

99 學年度第 2 學期 第 1 次教務會議 提案傳閱附件目錄

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100年4月20日

傳閱附件 1、(提案一) 100 學年度各系所課程新增、更名案中英文摘要

1-1、農學院

各系所新增、更名變更課程中英文摘要**(一) 野保所：****野生動物經營管理特論 (英語授課)****2 選**

孫元勳、蘇秀慧

本課程旨在應用野生動物族群生態與行為模式之知識，處理人與野生動物互動及衝突之經營管理，以及野生動物棲地經營管理之議題。本課程以靈長類生態與行為，靈長類、鹿科、豬科動物之作物危害，以及鷺科鳥類魚池危害之經營管理為例，探討人與野生動物衝突經營管理的相關議題。野生動物棲地經營管理則著重於，生態廊道應用於野生動物族群經營管理相關議題之探討。本課程將以課堂講演、實驗室操作及野外相關研究場域參訪之不同形式上課方式進行。

Special Topic in Wildlife Management 2 S

This course aims at applying ecology and behavior of wildlife on managing human-wildlife interactions and conflict, as well as wildlife habitats. We emphasize on behavior and ecology of wildlife, and deal with management issues of human-wildlife conflict from primates, deer, wild boars and birds of family Ardeidae. The application of ecological corridors to wildlife habitat management is to be discussed. The course will be delivered by lectures, laboratory and field trips to study sites for wildlife-management relevant research.

保育遺傳學特論**3 選**

本課程為保育遺傳學的進階課程，課程宗旨在於指導學生將遺傳學應用於野生動物生態與保育之研究，並提供學生實際操作之機會。固定上課內容包含：親緣關係、親子關係、瓶頸效應、族群分化等。此外亦可針對學生需要，安排（但不限於）下列內容：分子演化、溯祖理論、隔離-遷徙模式、族群可存活率分析、野生動物遺傳經營管理。上課方式包含課堂講解與軟體操作，及部分實驗室操作。

Special Topics in Conservation Genetics 3 S

This course is an advanced extension from conservation genetics. The purpose of this course is to instruct students to apply genetics on wildlife ecology and conservation and also provide hands-on experiences. The contents will cover the analysis of phylogeny, parentage, bottleneck events, and population differentiation. Besides, this course can be tailored according to students' needs and provide, but is not limited to, the following topics: molecular evolution, coalescence theory, isolation with migration model, population viability analysis, wildlife genetic management. Classes include lectures, software operation and lab when necessary.

(二) 農園系：**有機農業之土壤管理實習****1 選**

王鐘和

本課程藉由實際操作讓學生對有機農田土壤、有機質肥料及兩者與作物生產間的關係有更深刻的印象。實習內容包含：有機農場土壤樣品的採集與調製，土壤酸鹼度與電導度之測定，不同土壤 pH 值對作物生育的影響，土壤有機質和有效態養份的測定，有機質肥料用量實驗，不同堆肥成熟度對作物生育的影響等。

Practice of Soil Management of Organic Farming 1 S C. H. Wang

The laboratory course uses hands-on experiments to let students know more about properties of soils,

organic fertilizers and their roles in crop production. The experiments include soil sampling and preparation, measurement of soil pH and electric conductivity, pH effect on crop growth and development, soil organic matter and available nutrients analysis, optimizing organic fertilizer application, and compost maturity on crop growth and development.

取樣理論與方法

2 選

謝清祥、下

本課程內容將先介紹樣本與母族群間之關係，採樣問卷調查之方式、問卷之設計方法與建立。另，各類取樣方法如：簡單隨機取樣、階層取樣、複階層取樣、聚集取樣及複合式取樣方式介紹均將詳細討論。各取樣分析方法之各項統計介量計算與分析方法亦於課程中介紹。最後課程中亦會討論野外族群調查方法，取樣方式及其介量分析。

Sampling Theories and Techniques

2 S

C. H. Hsieh, S

The course will introduce the relationship between sample and population, questionair establishment, design, perform, and analysis methods. Sampling methods such as simple sampling. stratify sampling、multiple stratify sampling、cluster sampling and combined sampling will be discussed in the course. The statistical calculations of the parameters associated with above sampling methods will also be introduced. The sampling method for outdoor population, their parameter analysis will also be included in the course.

作物分子標誌輔助育種

2 選

李鎮宇、下

作物分子育種課程主旨在於教授學生如何利用作物雜交育種，生物資訊與核酸分子技術，其中包含聚合酶鏈鎖反應，即時定量聚合酶鏈鎖反應以及生物晶片等技術，將親代與子代之間選育性狀調查與分子數據進行比較分析，以達到作物育種性狀之基因定位，而能有效率地進行田間作物各項育種目標性狀之品種選育工作。

Molecular Marker-Assisted Selection

2 S

C.Y. Lee

in Crops

The class is aimed to introduce crop hybridization, bioinformatics, and molecular technologies including PCR (polymerase chain reaction), real-time qPCR (Real time quantitative PCR), and microarray. For genetic mapping of molecular markers, the relationships of the character of crop and genetic data are established between the parent lines and their progeny by statistics. The learning objectives may translate into greater efficiency and accelerated development for crop breeding with target-characters in fields.

