer.
- 2.Application of heat transfer.
- 3.heat conduction.
- 4.heat convection.
- 5.heat exchange design.
- 6.thermal radiation.

40006 工程圖學實習**1, 必**

本課程使學生瞭解 CNS 工程製圖之標準與方法，培養學生識圖的能力，並能應用投影與展開原理，正確、清晰、美觀、迅速繪製各種機械工作零件與組合圖，並使學生熟悉各種平面與立體繪圖的觀念與技術技能，養成圖學表現與溝通的實務應用能力。

40006Engineering Graphics and Practice**1,R**

This course enables students to understand the CNS standard and methods of engineering drawing, and cultivate students to have the abilities of knowing graphics and to apply the principles of projection and expanding for drawing various mechanical parts and assemble graphics. Moreover, this course familiarize students with a variety of two- and three-dimensional graphics concepts and drawing skills, and equip students with the ability to develop practical applications and drawing communications.

55149 靜力學**3,必**

本課程之目的主要是介紹基本的力學觀念及原則，包括了質點靜力學、剛體的等效力系、剛體平衡、均佈力，以及結構的分析。

55149Statics**3,R**

The coverage of this course includes fundamental concepts and principles of mechanics ; statics of particles ; equivalent systems of forces for rigid bodies ; equilibrium of rigid bodies ; distributed forces ; and analysis of structures.

22291 電腦輔助機械製圖與實習**3, 必**

本課程使學生熟悉機械工程製圖之正確繪圖方法以及電腦輔助機械製圖軟體之使用。培養學生識圖能力，並能應用投影原理，以 AutoCAD 或 SolidWorks 軟體繪製機械工作圖，並使學生瞭解電腦繪圖的觀念與技巧，養成電腦輔助繪圖的實務應用能力。

22291Computer-aided Mechanical Drawing**3, R**

This course equips students with regular operations on the mechanical engineering drawing and the use of computer-aided mechanical drawing. Students are trained to acquaint the mechanical drawing and to use the projection method to complete mechanical drawing by AutoCAD and SolidWorks software. This course trains students to understand the concept and technique of CAD and to possess the skill of practical application on CAD.

20036 工程材料 3, 必

概論、原子結構與鍵結、晶體結構與缺陷、相平衡、材料物化性、材料強化、金屬材料、陶瓷材料、聚合材料、複合材料、磁料、電性、材料使用與選擇。

20036 Materials Science and Engineering 3, R

Introduction , atomic structure and bonding. Crystal structures and imperfections, phase diagrams . Mechanical and electrical properties, polymers , Biron, engineering alloy, ceramics, composites and magnetic materials, using and selection.

40306 材料力學 3,必

本課程介紹的主題有受軸向力、扭力及彎矩等作用之構件的分析及設計，並包含應力、應變、彈性及非彈性行為和應變能的基本觀念。其它一般性主題包含應力與應變的轉換，應力集中，樑之撓度，柱之行為和能量法。特殊主題則有熱效應，預應變效應，壓力容器，非等載面構件，不連續函數，剪力中心和非彈性彎曲。

40306 Mechanics of Materials 3,R

The topics introduced in this course include the analysis and design of structural member subjected to axial load, torsion and bending, as well as such fundamental concepts as stress, strain, elastic, and inelastic behavior, and strain energy. Other topics of general interest are the transformation of stress and strain, stress concentrations, deflections of beam, behavior of columns, and energy methods. More specialized topics are thermal and prestrain effects, pressure vessels, nonprismatic members, discontinuity functions, shear center. and inelastic bending.

21350 材料實驗 1,必

在使材料本科同學，對於各種相關的材料實驗及技巧有基本的認識。本課程探討傳統及近代陶瓷的原料特性、基本物理性質檢測、及各種不同成形法。基本物性測試包括；粒度測試、密度測試、及黏度測試。成形法的課程內容有；泥陶瓷粉末之分散實驗、陶瓷粉末注漿成形法、理論密度量測與計算、陶瓷薄帶的製造等。本課程除傳授相關的知識背景外，並特別強調學生的實作與參與使學生認識陶瓷製造的基本過程，包括傳統陶瓷，結構陶瓷，及玻璃等製程。另外，藉由 SEM 與 XRD 的分析，也使學生了解陶瓷材料在燒結後顯微結構的變化。

21350 Fundamental Experiments in Materials 1,R

This course is designed to introduce the ceramic, basic reaction principles and fundamental approach of analysis of the inorganic substance occurred. The content includes the dielectric properties and compositions of ceramics. The experiment is designed to introduce students to the knowledge and implementation of characteristics of ceramics by microstructural analysis, particle dispersion, packing density, theory density calculation and sintering kinetic.

20048 工廠實習**1, 必**

本課程內容包含工廠使規則及安全規定說明，加工零組件之組合成成品，及兩大類別之實習項目：(1)鋸削及砂輪機，車床，鑽床及銑床，磨床和數控工具機之操作。(2)砂模鑄造，精密鑄造，銲接，熱處理，板金加工和鉗工。

20048 Machine Shop Practice 1,R

The content of this course include the description of the usage rules and safety requirements, to assembly the fabricated components to be a product, and two group items : (1)The operations of band machining and hard polishing, engine lathe, drilling and milling machines grinders, and numerical control machine tools. (2)Sand casting, precision casting, welding, heat treatment, sheet forming, and bench work

21570 機械製造**3, 必**

本課程介紹機械元件之製造原理與方法，著重系統化之說明。製造對象包含金屬、高分子、陶瓷及半導體等材料，製造方法包含鑄造、塑性成形、切削、銲接、熱處理、表面處理、粉末冶金及非傳統加工等。探討重點在於結合材料之特性及設計之理念，輔以工具機、工模夾治刀具及量測與檢驗的知識，配合生產管理及電腦輔助製造系統之學理與實務，建立一完整性之製造系統觀念。

21570 Manufacturing Processes and Systems 3,R

This course introduces the manufacturing principles and methods of the mechanical components, emphasizing on the systematic descriptions. The discussed materials include metals, polymers, ceramics and semiconductors. The manufacturing methods include casting, plastic deformation, machining, welding, heat treatment, surface treatment, powder metallurgy and nontraditional processes. The investigation of material properties and design concepts are discussed. In addition, the knowledge of machine tools, jigs, fixtures and tools, and metrology and inspections are discussed. The comprehensive manufacturing concept is built by combining the principles and techniques of the production management and computer-aided manufacturing systems.

22392 電腦輔助機械設計與實習 (1)**3,必**

本課程在讓學生運用 CAD 及 CAE 軟體進行簡易機構與機械元件之設計，並教授機構學及機械元件設計之基礎原理，透過分組實習讓學生在電腦的實作中更容易了解機構及機械之作動方式及如何分析機械系統之強度及動力特性。本課程為第一部份，著重在簡易機構之電腦輔助運動設計及分析，以及如何判讀分析結果。

22392Elements of Mechanism and Practice (1) 3,R

This course helps students learning about how to apply CAD and CAE softwares on mechanism and machinery design and the design skill of mechanisms and machine elements. Students can realize the motion of mechanisms, and strength and dynamic characteristics of the machinery system more easily through team-work and practice. This course is the first part and it focuses on design and analysis of the simple mechanisms using the CAD and CAE softwares, and interpretation of analysis results.

22390 應用電子學與實習**3, 必**

內容詳實，深入淺出的理論說明且豐富詳盡的範例，適合於控制、冷凍空調與電子修護等相關領域的應用電路。每一章都有立即練習與學後評量以強化練習，瞭解同學的學習成效。內容詳實，深入淺出的理論說明且豐富詳盡的範例，提升學生學習意願。〈1〉先簡述上課要學習的東西和內容。〈2〉例題說明與分析、示範講解以及學生自我模擬練習。〈3〉課後進行簡單的測驗來知道學生的學習狀況。

教導學生正確的實驗教室器材使用方法與安全認知：(a)教導工業安全與衛生，(b)手工工具的選擇及使用安全 2.瞭解實作與電子儀器的操作：(a)手工銲接的方法，(b)銲接練習，(c)綁線技術，(d)

識別電子元件，電子元件的特性與規格，(e)三用電錶的認識及基本量測，三用電錶的使用探討，(f)電阻的量測與計算，(g)直流電源供應器的認識與使用，訊號產生器的認識與使用，(i)示波器的認識與使用，3.電學電路實習課程如：(a)克西荷夫電壓電流定理，並聯電路電壓與電流量測，(b)串聯電路電壓與電流量測，(c)簡易印刷電路板的製作，(d)電子電路的實作

22390 Application Electronics and Practice 3,R

Informative, Theoretical explanation in simple terms, and full and detailed examples, Suitable for control, refrigeration and air conditioning and electrical repair and other related fields of application circuits. Each chapter has practice immediately after the assessment and learning in order to strengthen practice, understand students' learning, content full and accurate, The informative, easy to understand and enrich the theoretical description of detailed examples to enhance students' willingness to learn. <1> will explain briefly the class of things to learn and content. <2> Example description and analysis, lectures and demonstrations and student self-simulation exercises. <3> After-school simple quiz to know that student learning conditions.

1.Experimental classroom to teach students the proper use of equipment and safety awareness : (a)Teach Industrial Safety and Health (b) The choice of tools and the use of safety 2. Learn implementation and operation of electronic equipment: (a) Hand soldering methods (b) Welding Practice (c) Tie wire technology(d) Recognize of electronic components , Characteristics and specifications of electronic components (e) Multimeter awareness and basic measurement , Explore the use of Multimeter (f) Resistance measurements and calculations (g) Understanding and using the DC power supply (h) Understanding and using the Signal generator (i) Understanding and using the oscilloscope 3. Electrical circuit Internship Program: (a) Kirchhoff's voltage current law , Parallel circuit voltage and current measurements (b) Series circuit voltage and current measurements (c) Simple printed circuit board production (d) Electronic circuit implementatio

21057 精密量測與實習 3, 必

使學生了解不同類型的物件，可用何種量具或儀器(接觸式或非接觸式)，做量測或檢驗觀念，且熟悉各種量具及儀器的正確操作方法。

21057 Precision Measurement and Practice 3,R

To enable students to understand the different types of objects that can be used, or what kind of measuring instrument (contact or contactless), doing the measurement or test ideas, and are familiar with a variety of measuring tools and instruments for proper operation.

22393 電腦輔助機械設計與實習(2) 3, 必

本課程在讓學生運用 CAD 及 CAE 軟體進行簡易機構與機械元件之設計，並教授機構學及機械元件設計之基礎原理，透過分組實習讓學生在電腦的實作中更容易了解機構及機械之作動方式及如何分析機械系統之強度及動力特性。本課程為第二部份，著重在機械系統之電腦輔助設計，進行元件選用、尺寸設計、強度及壽命分析，以及如何判讀分析結果。

22393Elements of Mechanism and Practice (2) 3,R

This course helps students learning about how to apply CAD and CAE softwares on mechanism and mechnery design and the design skill of mechanisms and machine elements. Students can realize the motion of mechanisms, and strength and dynamic characteristics of the machinery system more easily through team-work and practice. This course is the second part and it focuses on the machine element selection, dimension determination, streangth and life analysis of the machinery systems through the CAD and CAE softwares, and interpretation of the analysis results.

22400 電腦數值控制工具機與實習 3,必

介紹電腦數值控制工具機的基本構造，操作面盤的功能及使用，加工程式的傳輸，工作定位夾持，刀具選用及補正操作。經由實際加工，熟練電腦數控車床和銑床的操作，工件尺寸的測量，完成

各類工件的精密加工。

22400 Computer Numerically Controlled Machine Tools and Practice 3,R

The fundamental construct of a computer numerically controlled machine tool is introduced. The functions and operations of the control panel, the transfer of the manually or automatically created program, the positioning and fixture of a workpiece, the selection of tools and modified length or diameter of tools in machining process are practiced. By conducting the operations in CNC lathe and miller, and learning the measuring methods, most kinds of precision machined components can be achieved.

22391 自動控制與實習 3,必

本課程學習控制系統的分析與設計，認識系統方塊圖、訊號流程圖、系統元件之數學模型、控制器的設計與系統性能分析等；數學模型包括系統轉換函數和狀態空間模型。性能分析包括閉回路控制系統特性，瞬時反應分析，系統穩定性、反應指標法設計及根軌分析法等。本課程並包含兩小時應用 MATLAB 進行控制系統分析與設計的實習。

22391 Automatic Control and Lab 3,R

This course studies control system analysis and design. It introduces system block diagram, signal flow graph, mathematical models, controller design and system performance analysis. System performance analyses and designs using both transfer function and state space model. Other topics include feedback control system characteristics, transient-response analysis, system stability, performance index design and root-locus method. The course also includes 2 hours computer simulation of control system analysis and design using Matlab Tools.

21290 工廠管理 3,必

培養健全之機械相關產業之技術人才，能擔任機械之元件製造、裝配、操作、保養及簡易復護等實用知識與技能，使用機具設備、機械製圖、識圖之能力，培養學生具備敬業、負責、勤奮、合作等職業道德及良好安全衛生工作習慣，使用量測設備之能力、機械工作之能力、培育具有在相關專業資域繼續進修、專題製作與研究發展的能力。

21290 Factory Management 3,R

The aim of this course unit is to acquaint the students with the know-how of factory management. The course also introduces to the students the organization management, factory layout, finished-good moving, products development and quality management. With the background, a course section on quality management topic is presented. It is hoped that it will be very useful to students who have to learn about the essential area of this management know-how. The content includes fundamentals of factory management, organization management, quality management and product management.

22402 可程式控制器與實習 3,必

本課程要旨為介紹近來工業界最常用之可程式控制器，其優點為精確、功能大、價格低、抗高溫及擴充性大。課程內容包括：控制器軟硬體介紹、撰寫程式、安裝及維修。本課程要旨為訓練學生能實際操作可程式控制器之能力。包括，程式撰寫，週邊設備架設，系統安裝與維修。

22402 Programmable Logic Controller and internship 3,R

The purpose of this course is to introduce the most-used programmable controller (PLC) in industries. The advantages of PLC are precision, easy-use, low-cost, anti high-temp and easy-expand. The course includes as follow: Hardware and software of PLC, Programming of PLC, Maintaining and Installing of PLC. The aim of this course is to develop the students with the ability of operating programmable controller. The course's subjects include the PLC programming, the peripherals setup, and systems installation and maintaining.

22756 進階電腦數值控制工具機實習(1) 1,必

介紹電腦數值控制工具機的基本構造，操作面盤的功能及使用，加工程式的傳輸，工作定位夾持，刀具選用及補正操作。經由實際加工，熟練電腦數控車床和銑床的操作，工件尺寸的測量，完成各類工件的精密加工。

22756Advanced computer numerical controlled machine tools internship (1) 1,R

The fundamental construct of a computer numerically controlled machine tool is introduced. The functions and operations of the control panel, the transfer of the manually or automatically created program, the positioning and fixture of a workpiece, the selection of tools and modified length or diameter of tools in machining process are practiced. By conducting the operations in CNC lathe and miller, and learning the measuring methods, most kinds of precision machined components can be achieved.

21099 模具學 3,必

教導學生了解現今市場的市場區隔細分化、而且消費者對於個性化產品的需求也越趨增加。想要在這樣的市場具有競爭力，勢必要具有「低成本、有彈性、高品質、以及良好的服務」，這幾種特性。而推動自動化、以及電腦整合，可以幫助解決這些問題，也可適時因應少量多樣化產品。電腦整合製造是利用電腦控制與管理技術，將由產品設計到製品出貨所有生產活動結合作一體之系統，以期在最短時間內，以最低的成本生產出品質最佳的產品。

21099 Mold Theory 3,R

This course is intended to provide a comprehensive study of the important topics in Computer Integrated Manufacturing and related systems. These topics include Computerized manufacturing planning systems, shop flow control, CAD/CAM, computer process control, Flexible manufacturing systems, automated material handing, and automated storage systems

21027 電腦整合製造 3,必

教導學生了解現今市場的市場區隔細分化、而且消費者對於個性化產品的需求也越趨增加。想要在這樣的市場具有競爭力，勢必要具有「低成本、有彈性、高品質、以及良好的服務」，這幾種特性。而推動自動化、以及電腦整合，可以幫助解決這些問題，也可適時因應少量多樣化產品。電腦整合製造是利用電腦控制與管理技術，將由產品設計到製品出貨所有生產活動結合作一體之系統，以期在最短時間內，以最低的成本生產出品質最佳的產品。

21027Computer Integrated Manufacturing 3,R

This course is intended to provide a comprehensive study of the important topics in Computer Integrated Manufacturing and related systems. These topics include Computerized manufacturing planning systems, shop flow control, CAD/CAM, computer process control, Flexible manufacturing systems, automated material handing, and automated storage systems.

22452 機電系統整合與實習 3,必

本課程主要學習機電整合系統之相關元件及其基本架構。內容包括控制系統架構及微處理器控制系統介紹、機電特性簡介、運算放大器各種應用電路設計與信號調整、電力控制半導體、感測器、機電元件匹配與介面等。本課並安排電腦實習來輔助正課重點內容學習。

22452Mechatronics and lab 3,R

This course studies the basic practice of electromechanical system components and structures. It introduces basic control system components and configuration, from feedback control system structure and microprocessor-based control system to components realization such as mechanical system design, power driver circuits design and sensor selection; topics include interface circuits between the mechanics and electronics, operational amplifier design and signal conditioning. computer simulatin lab is provided to assist major topics study.

22755 車銑複合加工實習 1,必

介紹車銑複合加工機的基本構造，操作面盤的功能及使用，加工程式的設計，工作定位夾持，刀具選用及補正操作。經由實際加工，熟練車銑複合加工機的操作，工件尺寸的測量，完成各類工件的精密加工。

22755 CNC Turning and Milling Complex Machines internships 1,R

The fundamental construct of a CNC turning and milling complex Machines tool is introduced. The functions and operations of the control panel, the design of the manually or automatically created program, the positioning and fixture of a workpiece, the selection of tools and modified length or diameter of tools in machining process are practiced. By conducting the operations in CNC turning and milling complex Machines, and learning the measuring methods, most kinds of precision machined components can be achieved.

傳閱附件 3--休閒運動健康系 105 學年度「實用休閒觀光專班」四年制課程規劃案

休閒運動健康系實用休閒觀光專班

(一)教育目標

本系結合運動、休閒、醫療保健、管理及社會等現代科學及實務，培養兼具國際宏觀、理論與實務相互應用之休閒運動管理與保健促進指導專業人才。

1. 休閒產業經營管理專業人才。
2. 健康促進與傷害防護專業人才。
3. 運動指導專業人才。

(二)校定共同必修科目

中文科目名稱 英	學分數	第一學年		第二學年		第三學年		第四學年		備註
		上	下	上	下	上	下	上	下	
通識選項課程 General Education	12	2	2	2	2	2		2		人文學科：2 門 社會科學：2 門 自然與生命科學：1 門 數理與應用科學：1 門
國文 Chinese	4	2	2							國文(閱讀與寫作)(1) 國文(閱讀與寫作)(2)
大一英文 Freshman English	4	2	2							大一英文(1) 大一英文(2)
英語聽講練習 101~102 English Listening & Speaking Practice	2	1	1							英語聽講練習 101 英語聽講練習 102
憲法 Constitution	2				2					
體育 Physical Education	2	1	1							一年級： 大一體育(1)、大一體育(2)
通識教育講座 Lectures on General Education	1									各系依序開課，開課學期不定
外語實務 Foreign Language Proficiency Test	0	0								畢業前修畢 通過標準依「外語實務課程實施要點」規定
合計	27	8	8	2	4	2	0	2	0	

(三) 學院共同必修科目

中 文 科 目 名 稱 英	學 分 數	第一學年		第二學年		第三學年		第四學年		備 註
		上	下	上	下	上	下	上	下	
心理學 Psychology	2	2								
社會學 Sociology	2	2								
電子計算機概論 Introduction to Computers	0			0						
合 計	4	4	0	0	0	0	0	0	0	

(四)專業必修科目

文 科 目 名 稱	學 分 數	第一學年		第二學年		第三學年		第四學年		備 註
		上	下	上	下	上	下	上	下	
休閒遊憩導論 Introduction to Leisure and Recreation	2	2								
人體解剖學 Human Anatomy	2	2								
舞蹈運動與指導 Dance and Guidance	2	2								
戶外遊憩管理 Outdoor Recreation Management	2		2							
觀光學 Introduction to Tourism	2		2							
基礎人體生理學 Human Physiology	2		2							
運動科學導論 Introduction to Sports Science	2		2							
休閒產業經營管理 Leisure Industry Management	2			2						
統計學 Statistics	2			2						
體驗與探索教育 Experiential Education	2			2						
運動生理學與能量代謝 Exercise Physiology and Energy Metabolism	2			2						
急救學與實驗 First Aid and Practicum	2			2						
運動行銷學 Sport Marketing	2				2					
服務與解說實務 Service and Guidance-Skills	2				2					
運動保健學 Principles of Athletic Training	2				2					
體適能測驗與評量 Testing and Assessment in Physical Fitness	2				2					
水上活動與安全指導 Coaching of Water-based Sports and Safety	2				2					
休閒運動職場實務 On job training and practice in leisure and sport businesses	2					2				

文 科 目 名 稱	學 分 數	第一學年		第二學年		第三學年		第四學年		備 註
		上	下	上	下	上	下	上	下	
學術論文寫作方法 Thesis Writing	2					2				
運動心理學 Sport Psychology	2					2				
運動處方 Exercise Prescription	2					2				
應用統計 Applied Statistics	2					2				
休閒運動經營診斷與分析 Analysis and Diagnoses of Recreation Sport Management	2						2			
休閒觀光事件管理 Event Management in Leisure & Tourism	2						2			
休閒產業個案分析 Case Analysis of Leisure Industry	2						2			
身體活動評估實務 Practice for physical activity assessment	2							2		
運動健康實務 Application of Exercise and Health Promotion	2							2		
活動指導實務 Practice of activities directing	2							2		
實務專題(1) Special Projects(1)	2								2	
休閒教育 Leisure Education	2								2	
休閒活動規劃與設計 Curriculum and Activities Design for Recreation Sport	2								2	
合 計	62	6	8	10	10	10	6	6	6	

(五)專業選修科目

文 科 目 名 稱	學 分 數	第一學年		第二學年		第三學年		第四學年		備 註
		上	下	上	下	上	下	上	下	
運動與健康專業英語 English of Sport	2	2								
運動知能與賞析 Sport Relish	2	2								
攀岩運動與指導 Coaching of Sport Climbing	2	2								
海洋觀光 Marine Tourism	2	2								
休閒經濟學 Economy of Leisure	2		2							
生態旅遊 Ecology Traveling	2		2							
運動體能訓練 Sports Conditioning Training	2		2							
徒手肌肉功能測試 Manual muscle testing and function	2		2							
運動醫學概論 Introduction of Sport Medicine	2		2							
有氧舞蹈運動與指導 Aerobic Dance Exercise and Coaching	2		2							
體適能活動與指導 Physical Fitness and Coaching	2		2							
羽球運動與指導 Coaching of Badminton	2		2							
進階攀岩運動與指導 Advanced Coaching of Sport Climbing	2		2							
服務管理 Service Management	2		2							
戶外遊憩領導 Leadership for Outdoor Recreation	2		2							
休閒人力資源管理 Human Resource Management of Leisure	2			2						
領隊與導遊實務 Practice of Leadership and Guidance	2			2						
旅運經營學 Travel Industry Management	2			2						
餐飲服務技術及實習 The Skill of Restaurant Service and Practice	3			3						

文 科 目 名 稱	學 分 數	第一學年		第二學年		第三學年		第四學年		備 註
		上	下	上	下	上	下	上	下	
營養學概論 Basic Nutrition	2			2						
運動推廣概論 Introductions of Promotion Strategies for Exercise	2			2						
社區健康營造 Community Health Building	2			2						
健康管理 Health Promotion and Disease Prevention	2			2						
運動傷害評估學 Recognition & Evaluation of Athletic Injury	2			2						
肌能系貼紮應用 Applications of Kinesio Tape	2			2						
運動傷害防護學與實驗(1) Principle and Practice in Athletic Training (1)	2			2						
進階羽球運動與指導 Advanced Coaching of Badminton	2			2						
桌球運動與指導 Coaching of Table Tennis	2			2						
繩索挑戰安全操作 Safety Practice for Challenge Courses	2			2						
休閒事業行銷研究 Marketing Research for Leisure Industry	2			2						
休閒運動與法規 Recreation Sport and Laws	2				2					
戶外冒險教育 Outdoor Adventure Education	2				2					
遊程設計 Package Tours Management	2				2					
休閒行為 Leisure Behavior	2				2					
營隊籌辦與管理 Organization and Management for Camps	2				2					
野外求生 Outdoor Survival	2				2					
客房管理與實習 House keep and practice	3				3					
健康飲食行為 Diet of Sport Behavior	2				2					
運動治療操作學 Exercise therapy and manipulation	2				2					

文 科 目 名 稱	學 分 數	第一學年		第二學年		第三學年		第四學年		備 註
		上	下	上	下	上	下	上	下	
運動傷害防護學與實驗(2) Principle and Practice in Athletic Training (2)	2				2					
進階桌球運動與指導 Advanced Coaching of Table Tennis	2				2					
網球運動與指導 Coaching of Tennis	2				2					
進階繩索挑戰安全操作 Advanced Safety Practice for Challenge Courses	2				2					
水域遊憩管理 Water Recreation Management	2				2					
個人運動指導 Personal Exercise Trainer	2				2					
高爾夫球運動與指導 Coaching of Golf	2				2					
運動與休閒社會學 Sports Sociology	2					2				
休閒民宿經營與管理 Management of Tourist Home	2					2				
運動與休閒消費行為 Consumer Behavior in Sports and Exercise	2					2				
運動觀光 Sports Tourism	2					2				
休閒與年老 Leisure and Aging	2					2				
國際禮儀與實務 International manners and practice	3					3				
運動復健學 Rehabilitation Techniques in Sport Medicine	2					2				
運動貼紮與實驗 Strap/Bandaging Techniques in Athletic Training	2					2				
銀髮族體適能保健與實務 Elderly Physical Fitness and Health Promotion	2					2				
水域運動 Water Sport	2					2				
運動技術教材教法 Teaching Methods and Materials in Physical Education	2					2				
墊上核心運動與指導 Mat Science	2					2				

文 科 目 名 稱	學 分 數	第一學年		第二學年		第三學年		第四學年		備 註
		上	下	上	下	上	下	上	下	
單車運動與指導 Instruction in Cycle Sports	2					2				
鐵人三項運動與指導 Triathlon Training and Instruction	2					2				
進階水上活動與安全指導 Advanced Coaching of Water-Based Sport and Safety	2					2				
山域運動與指導 Mountaineering	2					2				
運動保健之經營與管理 Management Strategies in Athletic Training	2					2				
運動生物力學 Biomechanics	2					2				
運動科學文獻導讀 The Introduction to Sport Science Papers	2					2				
運動推拿指壓學 Sports/Exercise Massage and Practice	2					2				
運動防護實習(1) Practicum in athletic training (1)	2					2				
瑜珈運動與指導 Coaching of Yoga	2					2				
職場體驗 The Experience of Worksite	2								2	
俱樂部經營與管理 Clubs Management	2								2	
旅遊電子商務 E-commerce on tourism	2								2	
冒險觀光(英文授課) Adventure Tourism	2								2	
運動防護實習(2) Practicum in athletic training (1)	2								2	
進階水域運動 Advanced Water Sport	2								2	
進階高爾夫球運動與指導 Advanced Coaching of Golf	2								2	
進階瑜珈運動與指導 Advanced Coaching of Yoga	2								2	
運動傷害防護儀器之運用 Athletic Training Principles for Therapeutic Modalities	2								2	
進階銀髮族體適能保健與實務 Advanced Elderly Physical Fitness and Health Promotion	2								2	

文 科 目 名 稱	學 分 數	第一學年		第二學年		第三學年		第四學年		備 註
		上	下	上	下	上	下	上	下	
進階墊上核心運動與指導 Advance Mat Science	2								2	
共通核心職能課程 Introduction of Job Capability	2								2	
特殊族群運動指導理論與實務 Exercise in Special Population:from Theory to Practice	2								2	
樂齡運動與健康促進 Aging Exercise and Health Promotion	2								2	
合 計	167	8	22	31	33	45	0	0	28	

觀賞魚科技國際學位專班 碩士班

(一)教育目標

- 1.以水生動物疾病診斷及疫苗研發、育種繁養殖、器材與系統研發、行銷為四大主軸。
- 2.建構全英語教學與學習環境，促進國際學術與師生交流。

(二)必修科目

中 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
專題討論 Seminar	4	1	1	1	1	
觀賞魚研究法 Research Methodology in Ornamental Fish	2	1	1			
碩士論文 Thesis	6			3	3	
合 計	12	2	2	4	4	

(三) 選修科目

中 文 科 目 名 稱 英	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
專題研究(1) Independent Studies 1	1	1				
觀賞魚產業專論 Advanced Topics on Ornamental Fish Industry	2	2				
餌料生物培養技術專論 Advanced Topics on Live Food Culture in Aquaculture	2	2				
養殖環境管理與永續利用專論 Advanced Topics on Sustainable Aquaculture Management	2	2				
水產生物技術應用專論 Advanced Topics on Application of Biotechnology in Aquaculture	2	2				
魚類生殖生理學專論 Advanced Topics on Fish Reproductive Physiology	3	3				
魚類營養學專論 Advanced Topics on Fish Nutrition	2	2				
魚類免疫學專論 Advanced Topics on Fish Immunology	2	2				
無脊椎動物免疫專論 Advanced Topics on Invertebrate Immunology in Aquaculture	2	2				
水生動物生理學專論 Advanced Topics on Animal Physiology in Aquaculture	2	2				
藥理學特論 Advanced Pharmacology	2	2				
傳染病免疫機轉 The mechanisms of host immunity to infectious diseases	2	2				
水生動物疾病學專論 Advanced Topics in Clinical Aquatic Animal Diseases	2	2				
專題研究(2) Independent Studies 2	1		1			
水生植物繁養殖專論 Advanced Topics on Aquatic Plants Cultivation	2		2			

中 文 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
魚類多樣性專論 Advanced Topics on the Diversity of Fishes	3		3			
實驗設計與生統分析 Experimental Designs and Biostatistical Analysis	2		2			
實驗設計與生統分析實習 Experimental Designs and Biostatistical Analysis Lab.	1		1			
水產生物分子育種 Aquatic Organism Molecular Breeding	2		2			
魚病臨床微生物學 Clinical Microbiology for Fish Disease	2		2			
生物電子顯微鏡技術特論 Advanced Bio. Electron Microscopy	2		2			
魚用疫苗學專論 Advanced Topics on Fish Vaccinology	2		2			
分子診斷學專論 Advanced Topics on Molecular Diagnostics	2		2			
魚用診斷試劑開發 Development of Diagnostic Reagents for Fishes	2		2			
水生動物疾病診療實習(1) Aquatic Animal Diseases (I)	1		1			
市場行銷 Marketing Management	2		2			
談判與溝通 Negotiation Strategies and Tactics for Business	2		2			
專題研究(3) Independent Studies 3	1			1		
服務業行銷與管理專論 Service Marketing and Management Seminar	2			2		
魚類分子系統分類學專論 Advanced Topics on Molecular Systematics of Fishes	2			2		
觀賞魚飼料配方與機能性飼料 Diet Formulation and Functional Feed for Ornamental Fishes	2			2		

中 文 科 目 名 稱 英	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
活魚運輸 Live Fish Transportation	2			2		
養殖器材與系統設計專論 Advanced Topics on Facility and System Design for Aquaculture	2			2		
基因轉殖動物專論 Advanced Topics on Animal Transgenesis	2			2		
魚用疫苗開發 Fish Vaccines Development	2			2		
水生動物生產醫學 Aquatic Animal Production Medicine	2			2		
水生動物疾病診療實習(2) Aquatic Animal Diseases (II)	1			1		
國際農業發展趨勢特論 Special Topics on Development Trends of International Agriculture	4			4		
專題研究(4) Independent Studies 4	1				1	
觀賞魚產業實習 Practice in Ornamental Fish Industry	1				1	
觀賞魚產業海外實習 Oversea Practice in Ornamental Fish Industry	1				1	
農業政策與經濟特論 Special Topics on Agriculture Policies and Economics	4				4	
合 計	81	26	26	22	7	

觀賞魚科技國際學位專班 博士班

(一)教育目標

1.以「專業化」、「國際化」、「全人化」為方向，以培育卓越且理論與實務兼備的觀賞魚產業高階專業人才為目標。

(二)必修科目

中 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
專題討論 Seminar	4	1	1	1	1	
專題研究(1) Independent Studies 1	2	2				
專題研究(2) Independent Studies 2	2		2			
博士論文 Dissertation	12			6	6	
合 計	20	3	3	7	7	

(三) 選修科目

中 文 科 目 名 稱 英	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
觀賞魚餌料生物培養技術特論 Special Topics of Live Food Culture in Ornamental Fish	2	2				
養殖環境管理與永續利用特論 Special Topics on Sustainable Aquaculture Management	2	2				
魚類免疫學特論 Special Topics on Fish Immunology	2	2				
傳染病之致病機制 Pathogenesis of Infectious Diseases	2	2				
進階魚用疫苗開發 Advanced Fish Vaccines Development	2	2				
觀賞魚繁殖養殖學特論(1) Special Topics on Ornamental Fish Culture 1	2	2				
水生動物疾病學特論 Special Topic on Clinical Aquatic Animal Diseases	2	2				
觀賞魚飼料配方與機能性飼料特論 Special Topics on Diet Formulation and Functional Feed for Ornamental Fishes	2		2			
觀賞魚繁殖養殖學特論(2) Special Topics on Ornamental Fish Culture 2	2		2			
整合行銷管理專論 Integrated Marketing and Management Seminar	2		2			
基因轉殖動物特論 Special Topics on Animal Transgenesis	2		2			
進階魚用診斷試劑開發 Advanced Development of Diagnostic Reagents for Fishes	2		2			
水生動物生產醫學特論 Aquatic Animal Production Medicine(I)	2		2			
談判與溝通 Negotiation Strategies and Tactics for Business	2		2			
專題研究(3) Independent Studies 3	2			2		
觀賞魚養殖經濟與經營管理 Special Topics on Economics and Management in Ornamental Fish Industry	2			2		

中 文 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
活魚運輸 Live Fish Transportation	2			2		
觀賞魚繁殖學特論(3) Special Topics on Ornamental Fish Culture 3	2			2		
養殖器材與系統設計特論 Special Topics on Facility and System Design for Aquaculture	2			2		
國際農業發展趨勢特論 Special Topics on Development Trends of International Agriculture	4			4		
專題研究(4) Independent Studies 4	2				2	
農業政策與經濟特論 Special Topics on Agriculture Policies and Economics	4				4	
合 計	48	14	14	14	6	

觀賞魚科技國際學位專班 碩士班 課程與核心能力關聯表

【專業必修】									
科目名稱	核心能力項目	水生動物疾病診斷及疫苗研發能力	具備育種繁殖開發能力	具備器材與系統研發能力	具備產業行銷能力	具備國際宏觀知能			
專題討論 Seminar		✓	✓	✓	✓	✓			
觀賞魚研究法 Research Methodology in Ornamental Fish		✓	✓	✓	✓	✓			
碩士論文 Thesis		✓	✓	✓	✓	✓			