(三) 植醫系：

攝影在植物醫學上的應用

2 S

將近兩百年前，現代攝影發足，逐漸滲透、影響我們的生活及專業各個領域。本課程祈使修習植物醫學的同學能廣泛瞭解現代攝影的基礎內涵，並能運用攝影作為學習及研究上的輔助工具。課程內容分成三部分，首先從攝影簡史開始，相機、鏡頭、配件的介紹，到相關概念的說明。

其次是微距攝影，包括常用器材、常用輔助工具或裝置。最後是作品(包含作業)的討論。

Photography in Plant Medicine

2 S

Nearly two hundred-years ago, modern photography initiated and influenced not only our daily life but also professional careers. The course designed to provide students major in plant medicine

with basics of photography and hopefully as aids for studying and research. The course composed of three different parts. First of all , basics on photography , includes formats and mechanics of cameras 、 lenses 、 accessories etc..Secondary, focused on micro photography, equipments and sorts of special sets-up wil be discussed. Finally, photos (includes home works) will be displayed and discussed by all class members.

(四) 食品系：

食品科學海外專業實習

2 選 許祥純、廖遠東,上

本課程旨在提供本系學生海外專業實習，以瞭解國際產業現況並加強食品科學專業能力之養成，進而培養良好工作態度與增進現場實作能力。同時開展學生國際觀，達到增強學生就業能力之目標。

Overseas Practice of Food Science 2 S F

This course provides the oversea training to students in the department of Food Science. The students will realize current status of food industry, enhance their professional capacity, working attitude, and practical ability. The goal of this course is to broaden students' global view and increase their industrial experience and career capacity.

(五) 動畜系：

標記輔助選拔與基因選種

2 選 張秀鑾,上

本課程旨在培養研究生具備科技選種之理論基礎與技術，內容主要包括四部分；(1)應用表型性能記錄與系譜之傳統評估法、最佳線性預到法(BLP)與最佳線性無偏預測法(BLUP)等遺傳評估方法之回顧與複習；(2)分子遺傳資訊介紹，包括應用孟德爾模式與主效基因模式於已知基因座效應分析；(3)標記輔助選拔介紹，包括理論基礎、直接與間接標記應用、數量性狀基因座之遺傳評估，以及基因選種之應用；(4)最佳化的選種策略。

Marker assisted selection and genomic breeding 2 S H . L . Chang ,F

The objective of this course is to educate graduate students with solid science and technology background in breeding and selection . Course content mainly covers four parts : (1) recall traditional genetic evaluation , using phenotype and pedigree , BLP and BLUP ; (2) introduce molecular information , including Mendelian models and major gene models for known gene ; (3) introduction to marker assisted selection with focus on basic principles , consequences and application with direct and indirect markers , genetic evaluation of QTL-BLUP , and its application on genomic breeding ; (4) optimize selection Strategy .

養豬學特論

2 選 夏良宙,上

本課程之主要目的在讓學生學習最新之養豬學，課程內容包含：1.豬隻品種、2.建立豬群：選育和評分、3.種豬選育和展示、4.豬隻遺傳、5.豬隻繁殖、6.豬隻營養、7.豬隻飼養標準、飼料配方和餵飼計畫、8.餵飼豬隻穀物與高能量飼料、9.豬隻飼糧中的蛋白質與胺基酸、10.豬隻的芻料、11.豬隻行為與環境、12.豬隻飼養管理、13.豬隻健康、疾病預防和寄生蟲的控制、14.豬隻的畜舍與設備、15.肉豬上市與屠宰、16.豬肉及其副產物、17.商業性的豬隻生產。

Special Topics on Pig Production 2 S L . C . Hsia ,F

The purpose of the course is to let students learn the recent advances in pig production . The content of the course will include : 1.breeds of swine、2 .establishing the herd ; selecting and judging swine、3. selecting , fitting , and showing swine、4. Principles of swine genetics、5. reproduction in swine、6.fundamentals of swine nutrition、7.swine feeding standards , ration formulation , and feeding programs、8. grains and other high energy feeds for swine、9.protein and amino acids for swine、10.forages for swine、11.swinc behavior and environment、12.swine management、13.swine health , disease prevention , and parasite control、14.buildings and equipment for swine、15.marketing and slaughtering hogs、16.pork and byproducts from hog slaughter、17.business aspects of swine production.

幸福寵物學

2

選

陳道杰,上

本課程內容主要經由豐富且生動的演講型態，讓選課的同學更了解照顧各種不同寵物的方法，並藉由不同的專業的各分科醫師，以輕鬆幽默上課方式引導「同學尊重生命，愛護動物」，並且對寵物市場商機有初步的瞭解認知。

Happypettology

2

S

Tao Chieh Chen F

This curriculum content mainly by way of rich and vivid lecture state , lets schoolmate who chooses the class understand that looks after each kind of different pet the method , and divides into separate fields doctor respectively because of the different specialty , by relaxed attends class the way guidance " schoolmate to respect the life humorously , cherishes the animal " , and has the preliminary understanding cognition to the pet market opportunity .

(六) 獸醫系：

鴿病學

2

選

蔡信雄，

臨床獸醫師在執業中有機會遇到鴿子送檢。本課程主要目的地的是提供診斷及治療常見鴿子疾病問題，為主要的教材。內容包括疾病之發病機序、病理變化及繁殖障礙之控制、消毒及預防等基本概念與操作。期能使學生瞭解疾病之治療及預防之實際處理方式。

Pigeon Diseases

2

S

S. H. Tsai,

Most veterinarians in the practice have the opportunity to treat pigeons. The purpose of this course is to provide the basic information required to diagnose and treat the common diseases of pigeons. This course is designed to precisely discuss the pathogenesis, pathological changes, diseases prevention, and reproductive disorders currently occurred in Taiwan. We expect the students will understand how to treat and prevent pigeon diseases in the practice.

鴿病學實習

1

選

蔡信雄，

本課程主要目的地的是提供診斷及治療常見鴿子疾病問題，為主要的教材。內容包括疾病之發病機序、病理變化及繁殖障礙之控制、消毒及預防等基本概念與操作。期能使學生瞭解疾病之治療及預防之實際處理方式。

Practice of Pigeon Diseases

1

S

S. H. Tsai,

The purpose of this course is to provide the basic information required to diagnose and treat the common diseases of pigeons. This course is designed to precisely discuss the pathogenesis, pathological changes, diseases prevention, and reproductive disorders currently occurred in Taiwan. We expect the students will understand how to treat and prevent pigeon diseases in the practice.

鴿病學特論

2 選

蔡信雄，上

本課程目的，在使研究生專題研究有關鴿病學領域有更深入的探討以及相關鴿病學診斷技術的建立。本課程將根據特定研究課題，針對某特定鴿子疾病之臨床診斷與預防方法，進行實際的技術開發與研究報告的討論。

Special Topic in Pigeon Diseases

2 S

S. H. Tsai, F

The purpose of this course is to help graduate students taking inside study on specific topic of pigeon diseases and also setting up its related diagnostic technique of pigeon diseases for their own research. For improving the graduate students on the specific topics, for instance, clinical diagnosis and prevention of special pigeon diseases, and will develop special techniques on processing their research and discuss update related reports in the course.

養豬醫學診療實習(1)

1 選

鍾文彬、張聰洲、邱明堂

本課程為「養豬醫學」專科醫師養成教育之第一年基礎課程，以本校動物醫院及南部各養豬場之豬隻為實習對象，進行豬隻健康管理相關知識與技術之現場實習。授課內容包括豬隻傳染及非傳染性疾病診療、豬隻群體健康管理、豬隻生產及現場群體健康診療等技術之基礎訓練。

Clinical Practice of Swine Medicine (1),

1 S

W.B. Chung, T.C. Chang,
M.T. Chiou

This course is designed for the first-year graduate students planning to specialize in 「swine medicine」. Participants will be provided with clinical practice regarding the knowledge and skills in swine health management. Animals involved in the clinical practice include the pigs registered in the Animal Hospital of NPUST and the animals from pig farms in southern Taiwan. The contents of this course include the clinical training in the diagnosis, treatment and control of individual infectious and non-infectious swine disease, swine herd health management, swine production, and on-farm swine herd health and disease control program.

養豬醫學診療實習(2)

1 選

鍾文彬、張聰洲、邱明堂

本課程為「養豬醫學」專科醫師養成教育之第一年基礎課程，以本校動物醫院及南部各養豬場之豬隻為實習對象，進行豬隻健康管理相關知識與技術之現場實習。授課內容包括豬隻傳染及非傳染性疾病診療、豬隻群體健康管理、豬隻生產及現場群體健康診療等技術之進一步訓練。

Clinical Practice of Swine Medicine (2)

1 S

W.B. Chung, T.C. Chang,
M.T. Chiou

This course is designed for the first-year graduate students planning to specialize in 「swine medicine」. Participants will be provided with clinical practice regarding the knowledge and skills in swine health management. Animals involved in the clinical practice include the pigs registered in the Animal Hospital of NPUST and the animals from pig farms in southern Taiwan. The contents of this course include the advanced clinical training in the diagnosis, treatment and control of individual infectious and non-infectious swine disease, swine herd health management, swine production, and on-farm swine herd health and disease control program.

養豬醫學診療實習(3)

1 選

鍾文彬、張聰洲、邱明堂

Cooperation

The curriculum aims to instruct the students to recognize the current development trend of international fisheries and aquaculture industries. And the technical assistance in terms of sustainable fisheries and aquaculture techniques for developing countries in Africa, Central and South America, Caribbean as well as Asia and Pacific region from the Republic of China (Taiwan). By way of the methodologies of Project Cycle executed, engaging in comparative analysis on successful and unsuccessful project, to facilitate understanding of the comprehensive operational strategies and approaches on Taiwan's international fisheries and aquaculture cooperation.

餌料生物培養技術專論

2

選

劉俊宏

本課程係著重於世界新穎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。

Advanced Topics on Live Food Culture in Aquaculture

2

S

C. H. Liu

The course is focused on the current developed techniques on the cultivation of live foods, and the related research methods in the world. In addition, the nutrition of live foods and techniques of nutritional improvement are chosen for discussion.

養殖環境管理與永續利用專論

2

選

葉信平

本課程包括回顧永續發展的由來及其在水產養殖上之應用、其次為國內外推行永續水產養殖的現況：含有機養殖魚類、水產養殖對環境的衝擊及因應之道、範例國家探討—以臺灣、日本、中國大陸、挪威、泰國等國為代表。

Advanced Topics in Sustainable Aquaculture

2

S

S. P. Yeh

This lecture comprises of the historical reviews of the sustainable development and its application to aquaculture, and prospects of current employment of sustainable aquaculture: green grow the fishes, environmental impact from aquaculture and its solution, and examples of major countries of aquaculture production such as Taiwan, Japan, mainland China, Thailand and Norway.

分子生物學專論

2

選

葉文吉

本課程以分子生物學為基礎，針對學生研究主題，探討其在分子生物學上之意義，並詳細介紹基因結構、調控機制、基因轉殖的分子生物學。

Advanced Topics in Molecular Biology

2

S

W.J. Yeh

Based on the fundamental knowledge of molecular biology the course will be focused on the structure of gene, the regulating mechanisms and gene transfer in molecular biology, which are depended on students' researches.