觀賞魚科技國際學位專班 碩士班 課程與核心能力關聯表

【專業選修】									
科目名稱	核心能力項目	水生動物疾病診斷及疫苗研發能力	具備育種繁殖開發能力	具備器材與系統研發能力	具備產業行銷能力	具備國際宏觀知能			
專題研究(1) Independent Studies 1		✓	✓	✓	✓				
觀賞魚產業專論 Advanced Topics on Ornamental Fish Industry			✓	✓	✓	✓			
餌料生物培養技術專論 Advanced Topics on Live Food Culture in Aquaculture			✓	✓					
養殖環境管理與永續利用專論 Advanced Topics on Sustainable Aquaculture Management			✓	✓	✓	✓			
水產生物技術應用專論 Advanced Topics on Application of Biotechnology in Aquaculture		✓	✓			✓			
魚類生殖生理學專論 Advanced Topics on Fish Reproductive Physiology			✓	✓					
魚類營養學專論 Advanced Topics on Fish Nutrition			✓	✓					
魚類免疫學專論 Advanced Topics on Fish Immunology		✓							
無脊椎動物免疫專論 Advanced Topics on Invertebrate Immunology in Aquaculture		✓							
水生動物生理學專論 Advanced Topics on Animal Physiology in Aquaculture		✓	✓	✓					
藥理學特論 Advanced Pharmacology		✓	✓						
傳染病免疫機轉 The mechanisms of host immunity to infectious diseases		✓	✓						

【專業選修】									
科目名稱	核心能力項目	水生動物疾病診斷及疫苗研發能力	具備育種繁殖開發能力	具備器材與系統研發能力	具備產業行銷能力	具備國際宏觀知能			
水生動物疾病學專論 Advanced Topics in Clinical Aquatic Animal Diseases	✓	✓	✓						
專題研究(2) Independent Studies 2	✓	✓	✓	✓	✓				
水生植物繁養殖專論 Advanced Topics on Aquatic Plants Cultivation		✓	✓						
魚類多樣性專論 Advanced Topics on the Diversity of Fishes		✓	✓	✓					
實驗設計與生統分析 Experimental Designs and Biostatistical Analysis	✓	✓	✓						
實驗設計與生統分析實習 Experimental Designs and Biostatistical Analysis Lab	✓	✓	✓						
水產生物分子育種 Aquatic Organism Molecular Breeding		✓							
魚病臨床微生物學 Clinical Microbiology for Fish Disease	✓								
生物電子顯微鏡技術特論 Advanced Bio. Electron Microscopy	✓								
魚用疫苗學專論 Advanced Topics on Fish Vaccinology	✓								
分子診斷學專論 Advanced Topics on Molecular Diagnostics	✓								
魚用診斷試劑開發 Development of Diagnostic Reagents for Fishes	✓								
水生動物疾病診療實習(1) Aquatic Animal Diseases(I)	✓								

【專業選修】									
科目名稱	核心能力項目	水生動物疾病診斷及疫苗研發能力	具備育種繁殖開發能力	具備器材與系統研發能力	具備產業行銷能力	具備國際宏觀知能			
市場行銷 Marketing Management				✓	✓				
談判與溝通 Negotiation Strategies and Tactics for Business					✓				
專題研究(3) Independent Studies 3	✓	✓	✓	✓	✓				
服務業行銷與管理專論 Service Marketing and Management Seminar				✓	✓				
魚類分子系統分類學專論 Advanced Topics on Molecular Systematics of Fishes	✓	✓	✓	✓					
觀賞魚飼料配方與機能性飼料 Diet Formulation and Functional Feed for Ornamental Fishes		✓	✓						
活魚運輸 Live Fish Transportation			✓	✓	✓				
養殖器材與系統設計專論 Advanced Topics on Facility and System Design for Aquaculture			✓						
基因轉殖動物專論 Advanced Topics on Animal Transgenesis	✓	✓	✓	✓					
魚用疫苗開發 Fish Vaccines Development	✓								
水生動物生產醫學 Aquatic Animal Production Medicine	✓	✓							
水生動物疾病診療實習(2) Aquatic Animal Diseases (II)	✓								
國際農業發展趨勢特論 Special Topics on Development Trends of International Agriculture					✓				
專題研究(4) Independent Studies 4	✓	✓	✓	✓	✓				

【專業選修】									
科目名稱	核心能力項目	水生動物疾病診斷及疫苗研發能力	具備育種繁殖開發能力	具備器材與系統研發能力	具備產業行銷能力	具備國際宏觀知能			
觀賞魚產業實習 Practice in Ornamental Fish Industry	✓	✓	✓	✓					
觀賞魚產業海外實習 Oversea Practice in Ornamental Fish Industry	✓	✓	✓	✓					
農業政策與經濟特論 Special Topics on Agriculture Policies and Economics					✓				

觀賞魚科技國際學位專班 博士班 課程與核心能力關聯表

【專業必修】									
科目名稱	核心能力項目	水生動物疾病診斷及疫苗研發之創新能力	具備育種繁殖技術研發能力	具備器材與系統新穎性研發創新能力	具備產業行銷拓展能力	具備高度國際宏觀知能			
專題討論 Seminar		✓	✓	✓	✓	✓			
專題研究(1) Independent Studies 1		✓	✓	✓	✓	✓			
專題研究(2) Independent Studies 2		✓	✓	✓	✓	✓			
博士論文 Dissertation		✓	✓	✓	✓	✓			

觀賞魚科技國際學位專班 博士班 課程與核心能力關聯表

【專業選修】									
科目名稱	核心能力項目	水生動物疾病診斷及疫苗研發之創新能力	具備育種繁殖技術研發能力	具備器材與系統新穎性研發創新能力	具備產業行銷拓展能力	具備高度國際宏觀知能			
觀賞魚餌料生物培養技術特論 Special Topics of Live Food Culture in Ornamental Fish		✓	✓						
養殖環境管理與永續利用特論 Special Topics on Sustainable Aquaculture Management		✓	✓	✓	✓				
魚類免疫學特論 Special Topics on Fish Immunology	✓								
傳染病之致病機制 Pathogenesis of Infectious Diseases	✓	✓							
進階魚用疫苗開發 Advanced Fish Vaccines Development	✓								
觀賞魚繁殖學特論(1) Special Topics on Ornamental Fish Culture 1		✓	✓						
水生動物疾病學特論 Special Topic on Clinical Aquatic Animal Diseases	✓								
觀賞魚飼料配方與機能性飼料特論 Special Topics on Diet Formulation and Functional Feed for Ornamental Fishes		✓	✓						
觀賞魚繁殖學特論(2) Special Topics on Ornamental Fish Culture 2		✓	✓						
整合行銷管理專論 Integrated Marketing and Management Seminar				✓	✓				

【專業選修】									
科目名稱	核心能力項目	水生動物疾病診斷及疫苗研發之創新能力	具備育種繁殖技術研發能力	具備器材與系統新穎研發創新能力	具備產業行銷拓展能力	具備高度國際宏觀知能			
基因轉殖動物特論 Special Topics on Animal Transgenesis	✓	✓	✓	✓					
進階魚用診斷試劑開發 Advanced Development of Diagnostic Reagents for Fishes	✓								
水生動物生產醫學特論 Aquatic Animal Production Medicine(I)	✓	✓							
談判與溝通 Negotiation Strategies and Tactics for Business					✓				
專題研究(3) Independent Studies 3	✓	✓	✓	✓	✓				
觀賞魚養殖經濟與經營管理 Special Topics on Economics and Management in Ornamental Fish Industry		✓	✓	✓	✓				
活魚運輸 Live Fish Transportation			✓	✓	✓				
觀賞魚繁殖學特論(3) Special Topics on Ornamental Fish Culture 3		✓	✓						
養殖器材與系統設計特論 Special Topics on Facility and System Design for Aquaculture			✓						
國際農業發展趨勢特論 Special Topics on Development Trends of International Agriculture					✓				
專題研究(4) Independent Studies 4	✓	✓	✓	✓	✓				
農業政策與經濟特論 Special Topics on Agriculture					✓				

【專業選修】									
科目名稱	核心能力項目	水生動物疾病診斷及疫苗研發之創新能力	具備育種繁殖技術研發能力	具備器材與系統新穎研發創新能力	具備產業行銷拓展能力	具備高度國際宏觀知能			
Policies and Economics									

觀賞魚科技國際學位專班 碩士班 課程與核心能力之關聯檢核表

核心能力	能力指標與 核心素養	對應課程	檢核機制
水生動物疾病診斷 及疫苗研發能力	1.提升研究水生動物疾病之能力 2.提升獸醫相關診斷技術及醫療能力 3.提升水生動物疫苗研發能力	專題討論、觀賞魚研究法、碩士論文、專題研究(1)、水產生物技術應用專論、魚類免疫學專論、無脊椎動物免疫專論、水生動物生理學專論、藥理學特論、傳染病免疫機轉、水生動物疾病學專論、專題研究(2)、實驗設計與生統分析、實驗設計與生統分析實習、魚病臨床微生物學、生物電子顯微鏡技術特論、魚用疫苗學專論、分子診斷學專論、魚用診斷試劑開發、水生動物疾病診療實習(1)、專題研究(3)、魚類分子系統分類學專論、基因轉殖動物專論、魚用疫苗開發、水生動物生產醫學、水生動物疾病診療實習(2)、專題研究(4)、觀賞魚產業實習、觀賞魚產業海外實習	1. 期中/期末考。 2. 多元化(評量)：書面報告、口試、分組討論、小考等。
具備育種繁養殖開 發能力	1.具備水產養殖之專業知識。 2.具備水產養殖之技術研發能力。	專題討論、觀賞魚研究法、碩士論文、專題研究(1)、觀賞魚產業專論、餌料生物培養技術專論、養殖環境管理與永續利用專論、水產生物技術應用專論、魚類生殖生理學專論、魚類營養學專論、水生動物生理學專論、藥理學特論、傳染病免疫機轉、水生動物疾病學專論、專題研究(2)、水生植物繁養殖專論、魚類多樣性專論、實驗設計與生統分析、實驗設計與生統分析實習、水產生物分子育種、專題研究(3)、魚類分子系統分類學專論、觀賞魚飼料配方	

觀賞魚科技國際學位專班 碩士班 課程與核心能力之關聯檢核表

核心能力	能力指標與 核心素養	對應課程	檢核機制
		與機能性飼料、基因轉殖動物專論、水生動物生產醫學、專題研究(4)、觀賞魚產業實習、觀賞魚產業海外實習	
具備器材與系統研發能力	1.研發創新能力。 2.問題解決能力。	專題討論、觀賞魚研究法、碩士論文、專題研究(1)、觀賞魚產業專論、餌料生物培養技術專論、養殖環境管理與永續利用專論、魚類生殖生理學專論、魚類營養學專論、水生動物生理學專論、水生動物疾病學專論、專題研究(2)、水生植物繁養殖專論、魚類多樣性專論、實驗設計與生統分析、實驗設計與生統分析實習、專題研究(3)、魚類分子系統分類學專論、觀賞魚飼料配方與機能性飼料、活魚運輸、養殖器材與系統設計專論、基因轉殖動物專論、專題研究(4)、觀賞魚產業實習、觀賞魚產業海外實習	
具備產業行銷能力	1.具備水產生物之行銷能力。 2.具備經營管理能力。	專題討論、觀賞魚研究法、碩士論文、專題研究(1)、觀賞魚產業專論、養殖環境管理與永續利用專論、專題研究(2)、魚類多樣性專論、市場行銷、專題研究(3)、服務業行銷與管理專論、魚類分子系統分類學專論、活魚運輸、基因轉殖動物專	

觀賞魚科技國際學位專班 碩士班 課程與核心能力之關聯檢核表

核心能力	能力指標與 核心素養	對應課程	檢核機制
		論、專題研究(4)、觀賞魚產業實習、觀賞魚產業海外實習	
具備國際宏觀知能	1.瞭解獸醫專業法律知識 2.培養多元思維。 3.具國際觀。	專題討論、觀賞魚研究法、碩士論文、觀賞魚產業專論、養殖環境管理與永續利用專論、水產生物技術應用專論、專題研究(2)、市場行銷、專題研究(3)、服務業行銷與管理專論、活魚運輸、專題研究(4)、談判與溝通、國際農業發展趨勢特論、農業政策與經濟特論	

觀賞魚科技國際學位專班 博士班 課程與核心能力之關聯檢核表

核心能力	能力指標與 核心素養	對應課程	檢核機制
水生動物疾病診斷 及疫苗研發之創新 能力	1.提升研究水生動物疾病之能力 2.提升獸醫相關診斷技術及醫療能力 3.提升水生動物疫苗研發能力	專題討論、專題研究(1)、專題研究(2)、 博士論文、魚類免疫學特論、傳染病之致 病機制、進階魚用疫苗開發、水生動物疾 病學特論、基因轉殖動物特論、進階魚用 診斷試劑開發、水生動物生產醫學特論、 專題研究(3)、專題研究(4)	1. 期中/期末考。 2. 多元化(評量)：書面報 告、口試、分組討論、小 考等。
具備育種繁養殖技 術研發能力	1.具備水產養殖之專業知識。 2.具備水產養殖之技術研發能力。	專題討論、專題研究(1)、專題研究(2)、 博士論文、觀賞魚餌料生物培養技術特 論、養殖環境管理與永續利用特論、傳染 病之致病機制、觀賞魚繁養殖學特論(1)、 觀賞魚飼料配方與機能性飼料特論、觀賞 魚繁養殖學特論(2)、基因轉殖動物特論、 水生動物生產醫學特論、專題研究(3)、觀 賞魚養殖經濟與經營管理、觀賞魚繁養殖 學特論(3)、專題研究(4)	
具備器材與系統新 穎性研發創新能力	1.研發創新能力。 2.問題解決能力。	專題討論、專題研究(1)、專題研究(2)、 博士論文、觀賞魚餌料生物培養技術特 論、養殖環境管理與永續利用特論、觀賞 魚繁養殖學特論(1)、觀賞魚飼料配方與機 能性飼料特論、觀賞魚繁養殖學特論(2)、 基因轉殖動物特論、專題研究(3)、觀賞魚 養殖經濟與經營管理、活魚運輸、觀賞魚 繁養殖學特論(3)、養殖器材與系統設計特	

觀賞魚科技國際學位專班 博士班 課程與核心能力之關聯檢核表

核心能力	能力指標與 核心素養	對應課程	檢核機制
		論、專題研究(4)	
具備產業行銷拓展能力	1.具備水生動物之行銷能力。 2.具備經營管理能力。	專題討論、專題研究(1)、專題研究(2)、博士論文、養殖環境管理與永續利用特論、整合行銷管理專論、基因轉殖動物特論、專題研究(3)、觀賞魚養殖經濟與經營管理、活魚運輸、專題研究(4)	
具備高度國際宏觀知能	1.瞭解獸醫專業法律知識 2.提升法律素養、培養獸醫倫理認知。 3.具國際觀。	專題討論、專題研究(1)、專題研究(2)、博士論文、養殖環境管理與永續利用特論、整合行銷管理專論、專題研究(3)、活魚運輸、專題研究(4)、觀賞魚養殖經濟與經營管理、談判與溝通、國際農業發展趨勢特論、農業政策與經濟特論	

觀賞魚科技國際學位專班 碩士班

International Program in Ornamental Fish Science and Technology

一、必修科目 Required Courses

專題討論**4 必****全部教師**

本課安排一系列演講，部分邀請校外專家，其餘則由研究生擔當。每位研究生於每一學期均須選一與觀賞魚研究或與其論文有關之題目，進行文獻蒐集和閱讀、資料整理、摘要撰寫及口頭發表。評分由本系教師共同評定。

Seminar**4 R****All Teachers**

A Series of lectures will be arranged in this course. Expert researchers will be invited from outside the university to share their experience and knowledge on their respective field. Graduate students are required to select a topic related to recent advances in ornamental fish culture or their thesis research topic in each semester. Each student must reviews the literatures related to their research and present a summary. Their presentations are evaluated by the faculty members.

觀賞魚研究法**2 必**

本課程旨教導學生進行觀賞魚研究之基本技巧。課程內容包括文獻尋找、試驗設計、統計分析及論文寫作。

**Research Methodology
in Ornamental Fish****2 R**

The aim of this course is to teach student the basic techniques for the development of research in ornamental Fish. The contents of this course include literature searching, experimental designing and conducting, data analysis and thesis writing.

碩士論文**6 必****各教師**

每位碩士班研究生選定論文題目，再指導教授指導下進行實驗、研究、依據實驗研究結果完成論文。

Thesis**6 R****All Teachers**

Master's thesis research plan and the summary must be submitted to advisor. This course will introduce graduate students a detailed approaches towards developing their own master thesis. The students will be advised on how to formulate a research question and develop a project description for their master thesis.

二、選修科目 Required Courses

專題研究 1**1 選****全部教師**

本課程主要目標在訓練研究生瞭解實驗設計之基本原理、設計解決觀賞魚研究問題之

實驗、分析實驗資料、熟悉觀賞魚研究之技巧與方法、整理結果以及作成發表報告。

Independent Studies 1

1 S

Faculties

The purpose of this course is to offer knowledge and techniques to graduate students to solve problems faced during research or graduate study.

觀賞魚產業專論

2 選

本課程強調外來與本土觀賞魚的全球貿易和出口潛力。水族館與水質管理的原則包含生物性，機械的和化學性的水過濾系統與照明和通風介紹。並探討了解水族周邊相關產業發展、觀賞魚養殖場的管理、常見疾病及其防治、貿易包裝，運輸和檢疫方法及相關貿易法規等。

Advanced Topics on

2 S

Ornamental Fish Industry

This course emphasizes on the World trade of ornamental fish and export potential, Different varieties of exotic and indigenous fishes. Principles of a balanced aquarium, Water quality management. Water filtration system – biological, mechanical and chemical, Lighting and aeration. Aquarium accessories and decoratives. Aquarium fish feeds. Dry, wet and live feeds. Breeding and rearing of ornamental fishes. Broodstock management. Application of genetics and biotechnology for producing quality strains. Management practices of ornamental fish farms. Common diseases and their control. Conditioning, packing, transport and quarantine methods. Trade regulations and wild life act in relation to ornamental fishes.