魚類營養學專論

3

選

邱謝聰

魚類與甲殼類需要之營養素包括蛋白質、脂肪、維生素與礦物質等、營養素之消化與代謝、非營養素之有害物質、營養素之各別需求量及飼料之組成要件等。

Advanced Topics in Fish Nutrition

3

S

S. T. Chiu

Nutrients for fish or shrimp included protein, lipid, vitamin and mineral, digestion and metabolism, nonnutrition diet components and feed formulation.

甲殼類生理學專論 **3** **選** **鄭文騰**

本課程之目的是教導學生了解甲殼類生理調節機制，其內容包括甲殼類內部結構、滲透壓及離子的調節、消化吸收與代謝、氧氣的吸收與運送、酸鹼的平衡調節、生殖生理等。並藉由最近甲殼類生理學研究之介紹，使學生瞭解甲殼類生理學相關研究之現況。

Advanced Topics in Crustacean Physiology **3** **S** **W. T. Cheng**

The purposes of this course are teaching students about the mechanism of physiological regulation in crustacean. The courses will include 1) internal anatomy, 2) osmotic and ionic regulation, 3) digestion and metabolism, 4) oxygen uptake and transport, 5) regulation of acid-base balance and reproductive physiology of crustacean. In addition, the newly advanced researches in crustacean physiology will also be introduced in the course to make students better understand the research status of crustacean physiology.

甲殼類繁殖專論 **2** **選** **鄭文騰**

介紹甲殼類最新繁殖技術，以及其生態、生殖生理及生物技術等研究新知之應用。以選定之甲殼類物種進行各階段繁殖之深入探討。

Advanced Topics on Propagation and Culture in Crustacean **2** **S** **W. T. Cheng**

Overall introduction on the current techniques and future trends of artificial propagation in crustacean, and the application of new knowledge in ecology, reproductive physiology, and biotechnology. The further discussions are conducted of the propagation in selected crustacean.

水產生物技術應用專論 **2** **選**

探討水產生物技術在繁殖力的改進、生長的促進、環境適應性的改良、水產疫苗的研發與應用。

Advanced Topics on Application of Biotechnology in Aquaculture **2** **S**

Introduce the application of biotechnology on the promotion of reproductive capacity and growth, improvement of the adaptation to environment, and the development and application of vaccine in aquaculture.

分子生物學專論 **2** **選** **葉文吉**

本課程以分子生物學為基礎，針對學生研究主題，探討其在分子生物學上之意義，並詳細介紹基因結構、調控機制、基因轉殖的分子生物學。

Advanced Topics in Molecular Biology **2** **S** **W.J. Yeh**

Based on the fundamental knowledge of molecular biology the course will be focused on the structure of gene, the regulating mechanisms and gene transfer in molecular biology, which are depended on students' researches.

魚類營養學專論 **3** **選** **邱謝聰**

魚類與甲殼類需要之營養素包括蛋白質、脂肪、維生素與礦物質等、營養素之消化與代謝、非營養素之有害物質、營養素之各別需求量及飼料之組成要件等。

藻類生理生態專論 **3** **選** **翁韶蓮**

課程包括藻類之 1.型態、生活史和分化 2.生態系中海藻群落之關係 3.藻類間之交互作用 4.光和光合作用出及生產力 5.營養鹽對成長與生理之影響 6.溫度和鹽度對生理之影響 7.水流與藻類生理 8.污染 9.藻類大規模養殖等。

Advanced Topics on Physiological Ecology of Seaweed **3** **S** **S.L. Wong**

Class will be divided into several sections. Communities and morphogenesis formerly served to review the introduction of the organisms and their interactions within community. Biological interaction between (and among) species. Light、photosynthesis and primary production. Effect of nutrients, temperature and salinity on physiology and growth of algae. Water motion relates to algae physiology. Kinds of pollution algae in the world.

魚類環境生理學專論 **2** **選** **陳英男**

主要內容為魚類(原口類、軟骨魚類及硬骨魚類)生理現象、調控機制及生態環境與魚類生理間之交互作用等課程的介紹及討論。

Advanced Fish Physiology and Ecology **2** **S** **Y.N. Chen**

Overall introduction and discussions on the physiological phenomena and regulatory mechanisms, and the interaction of environmental conditions and fish physiology will be included in the course.

實驗設計與生統分析 **2** **選** **葉信平**

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** **S.P. Yeh**

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** **葉信平**

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。

Pratice of Experimental Designs and Biostatistical Analysis **1** **S** **S.P. Yeh**

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.

養殖經濟與經營管理專論 **2** **選** **陳英男**

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產養殖產業之關鍵因素，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

The lecture includes the infecting mechanism of serious viral, bacterial and protozoal diseases in the aquatic organisms, and the latest diagnostic technique.

無脊椎動物免疫專論

3

選

鄭文騰

本課程除了介紹無脊椎動物免疫系統外，內容主要是免疫機制的調節徑路及可能影響免疫系統之內在或環境因子介紹。

Advanced Topics on Invertebrate

3

S

W.T. Cheng

Immunology in Aquaculture

The lecture includes the infecting mechanism of serious viral, bacterial and protozoal diseases in the aquatic organisms, and the latest diagnostic technique.

1-2、工學院

(一) 機械工程系：

自動化工程 3 選 **林宜弘、下**

以『控制』的觀念為主，培養自動化控制的能力，並能應用機器設計的能力，以構想出一套自動化設備之能力。課程內容包括自動化流程的設計，自動化元件與感測器使用知識，自動化裝配系統的設計，可程式控制器技術，此課程培訓學生具有實務性的設計能力，使學生瞭解可程式邏輯控制器的程式撰寫觀念與技巧，養成可程式邏輯控制器的實務應用能力。

Automatic Engineering 3 S **Yi-Hong Lin,S**

Automatic Engineering is very important technique applied in industrious area. This course will introduce the design automation process, the useful knowledge of automatic devices and sensors, the automatic assemble system design and PLCC controller technique. The goal of this course will train students with the strong fundamental discipline automatic engineering and practical design ability.

數位控制系統設計 3 選 **劉思正、下**

本課程學習數位控制系統設計的方法，並研討與控制系統相關的論文。課程以 Matlab 軟體來輔助控制系統之分析與設計：學習各種指令及 SIMULINK 程式寫作技巧，並進行時域與頻域分析及控制器設計。

Digital Control System Design 3 S **H.J. Liu,S**

This course studies digital control system design, with dual emphasis on presentation and discussion of current control researches. Also, this course studies MATLAB toolboxes to perform control system analysis and design: from basic MATLAB commands, Simulink programming techniques, to time-domain and frequency-domain analysis, as well as controller design.

人工智慧 3 選 **吳德和、下**

這門課程向學生介紹了人工智慧的基礎知識表達、解決問題和學習方法。幫助學生獲得敏銳的洞察能力，知悉在不同環境下是如何運用人工智慧，選擇強化課程的學生須完成專題，內容著重於人工智慧的應用和關於科學方面的特質。修完課程後，學生將具備以下能力：組織具體計算問題的答案，用於開發出智慧系統；理解知識表示、問題求解和學習方法在智慧系統工程中的作用；在由計算的角度了解人類智慧當中，正確地評價問題解決方式、洞察力和語言。

Artificial Intelligence 3 S **Der-Ho Wu, S**

This course introduces students to the basic knowledge representation, problem solving, and learning methods of artificial intelligence. It features are to help students gain intuition about how artificial intelligence methods work under a variety of circumstances. An intensified version of the course offers students the opportunity to complete projects which focus on the application and science aspects of artificial intelligence. Upon completion of this course, students should be able to develop intelligent systems by assembling solutions to concrete computational problems, understand the role of knowledge representation, problem solving, and learning in intelligent-system engineering, and appreciate the role of problem solving, vision, and language in understanding human intelligence from a computational perspective.

品質工程 3 選 **吳德和、下**

電池、以及有機太陽能電池。

The Design and Trend of Original Solar Cell 3 S Chuen-Shii Chou,S

This course provides fundamental aspects of the solar cell and includes theory, materials and preparation of solar cell. The content of this course includes the introduction of global warming and renewable energy, fundamental physics of photovoltaic materials, and the processes of manufacturing silicon solar cells, thin film solar cells, and organic solar cells.

(二) 水土保持系： 坡地工程地質分析

本課程旨在訓練學生瞭解山坡地地質特性，並學習地質調查分析技術與原理，應用於開發利用時所遇到的坡地工程地質問題，並依地形、坡向、地質與岩層走向等分析，規劃選擇安全兼顧環境景觀與觀光發展的坡地工程。

Geology Analysis of Slope Land Engineering

The goal of the course is designed to offer students to realize the slope land geology characteristics and to learn the geology investigation, analysis technological and it theory in the development and using problem of slope land geology engineering. The principles of runoff analysis, open channel hydraulics, soil mechanics, and transportation engineering will be covered in this course. Base on the analysis results of terrain, aspect, geology and trend of rock stratum to design and select the slope land engineering with more safety, environmental landscape and tourism development will include in the course.

1-3、管理學院

(一) 時尚設計與管理系：**時尚髮型設計****2 選****謝清秀、下**

課程目標在運用剪、燙、染、整、梳髮等各技巧組合搭配與多元化的學習。強調髮型整體設計，配合設計造型實務，以現場示範教學方式，引導學生在理論與實務上能掌握與設計具流行感的髮型。配合共同實際參與資料整理運用於髮型設計中，以達成學術並重的目的。

Fashion Hair Design**2 S****Ching Hsiu Hsieh 、S**

This course is aimed to apply the combinative techniques and comprehensive study through hair cutting, perming, coloring, combing etc into hairstyle. By using practical teaching method of demonstration emphatic the whole hairstyle in order to lead students are able to handle and design fashionable hair styling in the theoretical and practical practice. Operation with research and arranging the information to apply into the hairstyle to conclude the balance of the theoretical and practical purpose.

時尚髮型設計實習**1 選****謝清秀、下**

課程目標在練習剪、燙、染、整、梳髮等各技巧組合搭配與多元化的學習。強調髮型整體設計，配合設計造型實務，以現場示範教學方式，引導學生在理論與實務上能掌握與設計具流行感的髮型。配合共同實際參與資料整理運用於髮型設計中，以達成學術並重的目的。

Practice of Fashion Hair Design**1 S****Ching Hsiu Hsieh 、S**

This course is aimed to apply the combinative techniques and comprehensive study through hair cutting, perming, coloring, combing etc into hairstyle. By using practical teaching method of demonstration emphatic the whole hairstyle in order to lead students are able to handle and design fashionable hair styling in the theoretical and practical practice. Operation with research and arranging the information to apply into the hairstyle to conclude the balance of the theoretical and practical purpose.

餐旅產業個案研究**3 選****蘇衍綸、下**

本課程以個案教學法探討餐飲及旅館業實際個案，訓練學生邏輯思考和問題解決能力，培養人際互動及創意新觀。本課程精選台灣餐飲及旅館產業具代表性的個案，採研讀個案、應用問題解決模式、參與課堂討論及撰寫書面報告等個案教學步驟進行。個案主題內容包括經營策略、行銷策略、企業文化、永續發展模式等議題。

Case Studies in Food Service and Hotel Industry**3 S****Y. L. Su 、S**

This course uses executive cases to help students respond to real-life industry challenges in the operation of commercial food service and hotel establishments. Case studies explore the strategical management, operational management, marketing management, organizational culture and sustainable development issues.