餌料生物培養技術專論

2 選

本課程係專門討論近年新研發之載體餌料之培養技術，其中選擇特別之專題，如矽藻眼虫，輪虫，年蝦，水蚤及蛆為主要的討論對象。

Advanced Topics on Live Food 2 S

Culture in Aquaculture

The topics are focused on the new recent developed techniques on the cultivation of living foods as carrier for fisheries from which special terms of living foods are chosen for discussion, such as diatoms, Eugenia, rotifer, brine shrimp, copepod and fly larva, etc.

養殖環境管理與永續利用專論 2 選

本課程對目前世界因養殖活動所造成之各種環境污染作一介紹，同時亦介紹各種環境污染對天然水體，養殖池及養殖產物之影響及對食用者健康之影響，最後介紹各國為防止養殖對環境造成污染及對養殖本身造成污染所做之努力，並說明為維持養殖環境永續經營應做之各種措施，以供學生對養殖永續經營有所瞭解。

Advanced Topics on Sustainable 2 S

Aquaculture Management

This course will introduce the facts of the pollution problems caused by aquaculture activities around the world, also will introduce how the environmental pollutions will infest the natural waters and fish ponds, and how it will threaten the human health if consume the contaminated aquaculture products as food. Finally will introduce how to establish a sustainable aquaculture business and an environmental friendly fish farm.

水產生物技術應用專論

2 選

本課程旨在探討水產生物技術在生物資訊、重組 DNA、蛋白質的生產和免疫診斷測試的發展，尤其注重於養殖相關品種和問題。重點是旨在使學生能在廣泛的領域具應用生物技術的實踐

經驗。

Advanced Topics on Application 2 S of Biotechnology in Aquaculture

The aim of the Aquaculture Biotechnology is to provide in-depth training in bioinformatics, recombinant DNA, protein production, and development of immunodiagnostic tests with a particular focus on species and issues with relevance to aquaculture. The emphasis is on hands-on experience designed to equip students with the confidence of applying biotechnology in a wide range of areas.

魚類生殖生理學專論 3 選

介紹魚類生殖型態特性、生殖週期、生殖細胞之發育成熟過程及調控機制等基礎理論、全盤深入討論，並應用於人工操控促進性腺發育成熟、產卵受精及繁殖技術之開發、並探討性分化，性別控制以及品種改良等理論與應用之課題。

Advanced Topics on Fish 3 S Reproductive Physiology

Introduction and discussion on the reproductive biology and physiology of teleosts, including mode and characteristics of fish reproduction, reproductive periodicity, and fundamentals of oocyte growth and maturation and the controlled mechanisms involved in the processes. Applications of the fundamental knowledge in the reproductive physiology for the technology development for the manipulation of ovarian development and growth and further control of spawning aimed for hatchery technology development and refinement, will be emphasized. In addition, sex differentiation and control, and the theory and applications of stock improvements are also discussed.

魚類營養學專論 2 選

主要內容為探討魚類與甲殼類之營養需求，包括營養素之種類包括蛋白質、脂肪、維生素與礦物質等、營養素之消化與代謝、非營養素之干擾、營養素之各別需求量及飼料之組成要件等，逐一討論。

Advanced Topics on 2 S Fish Nutrition

Overall introduction and discussions on the fish or krill nutrition requirement, including nutrients (protein, lipid, vitamin and mineral), digestion and metabolism, nonnutrition diet components and feed formulation.

魚類免疫學專論 2 選

本課程著重講解魚類免疫學概念與原理及其應用，主要包含免疫反應之生物學理論、免疫對抵抗傳染病之重要性及由免疫現象引起之免疫疾病等三大項目。

Advanced Topics on 2 S Fish Immunology

The main objective of this course is to provide detailed knowledge on the recent advances in fish and shellfish immunology. The following topics will be discussed:

- [1] Basic Principles & Overview of Immunity;
- [2] Cardinal signs of immune system.
- [3] Cellular Interactions in the Immune System;
- [4] Mucosal Immunity;
- [5] Evasion of the Immune Response by Pathogens.
- [6] T Cell Activation and differentiation; B Cell Activation and differentiation;

[7]Antigen Processing and Presentation.

[8]Classical and alternate Pathway of Complement and their regulation.

無脊椎動物免疫專論 2 選

本課程之目的是教導學生了解甲殼類及貝類免疫機制及內外環境因子對甲殼類免疫機制的影響。其內容包括：甲殼類免疫系統、貝類免疫系統、無脊椎動物免疫調節。

Advanced Topics on Invertebrate Immunology in Aquaculture 2 S

The purposes of this course are teaching graduate students about immune mechanism of crustacean and molluscs, and the effects of intrinsic and extrinsic environmental factors to immune mechanism in crustacean. It will include 1) immune system of crustacean, 2) immune system of molluscs, 3) modulation of immunity in invertebrate.

水生動物生理學專論 2 選

本課程介紹水產動物之主要生理作用，並以特定主題檢索蒐集最新之學術資料進行研討，使學生了解該領域之最新知識進展，並掌握相關研究技術方法。

Advanced Topics on Animal Physiology in Aquaculture 2 S

This course teaches on the fundamental principles and mechanisms that govern body functions in animals, with an emphasis on the molecular aspects. The class focuses on the fish physiology and environmental adaptation. We will discuss about environmental adaptation of animal and compare each other. Water as a biological medium, Gas exchange, Circulation, Excretion, Osmoregulation. Reproductive physiology, Muscle physiology, Sense organs, Energy and nutrient status of food, Nitrogen balance, Standard and active metabolism, Energy utilization, Effect of environmental factors on physiology of fin and shellfishes, Stress related physiology changes, Structure and functions of important endocrine glands.

藥理學特論 2 選 蔡清恩

本課程主要以細胞及分子的領域為基礎，介紹最近的研究結果，例如藥物作用的感受體型式、信息傳遞途徑，中樞及自主神經的藥理，炎症、過敏、血小板功能以及化學療法等新知。

Advanced Pharmacology 2 S C. E. Tsai

The purpose of this course is to introduce the recent research information of pharmacology in cellular and molecular level. They include receptor types, signal transduction pathways, CNS and autonomic pharmacology, pharmacology of inflammation, allergy and platelet function and chemotherapeutic approaches.

傳染病免疫機轉 2 選

本課程旨在講述病毒、細菌、原蟲、蠕蟲對宿主所引起之免疫反應及宿主對上述之免疫防禦機轉。病原體如何逃避宿主免疫系統之辨認、攻擊之策略。由此瞭解病原體之免疫學之特性，以茲提供傳染病防治之道。

The mechanisms of host immunity to infectious diseases 2 S

The host immunity to pathogens, including virus, bacteria, protozoa and helminthes as well, are concerned. Particularly, the mechanism of immunological defense of host cells against an attack due to

adhesion, invasion and damages by pathogens. In view of immunopathology, the strategies of escape mechanisms performed by pathogens will be discussed in this course, so that the prevention from infectious disease will be mentioned also.

水生動物疾病學專論 2 選

本課程講述較深入的水生動物疾病知識尤其著重於發生於臺灣的疾病。內容包括個別疾病之致病因子、致病機序及控制方法。本課程亦介紹最新的水生動物疾病診斷及控制技術，如分子診斷技術、DNA 疫苗、新的生物製劑及增進群體健康的新方法等。

Advanced Topics in Clinical Aquatic Animal Diseases 2 S

This course is to understand the life cycle of pathogens and mechanisms of survival in host cells and diseases in aquaculture, how to enumerate micro-organisms, methodologies to prevent and cure microbial diseases and to handle, manipulate and sampling fish.

專題研究 2 1 選 全部教師

本課程主要目標在訓練研究生瞭解實驗設計之基本原理、設計解決觀賞魚研究問題之實驗、分析實驗資料、熟悉觀賞魚研究之技巧與方法、整理結果以及作成發表報告。

Independent Studies 2 1 S Faculties

The purpose of this course is to offer knowledge and techniques to graduate students to solve problems faced during research or graduate study.

水生植物繁養殖專論 2 選

本課程介紹水生植物生物學，並將就不同之水生植物繁養方面之技術問題作深入探討。

Advanced Topics on Aquatic Plants Cultivation 2 S

This course introduce on aquatic plant biology, the useful of aquatic plants, Grouping of Aquatic Plants on the basis of natural habitat ecology, the aquarium plants, and the aquarium plant propagation, aquarium plant cultivation.

魚類多樣性專論 3 選

現今超過 25000 種魚類存活於世界上，本課程主要以討論的方式進行。所有的討論主題包括魚類分的進展過程，魚體型態與功能，個體發生學，早期生活史，分類，親緣關係，演化，動物地理學，棲地，行為，生態。

Advanced Topics on the Diversity of Fishes 3 S

More than 25,000 species of fishes are alive at present. This course is designed as a discussion. All topics contain systematic procedures of fishes, form and function, ontogeny, early life history, taxonomy, phylogeny, evolution, zoogeography, habitats, adaptations, behavior, and ecology.

實驗設計與生統分析 2 選

本課程係教導研究生生統之實驗設計之基礎理論及方法，其內容有變方分析、均質性分析、資料

轉換、完全隨機設計、隨機區集設計、拉丁方格設計、二因子設計、迴歸與相關性分析等。

Experimental Designs and Biostatistical Analysis 2 S

This course trains graduate students with theory and method of biostatistics experimental designs which includes analysis of variance, homogeneous and, regression and correlation data transform, and completely randomized, randomized block, Latin square and two factorial design.

實驗設計與生統分析實習 1 選

本課程係配合正課教導研究生如何使用電腦應用軟體(SAS)，內容涵蓋變方分析、均質性分析、資料轉換、完全隨機設計、隨機區集設計、拉丁方格設計、二因子設計、迴歸與相關性分析等。

Experimental Designs and Biostatistical Analysis Lab. 1 S

This Lab. trains graduate students how to use SAS computer software on the analysis of variance, homogeneous and, regression and correlation data transform, and completely randomized, randomized block, Latin square and two factorial design.

水產生物分子育種 2 選

本課程介紹基礎的遺傳學、育種學和常使用的育種生物技術，以及利用分子檢測技術，進行育種或改良性狀，建立各種優良性狀品種、品系，輔助傳統育種之方法。

Aquatic Organism Molecular Breeding 2 S

The goal of this course is to provide introduction on Material Basis of Heredity and Cytogenetics of Fish Reproduction, Inheritance of Quantitative Morphological Traits in Fishes, Inheritance of Quantitative Traits in Fish Biochemical and Molecular (DNA) Genetic markers, Selective Breeding and Hybridization, Chromosome Set Manipulation and Sex Control in Aquaculture, Gene Engineering and Genomics.

魚病臨床微生物學 2 選 **陳石柱**

本課程講授水產動物之各種病原性微生物 (包括細菌、黴菌、病毒等) 之分類、形態、培養、生化特性及其病原性，並強調各種實用、有效且快速之分離鑑定系統及分子生物學等之診斷應用。

Clinical Microbiology for Fish Disease 2 S **S. C. Chen**

This course help to understand the theoretical and practical framework for clinical microbiology in the field of aquatic animal health. It encompasses: (1). accurate history, (2). collection, transportation and preservation of pathogens and specimens, (3). safety protection for working in the microbiological laboratories, (4). isolation of various pathogens, such as bacteria, fungi and viruses, (5). rapid and accurate identification by utilizing morphological, biochemical, immunological and molecular biological methods, (6). antimicrobial sensitivity tests for drug therapy.

生物電子顯微鏡技術特論 2 選 **陳瑞雄**

介紹電子顯微鏡標本的前處理法、超薄切片法、染色法、電子顯微鏡操作法、暗房技術等，並配

合實際操作，使學理和實務得以互為印證。

Advanced Bio. Electron

2 S

R. S. Chern

Microscopy

The content of this course includes the specimen preparation, ultramicrotomy, specimen staining, preparing the electron microscope for use, darkroom techniques. It was emphasized on mainstream methods in the hope that the forest will be seen and the trees ignored, at least for the time being.

魚用疫苗學專論

2 選

本課程主要教導學生各種水生動物之免疫學及各種水生動物用疫苗的製造技術。其內容包括水生動物免疫學器官之組織細胞、特異性及非特異性免疫系統、免疫系統之自然發生及免疫調節、水生動物用疫苗的製造方法等。

Advanced Topics on Fish

2 S

Vaccinology

The objective of this course is to learn the concepts of vaccination and the latest trends in fish vaccination. Following units will be introduced:

1. General principles of vaccination and vaccination strategies in aquaculture. Influence of environmental parameters on vaccination.
2. Types of vaccines- killed, live attenuated, synthetic peptide, recombinant, anti-idiotypic, DNA and RNAi based vaccines. Monovalent and polyvalent vaccines. Nanoparticle based vaccines.
3. Vaccine production, quality control, vaccine composition, adjuvants and immunostimulants.
4. Immunization against bacterial, viral pathogens and parasites.
5. Vaccination failure and adverse effects of vaccination.

分子診斷學專論

2 選

柯冠銘

本課程將介紹分子生物技術運用於魚類病原微生物檢測，包含聚合酶鏈鎖反應、即時定量聚合酶鏈鎖反應，內容包含診斷系統建立、引子設計、探針設計、溫度條件設定、診斷結果分析及診斷品管。

Advanced Topics on Molecular

2 S

Guan-Ming Ke

Diagnostics

This class applies molecular diagnostic techniques such as PCR and real time-PCR to the detection of microorganisms of aquatic animals. Contents encompass establishing diagnostic procedures, primer design, probe design, temperature determination, results analysis and quality assurance.

魚用診斷試劑開發

2 選

本課程的目的是魚用診斷試劑開發，課程內容包括各種魚類疫苗、血清、診斷抗原的準備、各種血清學診斷等。

Development of Diagnostic

2 S

Reagents for Fishes

The purpose of this course is to teach the contents includes preparation of various fish vaccines, sera, diagnostic antigens, various serological diagnosis etc..

水生動物疾病診療實習(1) 1 選

本課程講解及實際操作各種水生動物病原(包括細菌、病毒、黴菌及寄生蟲等)之分離, 鑑定及其他水生動物疾病診斷技術。本課程亦包括水生動物疾病之預防與治療及魚類免疫學診斷技術之應用。

Aquatic Animal Diseases(I) 1 S

This course is designed as an elective clinical block rotation in field services. Students electing this course should have successfully completed the two theoretical/laboratory courses in special species, providing the foundation for participation in this course. It is the only clinical course offering hands-on experience with medical care to aquatic species.

市場行銷 2 選 廖世義

本課程主要在教導學生有關行銷功能的基本概念、理論及技術，以作為進階行銷課程的基礎。其主要授課內容包括：行銷之重要角色、服務與價值以建立顧客之滿意、行銷管理程序與行銷規劃、行銷資訊系統與行銷研究、分析行銷環境、消費者市場及其購買行為、產業與競爭者分析、市場之衡量與預測、市場之區隔與目標市場之選擇、差異化與市場定位之行銷策略、新產品之發展、測試與上市、產品生命週期行銷策略、全球性行銷策略、產品線、品牌與包裝之決策與管理、服務業與輔助性服務之管理、定價決策、行銷通路決策、零售、批發與實價分配系統之管理、行銷溝通與公共關係、與數位經濟下有關的網路行銷、電子商務與線上行為議題。

Marketing Management 2 S Shu-Yi Laiw

This course is designed to meet the needs of students who wish to understand the basic concepts and techniques of marketing as a foundation for more advanced marketing courses. The major subjects of this course will include as followings: Defining marketing, Adapting marketing to the new economy, Building customer satisfaction, value, and retention, Winning markets through market-oriented strategic planning, Gathering information and measuring market demand, Scanning the marketing environment, Analyzing consumer markets and buyer behavior, Analyzing business markets and business buying behavior, Dealing with the competition, Identifying market segment and selecting target markets, Positioning and differentiating the market offering through the product life cycle, Developing new market offerings, Designing global market offerings, Developing price strategies and programs, designing and managing value networks and marketing channels, Managing retailing, wholesaling, and market logistics, Managing integrated marketing communications, Managing the total marketing effort. And, some special issues under digital economics environment, they include internet marketing, electronic commerce and online consumer behavior etc.

談判與溝通 2 選

本課程之目的，在於透過與商務談判有關的各項概念、程序、策略、與論理等事項的教學與演練，引領學員能夠習得談判的正確觀念與技巧及國際案例之剖析。

Negotiation Strategies and Tactics for Business 2S

The course employs instructions, discussions, and case studies to examine the concepts, processes, strategies, and ethical issues related to business negotiation.

專題研究 3 1 選 全部教師

本課程主要目標在訓練研究生瞭解實驗設計之基本原理、設計解決觀賞魚研究問題之實驗、分析實驗資料、熟悉觀賞魚研究之技巧與方法、整理結果以及作成發表報告。

Independent Studies 3

1 S

Faculties

The purpose of this course is to offer knowledge and techniques to graduate students to solve problems faced during research or graduate study.

服務業行銷與管理專論

2 選

王韻

本課程之目的在於傳授學生服務業行銷理念與分析消費者市場能力。其主要內容包括瞭解服務業行銷管理 7P：產品、價格、通路、廣告、實體環境、購物流程與消費者市場；分析市場競爭者與瞭解目標消費者行為。另外會閱讀相關主題的國際期刊以增加學生專業能力！

Service Marketing and Management Seminar

2 S

Yun Wang

This course is to teach students the concepts of service marketing and analyze consumer behavior. Its contents include: understanding 7P of service marketing management; analyzing marketing opportunities by understand competitors and consumer behavior. In addition, the course will read some articles to improve students' capability of service marketing and consumer behavior.

魚類分子系統分類學專論

2 選

本課程提供物種鑑定或系統分類方面的專業知識及新的方法，所有上課的內容包括魚類演化的研究中所使用的分子及外部形態，魚類粒線體 DNA 鹼基的取代，粒線體 DNA 細胞色素 b 基因建構魚類間親緣關係，使用細胞核 DNA 當作遺傳標誌建構魚類的親緣關係，主要組織相容複合物在魚類建構親緣關係的研究。

Advanced Topics on Molecular Systematics of Fishes

2 S

This course supplies the specific knowledge and new methods at many taxonomic and systematic levels. All contents include molecular and morphology in studies of fish evolution, base substitution in fish mitochondrial DNA, the phylogenetic utility of the mitochondrial cytochrome b gene among fishes, reconstruction of phylogeny using nuclear DNA markers, major histocompatibility complex genes in the study of fish phylogeny.