(二) 高階經營管理碩專班：

文化創意產業管理專題

3 選

陳秀足

文化創意設計專題教學目標：以文化內容為本，創意為核心價值，結合設計學術與產業發展實務為導向，進行相關文化知識的探勘，文化元素的萃取與創意加值的轉化應用研究。

**Special Topics on Culture and
Creation Industry**

3 S

Shiu-Tsu Chen

Course Outline：

1. Introduction to cultural creative design
2. Innovative design of local culture
3. Design example of local cultural application
4. Cultural Innovation Industry and Marketing
5. Cultural Innovation and value-added design and implementation
6. Concepts of Cultural Innovative product commercialization
7. Project research production

1-4、人文學院

(一) 幼兒保育系：**幼兒遊戲****2 選**

本課程之目的在介紹遊戲在生理上可以促進幼兒身體發展、動作發展；在心理上可以增進幼兒智能發展、認知發展、創造力發展、情緒發展、語言發展、道德發展、人格發展等；在社會上可以增長幼兒社會發展，有利於培養幼兒人際互動的技巧。

Early Childhood Play**2 S**

This course is to introduce may promote the children body development movement development in the physiology to be possible to promote the baby intelligence development cognition development creation movement development in the psychology to be possible to promote the baby intelligence development cognition development creativity development mood development language development morals development personality development in the psychology and so on to be possible to grow the baby social development in the society to be advantageous in raises the skill which the baby interacts interpersonally.

幼兒發展與保育**2 選****王淑清、下**

本課程旨在使學生學習有關兒童發展基本知識，其內容包含：生理發展、智力發展、情緒發展、語言發展、人格發展、社會發展、創造力發展及支持兒童適性發展的環境。

Child Development and Care**2 S****Shu-Ching Wang 、S**

A study of the child from birth to eight years of age including current theories of child development in relation to physical, psychological, and sociological growth and maturation. Emphasis is on the oncept of the whole child and how adults can provide a supportive environment for positive interactions with children.

學前融合教育實習**4 選****蔡惠玲、業界師資**

本課程旨在使學生習得帶領融合班級的現場實務經驗，包括從教學現場督導的教學觀摩中體驗如何落實學前融合教育之因材施教理念，並從實際試教實務中瞭解如何將特殊需求幼兒的個別化教育計畫目標融入教學課程中，從與家長與相關專業人員互動中體驗如何營造及維護一個良好的學前融合教學及學習生態環境。

Practicum for Early Childhood Inclusive Education 4 S**Instructors : Tsai, Huei Ling and field mentors**

The goal of this course is to help students to create and maintain an environment which is healthy and educational to promote maximum development for all children. Students will learn through observing the practicum mentor's everyday teaching strategy, communication skills with parents and professional team members, and also design and carry out teaching plans that include the IEP goals for children with special needs.

學前融合教育課程設計**2 選****王淑清、張富萍、業界師資**

本課程旨在培養學生學前融合教育課程設計的能力，以便日後勝任學前融合教育的教學工作。其主要的內容包含學前融合教育課程設計的基本概念、個別化教育計畫與教學活動調整策略、學前融合課程設計的理論取向與幼兒教育課程之內容與

組織、課程設計的模式及學前融合課程設計單元活動示例。

Curriculum Design for Early Childhood Inclusive Classroom 2 S

Instructors : Wang, Shu-Ching、Chang, Fu-Ping and field mentors

The purpose of this course is to increase the students' ability in curriculum design and train students to become a competent early childhood inclusive classroom teacher in the future. The main contents of this course contain the basic concepts of curriculum design, teaching activity, and the curriculum patterns in early childhood inclusive classroom. Examples of current early childhood inclusive education curriculum will be shared by professional early childhood inclusive education teachers and practitioners.

特殊嬰幼兒個案專題研討 2 選 蔡惠玲、徐庭蘭、業界師資

本課程旨在深入探討各種不同特殊需求兒童的障礙類別與療育方式。以個案探討的方式，從不同國內外案例瞭解不同特殊需求兒童障礙類別與成因以及提供特殊需求兒童完整照顧與療育的重要性與實況，期能增進對特殊需求兒童類別的認識，進而成為特殊需求兒童權益的擁護者。

Seminar on Special Topics of Children with Special Needs 2 S

Instructors : Tsai, Huei Ling、Hsu, Ting-Lan and field mentors

The course is designed to explore different conditions of children with special needs. Through case study from abroad and domestic to understand the cause and treatment of a specific disability and the possibilities of the child when proper treatment and care is provided. In hope that students will become an advocator for all children with special needs.

特殊嬰幼兒測驗與評量 2 選 蔡惠玲、鄭芬蘭、業界師資

本課程旨在瞭解早期發展篩檢與特殊嬰幼兒測驗評量的理論依據與目的，並熟悉各種適用於特殊需求兒童之發展測驗工具的施測、操作與結果判讀。藉由示範與實際操作，精熟測驗等過程，練習施測並向家長解釋測驗結果，期能強化學生在特殊嬰幼兒發展測驗實際操作以及與家長溝通測驗結果的能力。

Measurement and Evaluation for Children with Special Needs 2 S

Instructors : Tsai, Huei Ling、Cheng, Finland and field mentors

The course is designed to investigate the theoretical concepts and purposes of developmental evaluation and to become competent in operating developmental evaluation instruments for children with special needs. Direct experience with different instruments will be provided to enhance the ability in delivering the measurement and to communicate the results with the parent.