觀賞魚飼料配方與機能性飼料

2 選

本課程探討水產養殖動物所需營養物質之需要量及其功能與各種型態水族飼料之營養成份及特性，並介紹最新的飼料製作技術與製程。提供有關飼料原料成分分析測定的實用知識與水分，粗蛋白，粗脂肪，粗纖維，灰分等測定的實用知識。人工飼料原料包含 (A) 標準的魚飼料，(B) 魚飼料中的消化酵素，(C)。魚飼料中的，(D)。魚飼料中的植酸酶。

Diet Formulation and Functional Feed for Ornamental Fishes

2 S

This course provide a practical knowledge on proximate composition analysis of feed ingredients and prepared feeds for determination of moisture, crude protein, crude fat, crude fiber, ash, Preparation of artificial feeds using locally available feed ingredients (a). Standard fish feeds, (b). Digestive Enzyme based fish feeds, (c). Carotenoid based fish feeds, (d). Phytase based fish feeds, Determination of sinking rate and stability of formulated feeds, Determination of storage effect on feed quality (a). Protein associated changes, (b). Fat associated changes, Students Project Work: Testing and evaluation of formulated fish feeds on fish growth and survive.

活魚運輸

2 選

本課程介紹學生有關封閉式或開放式活魚運輸的原則與主要影響因子，以及運輸過程中利用化學方法對水和魚進行處理，包含使用鎮靜劑，可作為氧來源之化學藥物，抑菌性化學藥品和氨的控制。

Live Fish Transportation

2 S

This course introduces students on the main factors and principles associated with fish transport, closed and open systems of fish transport, and chemical methods for water and fish treatment during transport, use of tranquilizers, chemicals as oxygen sources, bacteriostatic chemicals, and ammonia control.

養殖器材與系統設計專論

2 選

本課程為學生提供水族相關器材設備的相關理論與並訓練學生具備實做的能力。學生們將熟悉水族相關的養殖系統及系統本身對水質管理的設計與實用性加以改進之能力。

Advanced Topics on Facility and System Design for Aquaculture

2 S

The course will provide students with an advanced theoretical and practical capacity to design construct and maintain systems for culturing aquatic animals. Students will become familiar with the requirements of aquatic animals in culture systems, the systems themselves, management of water quality within these systems, feeding practices within the aquaculture industry and industry placement. At the completion of this topic, students will be expected to demonstrate their ability in the areas of understanding design and management of aquatic animal production systems, know where to search for suppliers of equipment and stock, and be able to critically analyse peer-reviewed and non-peer-reviewed literature in this area.

基因轉殖動物專論

2 選

本課程旨在介紹動物基因轉移技術的最新發展概況，包括顯微注射法，精子載體法，胚胎幹細胞，體細胞核移植法，反轉錄病毒載體法等技術。這些新的轉基因技術可以提供一個用於開發新品種觀賞魚的平台。

Advanced Topics on Animal Transgenesis

2 S

The purpose of this course is to introduce the recent developments in animal gene transfer techniques, including microinjection method, sperm vector method, Embryonic stem cell, somatic cell nuclear transplantation method, retroviral vector method, germ line stem cell mediated method to improve

efficiency, gene targeting to improve accuracy, RNA interference-mediated gene silencing technology, zinc-finger nucleases–gene targeting technique and induced pluripotent stem cell technology. These new transgenic techniques can provide a better platform to develop transgenic animals for breeding new animal varieties, and promote the development of livestock production, and other fields.

魚用疫苗開發

2 選

本課程的目的是教魚類疫苗的生產技術。課程內容包括各種魚類疫苗的準備，在法律許可的疫苗應用程序，法制化的實驗等。

Fish Vaccines Development

2 S

The purpose of this course is to understand the recent production techniques for fish vaccines. Course contents include the preparation of various types of fish vaccines, application procedure for the legal approval vaccines, legalization experiments, biosafety and regulatory requirements for fish vaccines etc.

水生動物生產醫學

2 選

本學程修業科目之講授內容主要目標為奠定面對現場所需具備的專業知識基礎。強調健康和生產關係，結合疾病診斷與預防理念。

Aquatic Animal Production

2 S

Medicine

This course will emphasize on the integration of veterinary medicine with nutrition, genetics, economics, food safety, and other disciplines which can enable graduate students to acquire and use a broad knowledge base to support the health and improve the production and efficiency of the food supply chain.

水生動物疾病診療實習(2)

1 選

本課程講解及實際操作各種水生動物病原(包括細菌、病毒、黴菌及寄生蟲等)之分離,鑑定及其他水生動物疾病診斷技術。本課程亦包括水生動物疾病之預防與治療及魚類免疫學診斷技術之應用。

Aquatic Animal Diseases (II)

1 S

This course is designed as an elective clinical block rotation in field services. Students electing this course should have successfully completed the two theoretical/laboratory courses in special species, providing the foundation for participation in this course. It is the only clinical course offering hands-on experience with medical care to aquatic species.

國際農業發展趨勢特論

4 選

本課程將介紹農業政策和經濟,其主題包括經濟政策、農業發展、當前農業問題與政策、農地政策、農田水利政策、農產運銷、農業金融、農民組織、農業推廣、農業科技、加入 WTO 對農業之影響及其因應對策。

Special Topics on Developmenting

4 S

Trends of International Agriculture

This course is to introduce agricultural policies and economics in Taiwan. Its contents include: policies on economics, agricultural development, current problems and policies on agriculture, policies on farmland, policies on irrigation, marketing of agricultural products, agricultural finance, farmers' organizations, agricultural extension, agricultural technology, and impacts and responses of Taiwan's agriculture after its accession to WTO.

專題研究 4

1 選

全部教師

本課程主要目標在訓練研究生瞭解實驗設計之基本原理、設計解決觀賞魚研究問題之實驗、分析實驗資料、熟悉觀賞魚研究之技巧與方法、整理結果以及作成發表報告。

Independent Studies 4

1 S

Faculties

The purpose of this course is to offer knowledge and techniques to graduate students to solve problems faced during research or graduate study.

觀賞魚產業實習

1 選

本課程提供學生有機會至觀賞魚相關產業進行實務操作，以提升學生之實務經驗及技能，達到學理及實務並重之目的，並可使學生提早瞭解產業脈動，做為就業前之準備。

Practice in Ornamental Fish

1 S

Industry

This course provides hands on training on Identification of common ornamental fishes and plants, Fabrication of all-glass aquarium, Setting-up and maintenance, Aquarium accessories and equipment's, Conditioning and packing of ornamental fishes, Preparation of feed, Setting-up of breeding tank for live bearers, barbs, goldfish, tetras, cichlids, gourami's, fighters and catfishes, Identification of ornamental fish diseases and prophylactic measures.

觀賞魚產業海外實習

1 選

本課程提供學生有機會前往海外觀賞魚相關產業進行觀摩與實習，在當中除了獲得實務經驗及技能外，更能樹立信心，積累經驗和領導能力。

Oversea Practice in Ornamental

1 S

Fish Industry

The purpose of this course is to provide students an opportunity to gain experience and acquire skills in a wide variety of ornamental fish rearing and practice, Discover thousands of opportunities, build your confidence, gain experience and leadership capabilities.

農業政策與經濟特論

4 選

本課程的目的是讓學生得知當前最近的國際農業發展情形，同時協助學生建立最新的世界，糧食生產及消費之世界觀。本課程之內容包括：(1)世界糧食供應情形，(2)世界穀類之貿易，(3)世界的肉類生產，(4)世界肥料之生產及消耗，(5)非洲的糧食供應現況，(6)世界不同國家人口別的糧食供應情形，(7)非洲的農藥改進，(8)針對第三世界糧食生產不足之解決方法。

Special Topics on Agriculture 4 S**Policies and Economics**

This course is to introduce the latest development of international agriculture and to help students acquire the updated global views on agricultural production. Its contents include: crop and food supply situations in the world, cereal in the world trade, global meat production, global fertilizer supply and consumption, food supply situation and crop prospects in sub-Saharan Africa and other countries, agricultural reform in Africa, and causes and solutions of under-nutrition in the third world.

觀賞魚科技國際學位專班 博士班

International Program in Ornamental Fish Science and Technology

一、必修科目 Required Courses**專題討論****4 必****全部教師**

本課安排一系列演講，部分邀請校外專家，其餘則由研究生擔當。每位博士生於每一學期均須選一與觀賞魚研究或與其論文有關之題目，進行文獻蒐集和閱讀、資料整理、摘要撰寫及口頭發表。評分由本系教師共同評定。

Seminar**4 R****All Teachers**

A Series of lectures will be arranged in this course. Expert researchers will be invited from outside the university to share their experience and knowledge on their respective field. Graduate students are required to select a topic related to recent advances in ornamental fish culture or their thesis research topic in each semester. Each student must reviews the literatures related to their research and present a summary. Their presentations are evaluated by the faculty members.

專題研究 1**2 必****全部教師**

本課程主要目標在訓練博士生瞭解實驗設計之基本原理、設計解決觀賞魚研究問題之實驗、分析實驗資料、熟悉觀賞魚研究之技巧與方法、整理結果以及作成發表報告。

Independent Studies 1**2 R****Faculties**

The purpose of this course is to offer knowledge and techniques to graduate students to solve problems faced during research or graduate study.

專題研究 2**2 必****全部教師**

本課程主要目標在訓練博士生瞭解實驗設計之基本原理、設計解決觀賞魚研究問題之實驗、分析實驗資料、熟悉觀賞魚研究之技巧與方法、整理結果以及作成發表報告。

Independent Studies 2**2 R****Faculties**

The purpose of this course is to offer knowledge and techniques to graduate students to solve problems faced during research or graduate study.

博士論文**1 2 必****各教師**

每位博士班研究生選定論文題目，再指導教授指導下進行實驗、研究、依據實驗研究結果完成論文。

Dissertation**1 2 R****All Teachers**

PhD thesis research plan and the summary must be submitted to advisor. This course will introduce graduate students a detailed approaches towards developing their own master thesis. The students will be advised on how to formulate a research question and develop a project description for their PhD thesis.

二、選修科目 Required Courses**觀賞魚餌料生物培養技術特論 2 選**

本課程將著重在水產餌料生物之培養技術及相關研究方法的討論。此外，餌料生物的營養及其營養改善的技術也將在本課程中進行分析討論。

**Special Topics of Live Food
Culture in Ornamental Fish****2 S**

This course will discuss the recent developments in culture of micro-algae, Rotifers, Artemia, Zooplankton, Cladocerans, Nematodes, Tubifex and Trochophora larvae. Enrichment of live food organisms.

養殖環境管理與永續利用特論 2 選

本課程對目前世界因養殖活動所造成之各種環境污染作一介紹，同時亦介紹各種環境污染對天然水體，養殖池及養殖產物之影響及對食用者健康之影響，最後介紹各國為防止養殖對環境造成污染及對養殖本身造成污染所做之努力，並說明為維持養殖環境永續經營應做之各種措施，以供學生對養殖永續經營有所瞭解。

**Special Topics on Sustainable
Aquaculture Management****2 S**

This course will introduce the facts of the pollution problems caused by aquaculture activities around the world, also will introduce how the environmental pollutions will infest the natural waters and fish ponds, and how it will threaten the human health if consume the contaminated aquaculture products as food. Finally will introduce how to establish a sustainable aquaculture business and an environmental friendly fish farm.

魚類免疫學特論**2 選**

本課程著重講解魚類免疫學概念與原理及其應用，主要包含免疫反應之生物學理論、免疫對抵抗傳染病之重要性及由免疫現象引起之免疫疾病等三大項目。

**Special Topics on Fish
Immunology****2 S**

The main objective of this course is to provide detailed knowledge on the recent advances in fish and shellfish immunology. The following topics will be discussed:

- [1]Basic Principles & Overview of Immunity;
- [2]Cardinal signs of immune system.
- [3]Cellular Interactions in the Immune System;
- [4]Mucosal Immunity;
- [5]Evasion of the Immune Response by Pathogens.
- [6]T Cell Activation and differentiation; B Cell Activation and differentiation;
- [7]Antigen Processing and Presentation.
- [8]Classical and alternate Pathway of Complement and their regulation.

傳染病之致病機制 2 選

本課程旨在講述宿主對不同病原的免疫防禦機轉以及病原如何對抗宿主的防禦機制。內容包括宿主對病原體所引起之免疫反應、病原體如何逃避宿主免疫系統之辨認及攻擊以及應用病原體之免疫學特性作為進行傳染病之防治。

Pathogenesis of Infectious Diseases 2 S

This course will provide a foundation in the biology of micro-organisms, infection and interaction with their hosts, an overview of the immune system and host response to pathogenic virulence factors – response to intracellular and extracellular pathogens, cytokines, interleukins, antibodies and other immunological molecules, and disease development process if the host fails to effectively deal with infection.

進階魚用疫苗開發 2 選

本課程將針對外來抗原的免疫反應機制和免疫系統進行討論。包括 1) 水生動物的免疫系統。2) 非特異性免疫系統。3) 特異性免疫系統。4) 免疫系統自然變化。5) 影響魚類健康的環境因素。6) 免疫調節。7) 水生動物的疫苗製備。8) 水生動物的疫苗的應用。

Advanced Fish Vaccines Development 2 S

The objective of this course is to learn the concepts of vaccination and the latest trends in fish vaccination. Following units will be introduced:

- 1)General principles of vaccination and vaccination strategies in aquaculture. Influence of environmental parameters on vaccination.
- 2)Types of vaccines- killed, live attenuated, synthetic peptide, recombinant, anti-idiotypic, DNA and RNAi based vaccines. Monovalent and polyvalent vaccines. Nanoparticle based vaccines.
- 3)Vaccine production, quality control, vaccine composition, adjuvants and immunostimulants.
- 4)Immunization against bacterial, viral pathogens and parasites.
- 5)Vaccination failure and adverse effects of vaccination.

觀賞魚繁殖學特論 1 2 選

本課程內容主要為經由國際知名學術期刊探討淡、海水觀賞魚繁殖技術、貿易及其與生態保育相關之課題。

Special Topics on Ornamental Fish Culture 1 2 S

This lecture selects and reads those papers published on academic journal, particularly on the hatchery, aquaculture and trade of freshwater and marine ornamental fish and the associated issues on ecological conservation.

水生動物疾病學特論 2 選

本課程講述較深入的水生動物疾病知識尤其著重於發生於臺灣的疾病。內容包括個別疾病之致病因子、致病機序及控制方法。本課程亦介紹最新的水生動物疾病診斷及控制技術，如分子診斷技術、DNA 疫苗、新的生物製劑及增進群體健康的新方法等。

Special Topic on Clinical Aquatic animal Diseases 2 S

This course is to understand the life cycle of pathogens and mechanisms of survival in host cells and diseases in aquaculture, how to enumerate micro-organisms, methodologies to prevent and cure microbial diseases and to handle, manipulate and sampling fish.

觀賞魚飼料配方與機能性飼料特論 2 選

本課程探討水產養殖動物所需營養物質之需要量及其功能與各種型態水族飼料之營養成份及特性，並介紹最新的飼料製作技術與製程。提供有關飼料原料成分分析測定的實用知識與水分，粗蛋白，粗脂肪，粗纖維，灰分等測定的實用知識。人工飼料原料包含 (A) 標準的魚飼料 (B) 魚飼料中的消化酵素 (C) 魚飼料中的 (D) 魚飼料中的植酸酶。

Special Topics on Diet Formulation and Functional Feed for Ornamental Fishes 2 S

This course provide a practical knowledge on proximate composition analysis of feed ingredients and prepared feeds for determination of moisture, crude protein, crude fat, crude fiber, ash, Preparation of artificial feeds using locally available feed ingredients (a). Standard fish feeds, (b). Digestive Enzyme based fish feeds, (c). Carotenoid based fish feeds, (d). Phytase based fish feeds, Determination of sinking rate and stability of formulated feeds, Determination of storage effect on feed quality (a). Protein associated changes, (b). Fat associated changes, Students Project Work: Testing and evaluation of formulated fish feeds on fish growth and survive.

觀賞魚繁殖學特論 2 選

本課程內容主要為經由國際知名學術期刊探討淡、海水觀賞魚繁殖技術、貿易及其與生態保育相關之課題。

Special Topics on Ornamental Fish Culture 2 2 S

This lecture selects and reads those papers published on academic journal, particularly on the hatchery, aquaculture and trade of freshwater and marine ornamental fish and the associated issues on ecological conservation.

整合行銷管理專論**2 選****王韻**

本課程之目的在於傳授學生整合行銷理念與產品品牌策略規劃等能力。其主要內容包括：活動、媒體、公關、展覽規劃；產品發展創新與探索品牌策略管理。另外會閱讀相關主題的國際期刊以增加學生專業能力！

Integrated Marketing and Management Seminar**2 S****Yun Wang**

This course is to teach students the concepts of integrated marketing communication and manage the product brand strategy. Its contents include: understanding integrated marketing communication such as advertisement, public relations, sales promotion and exhibition; developing product and brand strategies; In addition, the course will read some articles to improve students' capability of integrated marketing and management.

基因轉殖動物特論**2 選**

本課程旨在介紹動物基因轉移技術的最新發展概況，包括顯微注射法，精子載體法，胚胎幹細胞，體細胞核移植法，反轉錄病毒載體法等技術。這些新的轉基因技術可以提供一個用於開發新品種觀賞魚的平台。

Special Topics on Animal Transgenesis**2 S**

The purpose of this course is to introduce the recent developments in animal gene transfer techniques, including microinjection method, sperm vector method, Embryonic stem cell, somatic cell nuclear transplantation method, retroviral vector method, germ line stem cell mediated method to improve efficiency, gene targeting to improve accuracy, RNA interference-mediated gene silencing technology, zinc-finger nucleases—gene targeting technique and induced pluripotent stem cell technology. These new transgenic techniques can provide a better platform to develop transgenic animals for breeding new animal varieties, and promote the development of livestock production, and other fields.