學前融合教育專業團隊 2 選 蔡惠玲、業界師資

本課程旨在認識並瞭解參與學前融合教育之專業團隊（語言治療師、物理治療師、職能治療師、社工員、學前特教老師、辦理學前融合教育之幼托園所長、小兒科醫師、藝術治療師、音樂治療師等）分享其各自扮演的角色，與其為學前特殊幼兒及其家庭所提供的各項服務內容以及彼此團隊合作經驗分享。

Professional Team Members in Early Childhood Inclusive Education 2 S

Instructors : Tsai, Huei Ling and field mentors

The purpose for this course is to provide opportunities for early childhood teachers to know about

the professional team members in the early childhood inclusive education. Professionals include: language therapist, physical therapist, occupational therapist, art therapist, musical therapist, social worker, pediatrician, early childhood special education teacher, and administrators in early childhood institute will be invited to come and share their role in providing services for children and family with special needs.

傳閱附件 2、(提案二) 新增、更名課程規劃

2-1、國際學院熱帶農業暨國際合作系(四技) 必選修科目表

四年制 熱帶農業暨國際合作系 (Curriculum Table for Undergraduate Program)

教育目標

1. 培育熱帶及國際農業基礎專業人才。
2. 傳承農業科技和永續經營的生態環境。
3. 促進農、林、漁、牧專業技術的發展。

植物生產組畢業學分總表 (Plant Production Group)

必修科目總稱 Names of Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		第三學年 3 rd Academic Year		第四學年 4 th Academic Year		備註 Remarks	
		1st semester	2nd semester	1st semester	2nd semester	1st semester	2nd semester	1st semester	2nd semester		
校定共同必修 科目(一) Common courses required by university	34	5	7	5	5	6	6	0	0	本 國 生	畢 業 學 分 Credits counted toward graduati on
	40	7	9	6	6	6	4	2	0	外 籍 生	
專業共同必修 科目 Common courses required for specialty	14	6	2	3	0	3	0	0	0	國際學院(二) Credits required by college	
	26	2	3	5	3	5	5	2	1	系定(三) Credits required by department	
植物生產組專業 必修科目 Courses required for group specializing in plant production	26	5	0	6	6	3	3	3	0	系組定(四)	
植物生產組專業 選修科目 Elective courses required for group specializing in Plant Production	20	2	2	0	1	0	0	5	10	生 本 國	植 物 組 (五)
	14	0	0	0	1	0	0	3	10	生 外 籍	
系專業選修科目 Elective Courses Plant Production and Animal Production	10	0	0	0	2	2	2	4	0	(八)	
合 計 Total	130	16	18	19	17	19	16	14	11	生 國 本	
		16	18	20	18	19	14	14	11	生 籍 外	

動物生產組畢業學分總表 (Animal Production Group)

必修科目總稱 Names of Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		第三學年 3 rd Academic Year		第四學年 4 th Academic Year		備註 Remarks	
		1st semester	2nd semester	1st semester	2nd semester	1st semester	2nd semester	1st semester	2nd semester		
校定共同必修 科目(一) Common courses required by university	34	5	7	5	5	6	6	0	0	本 國 生	畢業學分 Credits counted toward graduation
	40	7	9	6	6	6	4	2	0	外 籍 生	
專業共同必修 科目 Common courses required for specialty	14	6	2	3	0	3	0	0	0	國 際 學 院 (二)	Credits required by college 系定(三) Credits required by department
	26	2	3	5	3	5	5	2	1		
動物生產組專業 必修科目 Courses required for group specializing in Animal Production Group	25	0	2	6	1	6	2	7	1		系組定(六)
動物生產組專業 選修科目 Elective courses required for group specializing in Animal Production	23	4	0	0	5	0	2	6	6	本 國 生	動物組 (七)
	17	2	0	0	4	0	2	3	6	外 籍 生	
系專業選修科目 Elective Courses Plant Production and Animal Production	8	2	0	0	2	0	0	0	4		(八)
合 計 Total	130	15	18	19	16	20	15	15	12	本 國 生	
		15	20	20	16	20	13	14	12	外 籍 生	

(一) 校定共同必修科目 (Courses Required by University)

必修科目總稱 Names of Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		第三學年 3 rd Academic Year		第四學年 4 th Academic Year		備註 Remarks
		1 st semester	2 nd semester	1 st semester	2 nd semester	1 st semester	2 nd semester	1 st semester	2 nd semester	
		外籍生必修 Foreign Students Required Courses								
應用華語 (1) Applied Mandarin (1)	2	2								
應用華語 (2) Applied Mandarin (2)	2		2							
應用華語 (3) Applied Mandarin (3)	2			2						
應用華語 (4) Applied Mandarin (4)	2				2					
應用華語 (5) Applied Mandarin (5)	2					2				
應用華語 (6) Applied Mandarin (6)	2						2			
應用華語 (7) Applied Mandarin (7)	2							2		
台灣歷史、地理與 文化 History, Geography and Culture in Taiwan	4	2	2							
本國生必修 Local Students Required Courses										
通識課程 General Education	4					2	2			(人文學科、社會 科學各 2 學分)
國文 Chinese	4	2	2							
英語聽講練習 103/104 English Listening & Speaking Practice	1				1					(103/104 二選一)
憲法 Constitution	2						2			
軍訓 Military Training	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，畢業 前修畢
外語實務 Foreign Language Proficiency Test	0	0								畢業前修畢
共同必修 Foreign and Local Students Required Courses										
英文 (1) English (1)	2	2								