進階魚用診斷試劑開發**2 選**

本課程的目的旨在教導魚類診斷試劑發展。課程內容包括各種魚類疫苗、血清、診斷抗原的製備與各種血清學診斷等...

Advanced Development of Diagnostic Reagents for Fishes**2 S**

The purpose of this course is to teach the contents includes preparation of various fish vaccines, sera, diagnostic antigens, various serological diagnosis etc.

水生動物生產醫學特論**2 選**

本課程之講授內容主要目標為奠定學生現場執業需具備的專業知識基礎。強調健康和生產關係，結合疾病診斷與預防理念。並與各水生動物診斷中心、家畜衛生試驗所、水產試驗所及業界合作，安排學生實地學習以因應未來實際執業之準備。本課程目標在培育學生水生動物生產醫學（飼養管理、疾病防治、生產管理）知識且具獨立診療能力之水生動物專科獸醫師，進而投身水生動物生產醫學及養殖產業管理分析工作。

Aquatic Animal Production 2 S

Medicine(I)

This course will emphasize on the integration of veterinary medicine with nutrition, genetics, economics, food safety, and other disciplines which can enable graduate students to acquire and use a broad knowledge base to support the health and improve the production and efficiency of the food supply chain.

談判與溝通 2 選

本課程之目的，在於透過與商務談判有關的各項概念、程序、策略、與論理等事項的教學與演練，引領學員能夠習得談判的正確觀念與技巧及國際案例之剖析。

Negotiation Strategies and 2S

Tactics for Business

The course employs instructions, discussions, and case studies to examine the concepts, processes, strategies, and ethical issues related to business negotiation.

專題研究 3 2 選 全部教師

本課程主要目標在訓練研究生瞭解實驗設計之基本原理、設計解決觀賞魚研究問題之實驗、分析實驗資料、熟悉觀賞魚研究之技巧與方法、整理結果以及作成發表報告。

Independent Studies 3 2 S Faculties

The purpose of this course is to offer knowledge and techniques to graduate students to solve problems faced during research or graduate study.

觀賞魚養殖經濟與經營管理 2 選

本課程介紹產業經營與管理實務，並藉個案研究探討成功經營水族產業之關鍵因素，適時邀請標竿業界廠商經營者與學生座談或專題講演，使學生具備產業經營管理之基礎知識，及強化創新與研發之觀念。

Special Topics on Economics 2 S

and Management in Ornamental

Fish Industry

The objective of this course is to introduce to students in some managerial and microeconomic theories explaining decisions of agricultural producers with respect to production and input use. Focus is on the management of agricultural and horticultural holdings. After an introduction on the definition of farm management and farming systems the course consists of chapters on production and cost theory, efficiency analysis and risk management, transaction cost theory and financing. In the practical's, management tools such as profitability and cost calculation, investment analysis, budgeting, financial planning are introduced and learned through applications and case studies.

活魚運輸 2 選

本課程介紹學生有關封閉式或開放式活魚運輸的原則與主要影響因子，以及運輸過程中利用化學方法對水和魚進行處理，包含使用鎮靜劑，可作為氧來源之化學藥物，抑菌性化學藥品和氨的控制。

Live Fish Transportation 2 S

This course introduces students on the main factors and principles associated with fish transport, closed and open systems of fish transport, and chemical methods for water and fish treatment during transport, use of tranquilizers, chemicals as oxygen sources, bacteriostatic chemicals, and ammonia control.

觀賞魚繁殖學特論 3 2 選

本課程內容主要為經由國際知名學術期刊探討淡、海水觀賞魚繁殖技術、貿易及其與生態保育相關之課題。

Special Topics on Ornamental Fish Culture 3 2 S

This lecture selects and reads those papers published on academic journal, particularly on the hatchery, aquaculture and trade of freshwater and marine ornamental fish and the associated issues on ecological conservation.

養殖器材與系統設計特論 2 選

本課程為學生提供水族相關器材設備的相關理論與並訓練學生具備實做的能力。學生們將熟悉水族相關的養殖系統及系統本身對水質管理的設計與實用性加以改進之能力。

Special Topics on Facility and System Design for Aquaculture 2 S

The course will provide students with an advanced theoretical and practical capacity to design construct and maintain systems for culturing aquatic animals. Students will become familiar with the requirements of aquatic animals in culture systems, the systems themselves, management of water quality within these systems, feeding practices within the aquaculture industry and industry placement. At the completion of this topic, students will be expected to demonstrate their ability in the areas of understanding design and management of aquatic animal production systems, know where to search for suppliers of equipment and stock, and be able to critically analyse peer-reviewed and non-peer-reviewed literature in this area.

國際農業發展趨勢特論 4 選

本課程將介紹農業政策和經濟,其主題包括經濟政策、農業發展、當前農業問題與政策、農地政策、農田水利政策、農產運銷、農業金融、農民組織、農業推廣、農業科技、加入 WTO 對農業之影響及其因應對策。

Special Topics on Developing Trends of International Agriculture 4 S

Trends of International Agriculture

This course is to introduce agricultural policies and economics in Taiwan. Its contents include: policies on economics, agricultural development, current problems and policies on agriculture, policies on farmland, policies on irrigation, marketing of agricultural products, agricultural finance, farmers' organizations, agricultural extension, agricultural technology, and impacts and responses of Taiwan's agriculture after its accession to WTO.

專題研究 4 2 選 全部教師

本課程主要目標在訓練研究生瞭解實驗設計之基本原理、設計解決觀賞魚研究問題之實驗、分析實驗資料、熟悉觀賞魚研究之技巧與方法、整理結果以及作成發表報告。

Independent Studies 4

2 S

Faculties

The purpose of this course is to offer knowledge and techniques to graduate students to solve problems faced during research or graduate study.

農業政策與經濟特論

4 選

本課程的目的是讓學生得知當前最近的國際農業發展情形，同時協助學生建立最新的世界，糧食生產及消費之世界觀。本課程之內容包括：(1)世界糧食供應情形，(2)世界穀類之貿易，(3)世界的肉類生產，(4)世界肥料之生產及消耗，(5)非洲的糧食供應現況，(6)世界不同國家人口別的糧食供應情形，(7)非洲的農藥改進，(8)針對第三世界糧食生產不足之解決方法。

Special Topics on Agriculture 4 S

Policies and Economics

This course is to introduce the latest development of international agriculture and to help students acquire the updated global views on agricultural production. Its contents include: crop and food supply situations in the world, cereal in the world trade, global meat production, global fertilizer supply and consumption, food supply situation and crop prospects in sub-Saharan Africa and other countries, agricultural reform in Africa, and causes and solutions of under-nutrition in the third world.

傳閱附件 4-2--動物用疫苗國際學位專班

動物用疫苗國際學位專班 碩士班

International Master program in Animal Vaccine Technology

(一)教育目標 Educational goals

培育符合國際動物疫苗科技產業需求之人才

To develop the next generation of international animal vaccine industry leaders

(二)必修科目 Requirements

中 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
專題討論 Seminar	4	1	1	1	1	
碩士論文 Master Thesis Research	6			3	3	
動物疫苗研究法 Methods for Animal Vaccine Research	2	1	1			
合 計	12	2	1	4	4	

(三) 選修科目 Elective

中 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
傳染病之致病機制 Pathogenesis of Infectious Diseases	3	3				
酵素與蛋白質工程學 Enzyme and Protein Engineering	2	2				
進階免疫學 Advance Immunology	2	2				
疫苗學 Vaccinology	2	2				
佐劑學 Adjuvants	2		2			
疫苗工程學 Vaccine Engineering	2			2		
進階反芻獸疫苗開發 Advanced Ruminant Vaccine Development	2		2			
進階豬用疫苗開發 Advanced Porcine Vaccine Development	2		2			
進階魚用疫苗開發 Advanced Fish Vaccine Development	2		2			
免疫評估技術 Immunological Evaluation Techniques	2			2		
疫苗研發海外實務 Overseas Internship in Vaccine Research	2				2	
產業實務 Industry Internship	2				2	
專題研究(1)~(4) Special Topics(1)~(4)	8	2	2	2	2	
談判與溝通 Negotiation Strategies and Tactics for Business	2		2			
國際農業發展趨勢特論 Special Topics on Development Trends of International Agriculture	4			4		
農業政策與經濟特論 Special Topics on Agriculture Policies and Economics	4				4	
合 計	43	11	12	10	10	

動物用疫苗國際學位專班 博士班

International Ph.D. program in Animal Vaccine Technology

(一)教育目標 Educational goals

培育符合國際動物疫苗科技產業需求之人才。

To develop the next generation of international animal vaccine industry leaders

(二)必修科目 Requirements

中 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
專題討論 Seminar	4	1	1	1	1	
博士論文 Ph.D. Thesis Research	12			6	6	
合 計	16	1	1	7	7	

(三) 選修科目 Elective

中 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
傳染病之致病機制 Pathogenesis of Infectious Diseases	3	3				
酵素與蛋白質工程學 Enzyme and Protein Engineering	2	2				
進階免疫學 Advance Immunology	2	2				
疫苗工程學 Vaccine Engineering	2			2		
進階反芻獸疫苗開發 Advanced Ruminant Vaccine Development	2		2			
進階豬用疫苗開發 Advanced Porcine Vaccine Development	2		2			
進階魚用疫苗開發 Advanced Fish Vaccine Development	2		2			
免疫評估技術 Immunological Evaluation Techniques	2			2		
疫苗研發海外實務 Overseas Internship in Vaccine Research	2				2	
產業實務 Industry Internship	2				2	
專題研究(1)~(4) Special Topics(1)~(4)	8	2	2	2	2	
談判與溝通 Negotiation Strategies and Tactics for Business	2		2			
國際農業發展趨勢特論 Special Topics on Development Trends of International Agriculture	4			4		
農業政策與經濟特論 Special Topics on Agriculture Policies and Economics	4				4	
合 計	37	9	8	10	10	

動物用疫苗國際學位專班 碩士班 課程與核心能力之關聯表
International Master program in Animal Vaccine Technology
Curriculum and core competencies

科目名稱	核心能力項目	具備疫苗、佐劑之創新研發能力 Ability for innovative vaccine and adjuvant research	具備疫苗產業實務能力 Ability as a vaccine industry professional	具備國際溝通合作能力 Ability for international communication and collaboration
【專業必修】 Requirements				
專題討論		●		
碩士論文 Master Thesis Research		●	●	●
動物疫苗研究法 Methods for Animal Vaccine Research		●		
【專業選修】 Elective				
傳染病之致病機制 Pathogenesis of Infectious Diseases		●		
酵素與蛋白質工程學 Enzyme and Protein Engineering			●	
進階免疫學 Advance Immunology		●		
進階反芻獸疫苗開發 Advanced Ruminant Vaccine Development		●	●	●
進階豬用疫苗開發 Advanced Porcine Vaccine Development		●	●	●
進階魚用疫苗開發 Advanced Fish Vaccine Development		●	●	●
免疫評估技術 Immunological Evaluation Techniques		●		
疫苗工程學 Vaccine Engineering			●	
產業實務 Industry Internship			●	●

疫苗研發海外實務 Overseas Internship in Vaccine Researchs		●	●
疫苗學 Vaccinology	●		
佐劑學 Adjuvants	●		
專題研究 Special Topics	●	●	
國際農業發展趨勢特 論 Special Topics on Development Trends			●
農業政策與經濟特論 Special Topics on Agriculture Policies			●
談判與溝通 Negotiation Strategies and			●

動物用疫苗國際學位專班 博士班 課程與核心能力之關聯表
International Ph.D. program in Animal Vaccine Technology
Curriculum and core competencies

科目名稱	核心能力項目	具備疫苗、佐劑之創新研發能力 Ability for innovative vaccine and adjuvant research	具備疫苗產業實務能力 Ability as a vaccine industry professional	具備國際溝通合作能力 Ability for international communication and collaboration
【專業必修】 Requirements				
專題討論 Seminar		●		
博士論文 Ph. D. Thesis Research		●	●	●
【專業選修】 Elective				
傳染病之致病機制 Pathogenesis of Infectious Diseases		●		
酵素與蛋白質工程學 Enzyme and Protein Engineering			●	
進階免疫學 Advance Immunology		●		
進階反芻獸疫苗開發 Advanced Ruminant Vaccine Development		●	●	●
進階豬用疫苗開發 Advanced Porcine Vaccine Development		●	●	●
進階魚用疫苗開發 Advanced Fish Vaccine Development		●	●	●
免疫評估技術 Immunological Evaluation Techniques		●		
疫苗工程學 Vaccine Engineering			●	
產業實務 Industry Internship			●	●

疫苗研發海外實務 Overseas Internship in Vaccine Researchs		●	●
專題研究 Special Topics	●	●	
國際農業發展趨勢特論 Special Topics on Development Trends of International Agriculture			●
農業政策與經濟特論 Special Topics on Agriculture Policies and Economics			●
談判與溝通 Negotiation Strategies and Tactics for Business			●

動物用疫苗國際學位專班 碩士班 課程與核心能力之關聯檢核表
International Master program in Animal Vaccine Technology
Curriculum and core competencies checklist

核心能力 Core competencies	能力指標與核心素養 Capability Index & Core Quality	對應課程 Curriculum	檢核機制 Evaluation mechanism
具備疫苗、佐劑之創新研發能力 Ability for innovative vaccine and adjuvant research	抗原研發 Antigen Research 佐劑研發 Adjuvant Research	專題討論 Seminar 碩士論文 Thesis 傳染病之致病機制 Pathogenesis of Infectious Diseases 免疫評估技術 Immunological Evaluation Techniques 進階免疫學 Advance Immunology 進階反芻獸疫苗開發 Advanced Ruminant Vaccine Development 進階豬用疫苗開發 Advanced Porcine Vaccine Development 進階魚用疫苗開發 Advanced Fish Vaccine Development 動物疫苗研究法 Methods for Animal Vaccine Research 疫苗學 Vaccinology 佐劑學 Adjuvants 專題研究 Special Topics	一：修畢本所必修基礎課程(專題討論、碩士論文等)10學分 二：修畢本所選修進階課程20學分。
具備疫苗產業實務能力 Ability as a vaccine industry professional	疫苗量產 Vaccine Production 產品註冊及品保 Product	碩士論文 Thesis 酵素與蛋白質工程學 Enzyme and Protein Engineering	

	registration, QA, QC 市場行銷 Marketing	進階反芻獸疫苗開發 Advanced Ruminant Vaccine Development 進階豬用疫苗開發 Advanced Porcine Vaccine Development 進階魚用疫苗開發 Advanced Fish Vaccine Development 疫苗工程學 Vaccine Engineering 產業實務 Industry Internship 疫苗研發海外實務 Overseas Internship in Vaccine Research 專題研究 Special Topics	
具備國際溝通合作能力 Ability for international communication and collaboration	國際溝通（語言）International communication (languages) 團隊合作 teamwork	國際農業發展趨勢特論 Special Topics on Development Trends of International Agriculture 農業政策與經濟特論 Special Topics on Agriculture Policies and Economics 談判與溝通 Negotiation Strategies and Tactics for Business 碩士論文 Thesis 進階反芻獸疫苗開發 Advanced Ruminant Vaccine Development 進階豬用疫苗開發 Advanced Porcine Vaccine Development 進階魚用疫苗開發 Advanced Fish Vaccine Development 產業實務 Industry Internship 疫苗研發海外實務 Overseas Internship in Vaccine Research	

動物用疫苗國際學位專班 博士班 課程與核心能力之關聯檢核表
International Ph.D. program in Animal Vaccine Technology
Curriculum and core competencies checklist

核心能力 Core competencies	能力指標與核心素養 Capability Index & Core Quality	對應課程 Curriculum	檢核機制 Evaluation mechanism
具備疫苗、佐劑之創新研發能力 Ability for innovative vaccine and adjuvant research	抗原研發 Antigen Research 佐劑研發 Adjuvant Research	專題討論 Seminar 博士論文 Thesis 傳染病之致病機制 Pathogenesis of Infectious Diseases 免疫評估技術 Immunological Evaluation Techniques 進階免疫學 Advance Immunology 進階反芻獸疫苗開發 Advanced Ruminant Vaccine Development 進階豬用疫苗開發 Advanced Porcine Vaccine Development 進階魚用疫苗開發 Advanced Fish Vaccine Development 專題研究 Special Topics	一、修畢本所必修基礎課程(專題討論、博士論文等)10學分 二、修畢本所選修進階課程10學分。
具備疫苗產業實務能力 Ability as a vaccine industry professional	疫苗量產 Vaccine Production 產品註冊及品保 Product registration, QA, QC 市場行銷 Marketing	博士論文 Thesis 酵素與蛋白質工程學 Enzyme and Protein Engineering 進階反芻獸疫苗開發 Advanced Ruminant Vaccine Development 進階豬用疫苗開發 Advanced Porcine Vaccine Development	

		進階魚用疫苗開發 Advanced Fish Vaccine Development 疫苗工程學 Vaccine Engineering 產業實務 Industry Internship 疫苗研發海外實務 Overseas Internship in Vaccine Research 專題研究 Special Topics	
具備國際溝通合作能力 Ability for international communication and collaboration	國際溝通（語言）International communication (languages) 團隊合作 teamwork	國際農業發展趨勢特論 Special Topics on Development Trends of International Agriculture 農業政策與經濟特論 Special Topics on Agriculture Policies and Economics 談判與溝通 Negotiation Strategies and Tactics for Business 博士論文 Thesis 進階反芻獸疫苗開發 Advanced Ruminant Vaccine Development 進階豬用疫苗開發 Advanced Porcine Vaccine Development 進階魚用疫苗開發 Advanced Fish Vaccine Development 產業實務 Industry Internship 疫苗研發海外實務 Overseas Internship in Vaccine Research	

動物用疫苗國際學位專班 碩士班

International Master program in Animal Vaccine Technology**一、必修科目 Required Courses**

30039 專題討論 4 必 輪授

本課程擬指導學生由最新動物疫苗相關期刊中，挑選最新而重要的論文提出報告，並由全體教師、學生共同研討，讓學生學習到如何尋找資料、論文寫作、實驗設計與結果討論等實驗研究工作相關的技術。

30039 Seminar 4 R All Teachers

This curriculum is designed to advise students to collect update papers from Animal vaccine related journals, to make a presentation in class, and to discuss with teachers and classmates. This class let students to learn how to collect research papers, and to design, and perform their experiment.

30057 碩士論文 6 必 各教師

每位碩士班研究生選定論文題目，再指導教授指導下進行實驗、研究、依據實驗研究結果完成論文。

30057 Master Thesis Research 6 R All Teachers

Graduate students propose their research project, complete experiments and write a thesis under advisor supervision.

30037 動物疫苗研究法 2 必 輪授

本課程旨教導學生進行動物疫苗研發之基本技巧。課程內容包括文獻攝取、試驗設計、統計分析及論文寫作。同時教導學生如何應用最新的技術研發較安全且有效的疫苗或研發簡單快速且有效的診斷試劑。

30037 Methods for Animal Vaccine Research 2 R All Teachers

The aim of this course is to teach student the basic techniques for the development of veterinary vaccines. The contents of this course include literature searching, experimental designing and conducting, data analysis and thesis writing. In addition, new methodologies currently being used to develop safer and more effective vaccines and for the development of rapid, effective and simple diagnostics will be discussed in this course.

二、選修科目 Elective Courses

40895 傳染病之致病機制 3選 莊國賓

傳染病可由病毒，細菌，黴菌及寄生蟲等引起。本課程之目的在解釋傳染性致病原與宿主間之交互作用及其致病機制。課程內容包括病原之致病因子、宿主對病原之先天性及適應性免疫、病原對宿主防禦機制之反應以及個別疾病之致病機序。

40895 Pathogenesis of Infectious Diseases 3 S K.P. Chuang

Infectious diseases can be caused by viruses, bacteria, fungus and parasites. The aim of this course is to explain the interaction between pathogenic microbes and the hosts, and to explain the mechanisms of pathogenesis of infectious diseases. The content of this course covers virulence factors of pathogens, host response against infection including innate and adaptive immunity, pathogen's responses to host defense systems and pathogenic mechanisms of individual infectious disease.

55119 酵素與蛋白質工程學 2選 楊忠達

本課程將介紹常用於生物科技酵素之種類及功能，以及探討蛋白質之純化、結構、功能及其應用。

55119 Enzyme and Protein Engineering 2 S C.D. Yang

The curriculum will introduce the classification and function of enzymes used in biotech and focus on the purification, structure, function and application of proteins.

20493 疫苗學 2選 朱純燕、莊國賓

本課程主要教導學生有關疫苗的相關免疫學理基礎及動物疫苗之應用。其課程內容包括疫苗之生物研究過程及近代免疫學理論對疫苗研究與發展之新領域等，並介紹不同動物之疫苗研發與應用。

20493 Vaccinology 2 S C.Y. Chu, K.P. Chuang

The purpose of this course is to teach students the theory of vaccination and the applications of various veterinary vaccines. The contents include the past research on vaccination and the impact of update knowledge about cellular and molecular immunity on developing new generations of vaccines and also introduce the current research of veterinary vaccines and their applications.

20318 佐劑學 2選 朱純燕、楊忠達

本課程內容介紹疫苗佐劑之用途、佐劑之生物與物化特性及其作用機轉、佐劑與生物體各種免疫細胞之交互作用、如何選擇適當之佐劑、不同佐劑之設計與製備，以及佐劑有效性之評估。

20318 Adjuvants 2 S C.Y. Chu, C.D. Yang

This objective of this course is to introduce the purpose of an adjuvant, the acting mechanisms and related characteristics and chemical features of an adjuvant, the interactions of adjuvants with immune cells, the choice of the appropriate adjuvant and how to manufacture different types of adjuvants and evaluate their efficacy.

20492 疫苗工程學 2選 朱純燕、莊國賓

課程包括：疫苗概論、抗原之結構與抗原性、免疫概論、疫苗工程之相關技術、培養系統總

論、佐劑、劑型與配方、疫苗種類-依宿主區分、疫苗種類-依抗原區分、標準操作方式與品管、疫苗登記註冊與市場分析、生化技術產品之特別安全需求、影響疫苗之因子、未來之發展趨勢。

20492 Vaccine Engineering 2 S C.Y. Chu, K.P. Chuang

The purpose of this course is to teach students the production techniques of various veterinary vaccines and diagnostics. The contents include general description of vaccines, structure of antigens and immuogenicity, the immunological basis of immunization, In vitro methods in vaccinology, Convergence of culture systems, adjuvants, vehicles and formulation, vaccines according to their target species, vaccines according to their antigenic target, good manufacturing practices and controls, registration and marketing specific safety requirements for products derived from biotechnology, factor influencing the outcome of vaccination, and future possibilities.

30173 進階免疫學 2 選莊國賓

瞭解進階免疫學的精義、免疫系統的要素及激發免疫反應的重要條件等基本知識。由基礎講起，並加入進階及最新之知識：1. 先天及後天免疫要素，2. 抗原、抗體之結構、功能與交互作用，3. 補體，4. B 淋巴球及 T 淋巴球之生物學基礎，5. 抗體的遺傳學基礎，6. 主要組織相容抗原複合物之角色，7. 細胞激素。

30173 Advance Immunology 2 S K.P. Chuang

Introduce the elements of Immunology from the basic, advance concepts and journal including: 1. Innate and Acquired Immunity. 2. Antigen, Antibody structure and function. 3. Complement. 4. Biology of B and T lymphocyte. 5. The genetic basis of Antibody structure. 6 The role of the major histocompatibility complex in the immune response. 7. Cytokines.

40287 免疫評估技術 2 選 柯冠銘

當疫苗或抗原進行動物免疫之後，需有特定免疫評估技術協助分析所引起的免疫反應，本課程即幫助學生瞭解各種免疫評估技術之原理及應用，以加強學生在免疫反應分析及評估能力。

40287 Immunoevaluation Techniques 2 S G.M. Ke

Many special immunoevaluation techniques should be used to analyze the immune responses induced by the given antigens or vaccines. This curriculum will help students to realize theorems and applications of different immunoevaluation techniques and to reinforce their capacities for analyzing immune responses.

產業實務 2 選合授

本課程內容主要是讓學生有機會至動物疫苗相關公私立單位進行實務操作，以提升學生之實務經驗及技能，達到學理及實務並重之目的，並可使學生提早瞭解產業脈動，做為就業前之準備。

Industry Internship 2 S All Teachers

This aims of the course are to provide the practice opportunities for students at other animal vaccine related organizations and private companies. The output goal is to enable improved students' real experiences and skills which will help to fulfilling interaction between theory and practice, understating the industry dynamic and preparation for employment.

30143 疫苗研發海外實務 2 選 鄭力廷

此課程由學生前往海外頂尖實驗室參與傳染病分子醫學與疫苗研發，以英文溝通，討論實驗，報告成果。因國際學術交流大多以英文進行，此課程有助學生溝通能力並增長國際視野。

30143 Overseas Internship in Vaccine Research 2 S L.T. Cheng

Students will participate in research in a productive laboratory in a foreign setting. English will be used for communication and oral presentations. Since English is the primary language for biomedical research, this overseas study will improve students' communication skills in English and expand their international experience.

專題研究(1) 1 選 輪授

本課程擬指導學生由最新動物疫苗相關期刊中，挑選最新而重要的論文提出報告，並由全體教師、學生共同研討，讓學生學習到如何尋找資料、論文寫作、實驗設計與結果討論等實驗研究工作相關的技術。

Special Topics(1) 1S All Teachers

This curriculum is designed to advise students to collect update papers from Animal vaccine related journals, to make a presentation in class, and to discuss with teachers and classmates. This class let students to learn how to collect research papers, and to design, and perform their experiment.

專題研究(2) 1 選 輪授

本課程延續前一學期授課內容進度。擬指導學生由最新動物疫苗相關期刊中，挑選最新而重要的論文提出報告，並由全體教師、學生共同研討，讓學生學習到如何尋找資料、論文寫作、實驗設計與結果討論等實驗研究工作相關的技術。

Special Topics(2) 1S All Teachers

This course is a continuation of the previous semester lectures progress .This curriculum is designed to advise students to collect update papers from Animal vaccine related journals, to make a presentation in class, and to discuss with teachers and classmates. This class let students to learn how to collect research papers, and to design, and perform their experiment.

專題研究(3) 1 選 輪授

本課程延續前一學期授課內容進度。本課程擬指導學生由最新動物疫苗相關期刊中，挑選最新而重要的論文提出報告，並由全體教師、學生共同研討，讓學生學習到如何尋找資料、論文寫作、實驗設計與結果討論等實驗研究工作相關的技術。

Special Topics(3) 1S All Teachers

This course is a continuation of the previous semester lectures progress .This curriculum is designed to advise students to collect update papers from Animal vaccine related journals, to make a presentation in class, and to discuss with teachers and classmates. This class let students to learn how to collect research papers, and to design, and perform their experiment.

專題研究(4) 1 選 輪授

本課程延續前一學期授課內容進度。本課程擬指導學生由最新動物疫苗相關期刊中，挑選最新而重要的論文提出報告，並由全體教師、學生共同研討，讓學生學習到如何尋找資料、論文寫作、

實驗設計與結果討論等實驗研究工作相關的技術。

Special Topics(4) 1S All Teachers

This course is a continuation of the previous semester lectures progress. This curriculum is designed to advise students to collect update papers from Animal vaccine related journals, to make a presentation in class, and to discuss with teachers and classmates. This class let students to learn how to collect research papers, and to design, and perform their experiment.

進階反芻獸疫苗開發 2 選 鍾曜吉、朱純燕

本課程主要教導學生有關反芻動物用疫苗在開發過程中的相關應用知識。其課程內容包括主要的反芻動物如牛、羊等的相關傳染性疾病及目前相對應的疫苗，並藉由近代免疫學理論及疫苗研究與發展之新領域的相關研究，引導學生對於新型反芻獸疫苗的研發與應用進行深入討論，使學生能夠對此領域有更深入的了解。

Advanced Ruminant Vaccine Development 2 S C.Y. Chu, Y.C. Chung

The purpose of this course is to teach students the theory and knowledge in developing the ruminant vaccine. The contents include the contagious diseases of ruminant animals, like cow, sheep and goat, etc., and the related vaccines. With the past research on vaccination and the impact of update knowledge about immunity, students in the course will be guided to discuss about the research and development of new generations ruminant vaccine. This course also leads students to learn how to develop new ruminant vaccines.

進階豬用疫苗開發 2 選 莊國賓、鄭力廷

教導學生有關豬隻疫苗的相關免疫學理及動物疫苗之應用。其課程內容包括豬隻疫苗之生物研究過程及近代免疫學理論對豬隻疫苗研究與發展之新領域等，並介紹不同動物之疫苗研發與應用。另外本課程並指導學生由最新動物疫苗相關期刊中，挑選豬最新而重要的論文提出報告，並由全體教師、學生共同研討豬隻疫苗研發。最後在經由豬隻細菌及病毒疫苗研發個論探討最新疫苗研發趨勢及方法。

Advanced Porcine Vaccine Development 2 S K.P. Chuang, L. T. Cheng

This course covers the basic vaccine principles as applicable to porcine vaccine development. Contents include vaccine development processes and newest trends as report in contemporary journals. Through the discussion of vaccine development for viral and bacterial pathogens, the students are kept abreast of the newest technology and trends.

進階魚用疫苗開發 2 選 柯冠銘、楊忠達

於海水和淡水，或在箱網裡，或在養殖桶或池塘所進行的魚類養殖工作，不斷提高和大量貢獻於世界上許多地區水產食品的生產。在過去的幾十年中，水產養殖顯著的進步和擴張，其特點是集約化生產和許多新品種的開發。水產養殖可以在環保上和經濟上成為可維持的產業。而且疾病預防及使用抗生素以減少損失，在這方面亦是至關重要的。接種疫苗在這幾年已成為預防水產疾病的重要方法，刺激魚類免疫系統達到有效預防是發展這項產業的重要方法。

在課程中，我們將提供機會給學生學習以下主題：

- (1) 魚類疫苗接種的歷史
- (2) 魚類先天性免疫反應
- (3) 魚類後天性免疫反應

- (4) 開發，生產和控制魚類的疫苗
- (5) 魚類疫苗的相關法規
- (6) 免疫接種策略和程序
- (7) 不活化疫苗 - 不活化方法
- (8) 減毒策略 - 細菌疫苗
- (9) 減毒策略 - 病毒疫苗
- (10) 魚類 DNA 疫苗
- (11) 魚用疫苗的佐劑
- (12) 水產養殖的生物安全與預防接種
- (13) 疫苗接種對抗不同的水產疾病 (I)
- (14) 疫苗接種對抗不同的水產疾病 (II)
- (15) 疫苗接種的副作用
- (16) 未來魚類疫苗學

Advanced Fish Vaccine Development 2 S G.M. Ke , C.D. Yang

Fish farming, in seawater and in freshwater, in cages, tanks or ponds, makes an ever-increasing and significant contribution to the production of aquatic food in many regions of the world. During the last few decades there has been significant progress and expansion in the aquaculture sector, characterized by intensified production and the exploitation of many new species. Aquaculture must be a sustainable bio-production, environmentally as well as economically. Disease prevention in order to reduce losses, and the use of antimicrobials is crucial in this perspective. Vaccination has, in a few years, become the most important method for disease prevention in aquaculture, and effective prophylaxis based on stimulation of the immune system of the fish is essential for further development of the industry.

In the course, we provide an opportunity for students to learn:

- (1)The History of Fish Vaccination
- (2)The Innate Immune Response in Fish
- (3)The Adaptive Immune Response in Fish
- (4)Development, Production and Control of Fish Vaccines
- (5)Legal Requirements and Authorization of Fish Vaccines
- (6)Vaccination Strategies and Procedures
- (7)Inactivated Vaccines - Methods of Inactivation
- (8)Attenuation Strategies - Bacterial Vaccines
- (9)Attenuation Strategies - Viral Vaccines
- (10)DNA Vaccines
- (11)Adjuvants in Fish Vaccines
- (12)Biosecurity and Vaccination in Aquaculture
- (13)Vaccination Against Different Diseases in Aquaculture (I)
- (14)Vaccination Against Different Diseases in Aquaculture (II)
- (15)Side-Effects of Vaccination
- (16)Future Fish Vaccinology

國際農業發展趨勢特論 4 選

本課程將介紹農業政策和經濟，其主題包括經濟政策、農業發展、當前農業問題與政策、農地政策、農田水利政策、農產運銷、農業金融、農民組織、農業推廣、農業科技、加入 WTO 對農業之影響及其因應對策。

Special Topics on Development Trends of International Agriculture

4 S

Trends of International Agriculture

This course is to introduce agricultural policies and economics in Taiwan. Its contents include: policies on economics, agricultural development, current problems and policies on agriculture, policies

on farmland, policies on irrigation, marketing of agricultural products, agricultural finance, farmers' organizations, agricultural extension, agricultural technology, and impacts and responses of Taiwan's agriculture after its accession to WTO.

農業政策與經濟特論 4 選

本課程的目的是讓學生得知當前最近的國際農業發展情形，同時協助學生建立最新的世界，糧食生產及消費之世界觀。本課程之內容包括：(1)世界糧食供應情形，(2)世界穀類之貿易，(3)世界的肉類生產，(4)世界肥料之生產及消耗，(5)非洲的糧食供應現況，(6)世界不同國家人口別的糧食供應情形，(7)非洲的農藥改進，(8)針對第三世界糧食生產不足之解決方法。

Special Topics on Agriculture Policies and Economics 4 S

Policies and Economics

This course is to introduce the latest development of international agriculture and to help students acquire the updated global views on agricultural production. Its contents include: crop and food supply situations in the world, cereal in the world trade, global meat production, global fertilizer supply and consumption, food supply situation and crop prospects in sub-Saharan Africa and other countries, agricultural reform in Africa, and causes and solutions of under-nutrition in the third world.

談判與溝通 2選

本課程之目的，在於透過與商務談判有關的各項概念、程序、策略、與論理等事項的教學與演練，引領學員能夠習得談判的正確觀念與技巧及國際案例之剖析。

Negotiation Strategies and Tactics for Business 2S

The course employs instructions, discussions, and case studies to examine the concepts, processes, strategies, and ethical issues related to business negotiation.

動物用疫苗國際學位專班 博士班

International Ph.D. program in Animal Vaccine Technology

一、必修科目 Required Courses

30039 專題討論 4 必 輪授

本課程擬指導學生由最新動物疫苗相關期刊中，挑選最新而重要的論文提出報告，並由全體教師、學生共同研討，讓學生學習到如何尋找資料、論文寫作、實驗設計與結果討論等實驗研究工作相關的技術。

30039 Seminar 4 R All Teachers

This curriculum is designed to advise students to collect update papers from Animal vaccine related journals, to make a presentation in class, and to discuss with teachers and classmates. This class let students to learn how to collect research papers, and to design, and perform their experiment.

30057 博士論文 12 必 各教師

每位博士班研究生選定論文題目，再指導教授指導下進行實驗、研究、依據實驗研究結果完成論文。

30057 Ph.D. Thesis Research 12 R All Teachers

Graduate students propose their research project, complete experiments and write a thesis under advisor supervision.

二、選修科目 Elective Courses

40895 傳染病之致病機制 3 選 莊國賓

傳染病可由病毒，細菌，黴菌及寄生蟲等引起。本課程之目的在解釋傳染性致病原與宿主間之交互作用及其致病機制。課程內容包括病原之致病因子、宿主對病原之先天性及適應性免疫、病原對宿主防禦機制之反應以及個別疾病之致病機序。

40895 Pathogenesis of Infectious Diseases 3 S K.P. Chuang

Infectious diseases can be caused by viruses, bacteria, fungus and parasites. The aim of this course is to explain the interaction between pathogenic microbes and the hosts, and to explain the mechanisms of pathogenesis of infectious diseases. The content of this course covers virulence factors of pathogens, host response against infection including innate and adaptive immunity, pathogen's responses to host defense systems and pathogenic mechanisms of individual infectious disease.

55119 酵素與蛋白質工程學 2 選 楊忠達

本課程將介紹常用於生物科技酵素之種類及功能，以及探討蛋白質之純化、結構、功能及其應用。

55119 Enzyme and Protein Engineering 2 S C.D. Yang

The curriculum will introduce the classification and function of enzymes used in biotech and focus on the purification, structure, function and application of proteins.

20492 疫苗工程學 2 選 朱純燕、莊國賓

課程包括：疫苗概論、抗原之結構與抗原性、免疫概論、疫苗工程之相關技術、培養系統總論、佐劑、劑型與配方、疫苗種類-依宿主區分、疫苗種類-依抗原區分、標準操作方式與品管、疫苗登記註冊與市場分析、生化技術產品之特別安全需求、影響疫苗之因子、未來之發展趨勢。

20492 Vaccine Engineering 2 S C.Y. Chu, K.P. Chuang

The purpose of this course is to teach students the production techniques of various veterinary vaccines and diagnostics. The contents include general description of vaccines, structure of antigens and immunogenicity, the immunological basis of immunization, In vitro methods in vaccinology, Convergence of culture systems, adjuvants, vehicles and formulation, vaccines according to their target species, vaccines according to their antigenic target, good manufacturing practices and controls, registration and marketing specific safety requirements for products derived from biotechnology, factor influencing the outcome of vaccination, and future possibilities.

30173 進階免疫學 2 選 莊國賓

瞭解進階免疫學的精義、免疫系統的要素及激發免疫反應的重要條件等基本知識。由基礎講起，並加入進階及最新之知識：1. 先天及後天免疫要素，2. 抗原、抗體之結構、功能與交互作用，3. 補體，4. B 淋巴球及 T 淋巴球之生物學基礎，5. 抗體的遺傳學基礎，6. 主要組織相容抗原複合物之角色，7. 細胞激素。

30173 Advance Immunology 2 S K.P. Chuang

Introduce the elements of Immunology from the basic, advance concepts and journal including: 1. Innate and Acquired Immunity. 2. Antigen, Antibody structure and function. 3. Complement. 4. Biology of B and T lymphocyte. 5. The genetic basis of Antibody structure. 6 The role of the major

histocompatibility complex in the immune response. 7. Cytokines.

40287 免疫評估技術 2 選 柯冠銘

當疫苗或抗原進行動物免疫之後，需有特定免疫評估技術協助分析所引起的免疫反應，本課程即幫助學生瞭解各種免疫評估技術之原理及應用，以加強學生在免疫反應分析及評估能力。

40287 Immunoevaluation Techniques 2 S G.M. Ke

Many special immunoevaluation techniques should be used to analyze the immune responses induced by the given antigens or vaccines. This curriculum will help students to realize theorems and applications of different immunoevaluation techniques and to reinforce their capacities for analyzing immune responses.

產業實務 2 選合授

本課程內容主要是讓學生有機會至動物疫苗相關公私立單位進行實務操作，以提升學生之實務經驗及技能，達到學理及實務並重之目的，並可使學生提早瞭解產業脈動，做為就業前之準備。

Industry Internship 2 S All Teachers

This aims of the course are to provide the practice opportunities for students at other animal vaccine related organizations and private companies. The output goal is to enable improved students' real experiences and skills which will help to fulfilling interaction between theory and practice, understating the industry dynamic and preparation for employment.

30143 疫苗研發海外實務 2 選 鄭力廷

此課程由學生前往海外頂尖實驗室參與傳染病分子醫學與疫苗研發，以英文溝通，討論實驗，報告成果。因國際學術交流大多以英文進行，此課程有助學生溝通能力並增長國際視野。

30143 Overseas Internship in Vaccine Research 2 S L.T. Cheng

Students will participate in research in a productive laboratory in a foreign setting. English will be used for communication and oral presentations. Since English is the primary language for biomedical research, this overseas study will improve students' communication skills in English and expand their international experience.

專題研究(1) 1 選 輪授

本課程擬指導學生由最新動物疫苗相關期刊中，挑選最新而重要的論文提出報告，並由全體教師、學生共同研討，讓學生學習到如何尋找資料、論文寫作、實驗設計與結果討論等實驗研究工作相關的技術。

Special Topics(1) 1S All Teachers

This curriculum is designed to advise students to collect update papers from Animal vaccine related journals, to make a presentation in class, and to discuss with teachers and classmates. This class let students to learn how to collect research papers, and to design, and perform their experiment.

專題研究(2) 1 選 輪授

本課程延續前一學期授課內容進度。擬指導學生由最新動物疫苗相關期刊中，挑選最新而重要的論文提出報告，並由全體教師、學生共同研討，讓學生學習到如何尋找資料、論文寫作、實驗設計與結果討論等實驗研究工作相關的技術。

Special Topics(2) 1S All Teachers

This course is a continuation of the previous semester lectures progress .This curriculum is designed to advise students to collect update papers from Animal vaccine related journals, to make a presentation in class, and to discuss with teachers and classmates. This class let students to learn how to collect research papers, and to design, and perform their experiment.

專題研究(3) 1 選 輪授

本課程延續前一學期授課內容進度。本課程擬指導學生由最新動物疫苗相關期刊中，挑選最新而重要的論文提出報告，並由全體教師、學生共同研討，讓學生學習到如何尋找資料、論文寫作、實驗設計與結果討論等實驗研究工作相關的技術。

Special Topics(3) 1S All Teachers

This course is a continuation of the previous semester lectures progress .This curriculum is designed to advise students to collect update papers from Animal vaccine related journals, to make a presentation in class, and to discuss with teachers and classmates. This class let students to learn how to collect research papers, and to design, and perform their experiment.

專題研究(4) 1 選 輪授

本課程延續前一學期授課內容進度。本課程擬指導學生由最新動物疫苗相關期刊中，挑選最新而重要的論文提出報告，並由全體教師、學生共同研討，讓學生學習到如何尋找資料、論文寫作、實驗設計與結果討論等實驗研究工作相關的技術。

Special Topics(4) 1S All Teachers

This course is a continuation of the previous semester lectures progress .This curriculum is designed to advise students to collect update papers from Animal vaccine related journals, to make a presentation in class, and to discuss with teachers and classmates. This class let students to learn how to collect research papers, and to design, and perform their experiment.

進階反芻獸疫苗開發 2 選 鍾曜吉、朱純燕

本課程主要教導學生有關反芻動物用疫苗在開發過程中的相關應用知識。其課程內容包括主要的反芻動物如牛、羊等的相關傳染性疾病及目前相對應的疫苗，並藉由近代免疫學理論及疫苗研究與發展之新領域的相關研究，引導學生對於新型反芻獸疫苗的研發與應用進行深入討論，使學生能夠對此領域有更深入的了解。

Advanced Ruminant Vaccine Development 2 S C.Y. Chu, Y.C. Chung

The purpose of this course is to teach students the theory and knowledge in developing the ruminant vaccine. The contents include the contagious diseases of ruminant animals, like cow, sheep and goat, etc., and the related vaccines. With the past research on vaccination and the impact of update knowledge about immunity, students in the course will be guided to discuss about the research and development of new generations ruminant vaccine. This course also leads students to learn how to develop new ruminant vaccines.

進階豬用疫苗開發 2 選 莊國賓、鄭力廷

教導學生有關豬隻疫苗的相關免疫學理及動物疫苗之應用。其課程內容包括豬隻疫苗之生物研究過程及近代免疫學理論對豬隻疫苗研究與發展之新領域等，並介紹不同動物之疫苗研發與應用。另外本課程並指導學生由最新動物疫苗相關期刊中，挑選豬最新而重要的論文提出報告，並由全體教師、學生共同研討豬隻疫苗研發。最後在經由豬隻細菌及病毒疫苗研發個論探討最新疫苗研發趨勢及方法。

Advanced Porcine Vaccine Development 2 S K.P. Chuang , L. T. Cheng

This course covers the basic vaccine principles as applicable to porcine vaccine development. Contents include vaccine development processes and newest trends as report in contemporary journals. Through the discussion of vaccine development for viral and bacterial pathogens, the students are kept abreast of the newest technology and trends.

進階魚用疫苗開發 2 選 柯冠銘、楊忠達

於海水和淡水，或在箱網裡，或在養殖桶或池塘所進行的魚類養殖工作，不斷提高和大量貢獻於世界上許多地區水產食品的生產。在過去的幾十年中，水產養殖顯著的進步和擴張，其特點是集約化生產和許多新品種的開發。水產養殖可以在環保上和經濟上成為可維持的產業。而且疾病預防及使用抗生素以減少損失，在這方面亦是至關重要的。接種疫苗在這幾年已成為預防水產疾病的重要方法，刺激魚類免疫系統達到有效預防是發展這項產業的重要方法。

在課程中，我們將提供機會給學生學習以下主題：

- (1) 魚類疫苗接種的歷史
- (2) 魚類先天性免疫反應
- (3) 魚類後天性免疫反應
- (4) 開發，生產和控制魚類的疫苗
- (5) 魚類疫苗的相關法規
- (6) 免疫接種策略和程序
- (7) 不活化疫苗 - 不活化方法
- (8) 減毒策略 - 細菌疫苗
- (9) 減毒策略 - 病毒疫苗
- (10) 魚類 DNA 疫苗
- (11) 魚用疫苗的佐劑
- (12) 水產養殖的生物安全與預防接種
- (13) 疫苗接種對抗不同的水產疾病 (I)
- (14) 疫苗接種對抗不同的水產疾病 (II)
- (15) 疫苗接種的副作用
- (16) 未來魚類疫苗學

Advanced Fish Vaccine Development 2 S G.M. Ke , C.D. Yang

Fish farming, in seawater and in freshwater, in cages, tanks or ponds, makes an ever-increasing and significant contribution to the production of aquatic food in many regions of the world. During the last few decades there has been significant progress and expansion in the aquaculture sector, characterized by intensified production and the exploitation of many new species. Aquaculture must be a sustainable bio-production, environmentally as well as economically. Disease prevention in order to reduce losses, and the use of antimicrobials is crucial in this perspective. Vaccination has, in a few years, become the most important method for disease prevention in aquaculture, and effective prophylaxis based on stimulation of the immune system of the fish is essential for further development of the industry.

In the course, we provide an opportunity for students to learn:

The History of Fish Vaccination

The Innate Immune Response in Fish

The Adaptive Immune Response in Fish

Development, Production and Control of Fish Vaccines

Legal Requirements and Authorization of Fish Vaccines

Vaccination Strategies and Procedures

Inactivated Vaccines – Methods of Inactivation

(17)Attenuation Strategies - Bacterial Vaccines

(18)Attenuation Strategies - Viral Vaccines

(19)DNA Vaccines

(20)Adjuvants in Fish Vaccines

(21)Biosecurity and Vaccination in Aquaculture

(22)Vaccination Against Different Diseases in Aquaculture (I)

(23)Vaccination Against Different Diseases in Aquaculture (II)

(24)Side-Effects of Vaccination

(25)Future Fish Vaccinology

國際農業發展趨勢特論 4 選

本課程將介紹農業政策和經濟，其主題包括經濟政策、農業發展、當前農業問題與政策、農地政策、農田水利政策、農產運銷、農業金融、農民組織、農業推廣、農業科技、加入 WTO 對農業之影響及其因應對策。

Special Topics on Development Trends of International Agriculture 4 S

Trends of International Agriculture

This course is to introduce agricultural policies and economics in Taiwan. Its contents include: policies on economics, agricultural development, current problems and policies on agriculture, policies on farmland, policies on irrigation, marketing of agricultural products, agricultural finance, farmers' organizations, agricultural extension, agricultural technology, and impacts and responses of Taiwan's agriculture after its accession to WTO.

農業政策與經濟特論 4 選

本課程的目的是讓學生得知當前最近的國際農業發展情形，同時協助學生建立最新的世界，糧食生產及消費之世界觀。本課程之內容包括：(1)世界糧食供應情形，(2)世界穀類之貿易，(3)世界的肉類生產，(4)世界肥料之生產及消耗，(5)非洲的糧食供應現況，(6)世界不同國家人口別的糧食供應情形，(7)非洲的農藥改進，(8)針對第三世界糧食生產不足之解決方法。

Special Topics on Agriculture Policies and Economics 4 S

Policies and Economics

This course is to introduce the latest development of international agriculture and to help students acquire the updated global views on agricultural production. Its contents include: crop and food supply situations in the world, cereal in the world trade, global meat production, global fertilizer supply and consumption, food supply situation and crop prospects in sub-Saharan Africa and other countries, agricultural reform in Africa, and causes and solutions of under-nutrition in the third world.

談判與溝通 2選

本課程之目的，在於透過與商務談判有關的各項概念、程序、策略、與論理等事項的教學與演練，引領學員能夠習得談判的正確觀念與技巧及國際案例之剖析。

Negotiation Strategies and Tactics for Business 2S

The course employs instructions, discussions, and case studies to examine the concepts, processes, strategies, and ethical issues related to business negotiation.

『農業生產力 4.0 學分學程』規劃(草案)

一、設置目的

依行政院農業委員會規劃農業生產力 4.0 推動領域包括生技農產業、精緻農產業及精準農產業等三項，為因應未來生產環境調整，培育未來農業生產人力，特整合本校各系課程，規劃本校生產力 4.0 學分學程供學生修讀。

二、參與規劃學校：

國立屏東科技大學、國立高雄海洋科技大學、國立澎湖科技大學、美和科技大學、大仁科技大學、嘉南藥理大學、正修科技大學、南台科技大學、崑山科技大學

三、指導機構：行政院農業委員會

四、學程課程規劃

(一) 課程規劃原則

1. 學生跨領域學習：因應農業科技發之多元性，農業生產力 4.0 之人才培養應為跨領域培訓，讓學生在既有專業上加值生產力 4.0 之課程。
2. 建構跨校核心課程：為減輕各校對本學分學程基礎與核心課程之負擔，並培育各校生產力 4.0 種子教師，農業生產力 4.0 之觀念與核心課程將推薦學校教師組成授課團隊，共同研發教材與製作 MOOC 教案。
3. 各校自訂發展特色課程：為兼顧各校發展特色，本學分學程之應用課程由各校自行規劃。

(二) 課程規定

1. 本學程課程規劃為基礎課程、核心課程及應用課程等三類。
2. 修習本學程者，除須修讀基礎課程 8 學分外。核心課程至少修習 6 學分，應用課程至少修習 8 學分，而且每個課程屬性至少修習 2 個領域。學程修習學分數累積達 22 學分者由教務處發給『生產力 4.0 學程』專長證明。
3. 學程之學分抵免，最多以 8 學分為限。
4. 學生修習學程之課程科目應至少 6 學分以上為非原系(所)開設課程。

(三) 課程規劃內容

課程屬性	領域	課程名稱	學分/時數	開課單位
必修課程	通識教育	生產力 4.0 概論	2/2	通識教育中心
基礎課程	統計	統計學	3/3	管理學院
		生物統計	3/3	農學院
		工程統計	3/3	工學院
	生產環境	環境土壤學	3/3	工學院
		土壤與肥料	2/2	農學院
		生物環境控制工程與實習	3/4	工學院

課程屬性	領域	課程名稱	學分/時數	開課單位
		農田水利與實習	3/3	工學院
		農業氣象學	2/2	農學院
	生產技術	作物學	2/2	農學院
		植物學與實習	3/4	農學院
		水產養殖學	3/3	農學院
		動物學	3/3	農學院
		動物行為學	3/3	農學院
		木建築工程設計及實習	3/4	農學院
		家具製造工程實務	2/4	農學院
		菇蕈栽培技術	2/2	農學院
		食品加工	2/2	農學院
		食品加工實習	1/2	農學院
		育林學各論	2/2	農學院
	行銷管理	設計行銷與管理	2/2	農學院
		農業財務概論	2/2	農學院
		食品行銷	2/2	農學院
		農產行銷	3/3	農學院
		創意設計	3/3	工學院
		生產管理	3/3	管理學院
		行銷管理	3/3	管理學院
		行銷通路管理	3/3	管理學院
		供應鏈管理	3/3	管理學院
核心課程	自動化	自動化概論與實習	3/4	管理學院
		感測元件原理與應用	3/3	工學院
		自動控制	3/3	工學院
		智慧型機器人	3/3	工學院
		地理資訊系統與實習	3/4	農學院
		遙感探測與實習	3/4	農學院
		食品加工自動化元件與實習	3/4	農學院
	物聯網	電子商務	3/3	管理學院
		物聯網實務應用概論	3/3	管理學院
	巨量資料技術	資料探勘應用	3/3	管理學院
		決策分析概論	3/3	管理學院
		資料庫設計實務	3/3	管理學院
	智慧技術	新產品開發與實習	3/4	農學院
		商業智慧	3/3	管理學院
		創新與創業	3/3	管理學院
		雲端計算概論	3/3	管理學院
進階課程	生技農產業	保健食材之加工與應用	3/3	農學院
		食品生物技術	2/2	農學院
		醱酵學	2/2	農學院
		醱酵學實驗	1/2	農學院
		酵素應用技術	2/2	農學院
		酵素應用技術實驗	1/2	農學院

課程屬性	領域	課程名稱	學分/時數	開課單位
		木竹炭應用實務	2/2	農學院
		生物質利用與產品開發實務	2/4	農學院
	精緻農產業	機能性食品理論與應用	2/2	農學院
		魚類養殖技術	2/2	農學院
		紙品與包裝設計實務	2/4	農學院
		機能性木材應用實務	2/4	農學院
		生態旅遊與實習	3/4	農學院
		社區林業與實習	3/4	農學院
		園藝種苗生產技術	2/2	農學院
		植物繁殖技術	2/2	農學院
		糧食作物學	2/2	農學院
		特用作物學	2/2	農學院
	精準農產業	文創商品設計實務	2/4	農學院
		園藝作物產期調整	2/2	農學院
		作物營養管理與診斷技術	2/2	農學院