100.04.20 教務會議傳閱附件 2、(提案二) 新增、更名課程規劃
2-1、國際學院熱帶農業暨國際合作系(四技) 必修科目表

必修科目總稱 Names of Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		第三學年 3 rd Academic Year		第四學年 4 th Academic Year		備註 Remarks
		1 st semester	2 nd semester							
英文(2) English (2)	2		2							
英文(3) English (3)	2			2						
英文(4) English (4)	2				2					
英文(5) English (5)	2					2				
英文(6) English (6)	2						2			
體育 Physical Education	2	1	1							每週上課 2 小時
生活服務教育 Student Life Service Education	0	0	0							每週上課 2 小時
通識選項課程 Courses of General Education	8		2	2	2	2				人文學科 (Contemporary Leisure and Health Promotion) 社會科學 (Social Science) 自然與生命科學 (Animal and Plant Protection and Agriculture) 數理與應用科學 (Introduction of Geographic Information System and Its Applications)
合 計 Total	34	5	7	5	5	6	6	0	0	本國生
	40	7	9	6	6	6	4	2	0	外籍生

(二) 國際學院共同必修科目 (Credits Required by College)

必修科目總稱 Names of Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		第三學年 3 rd Academic Year		第四學年 4 th Academic Year		備註 Remarks
		1 st semester	2 nd semester							
共同必修 Plant and Animal Groups Required Courses										
微積分 Calculus	2	2								
普通化學(1) General Chemistry (1)	3	3								環工系
普通化學實驗(1) General Chemistry Lab.(1)	1	1								每週上課 2 小時 環工系
生態學 Ecology	2		2							畜產系
生物統計 Biometry	2			2						
生物統計實習 Practice of Biometry	1			1						每週上課 2 小時
電子計算機概論 Introduction to Computers	0		0							每週上課 2 小時 資管系
永續發展趨勢 Trends in Sustainable Development	3					3				
合 計 Total	14	6	2	3	0	3	0	0	0	

(三) 系定專業共同必修科目

(Courses Required for Group Specializing in Plant and Animal Production)

必修科目總稱 Names of Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		第三學年 3 rd Academic Year		第四學年 4 th Academic Year		備註 Remarks
		1 st semester	2 nd semester							
生物技術 Biotechnology	2					2				
實務專題 Special Projects	2						1	1		指導教師
鄉村社會學 Rural Sociology	2	2								農企系
有機化學 Organic Chemistry	2		2							環工系
有機化學實驗 Organic Chemistry Lab.	1		1							環工系
行銷學 Marketing	2			2						
生物化學(1) Biochemistry (1)	2			2						
生物化學實驗(1) Biochemistry Lab. (1)	1			1						
微生物學 Microbiology	2				2					食品系
微生物學實習 Practice of Microbiology	1				1					食品系
遺傳學 Genetics	2					2				
遺傳學實習 Practice of Genetics	1					1				
農企業管理 Agribusiness Management	2						2			
分子生物學 Molecular Biology	2						2			
專題討論 Seminar	2							1	1	輪授
合 計 Total	26	2	3	5	3	5	5	2	1	

(四) 植物生產組專業必修科目

(Courses Required for Group Specializing in Plant Production)

必修科目總稱 Names of Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		第三學年 3 rd Academic Year		第四學年 4 th Academic Year		備註 Remarks
		1 st semester	2 nd semester							
農藝園藝概論 Introduction to Agronomy and Horticulture	2	2								
土壤與肥料 Soil and Fertilizer	2			2						
土壤與肥料實習 Practice of Soil and Fertilizer	1			1						
植物學 Botany	2	2								植物組必修
植物學實習 Practice of Botany	1	1								植物組必修
植物生理學 Plant Physiology	2			2						農園系
植物生理學實驗 Plant Physiology Lab.	1			1						農園系
植物繁殖與保存 Plant Propagation and conservation	2				2					
植物繁殖與保存實 習 Practice of Plant Propagation and conservation	1				1					
農產品生鮮處理技術 Postharvest Technology of Agricultural Products	2				2					食品系
農產品生鮮處理技術 實習 Practice of Postharvest Technology of Agricultural Products	1				1					
作物育種學 Crop Breeding	2						2			農園系
作物育種學實習 Practice of Crop Breeding	1						1			
設施園藝 Horticultural Production Under Structures	2							2		農園系

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2-1、國際學院熱帶農業暨國際合作系(四技) 必選修科目表

必修科目總稱 Names of Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		第三學年 3 rd Academic Year		第四學年 4 th Academic Year		備註 Remarks
		1st semester	2nd semester	1st semester	2nd semester	1st semester	2nd semester	1st semester	2nd semester	
設施園藝實習 Practice of Horticultural Production Under Structures	1							1		農園系
植物保護學 Plant Protection	2					2				植醫系
植物保護學實習 Practice of Plant Protection	1					1				植醫系
合 計 Total	26	5	0	6	6	3	3	3	0	

(五) 植物生產組專業選修科目

(Elective Courses Required for Group Specializing in Plant Production)

選修科目總稱 Names of Elective Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		第三學年 3 rd Academic Year		第四學年 4 th Academic Year		備註 Remarks
		1 st semester	2 nd semester							
蔬菜學 Olericulture	2					2				
蔬菜學實習 Practice of Olericulture	1					1				
特用作物學 Special Crops Science	2						2			
特用作物學實習 Practice of Special Crops Science	1						1			
林產與木材科學 Forest Products and Wood Science	3			3						
植物組織培養技術 Plant Tissue Culture Techniques	2					2				
植物組織培養技術 實習 Practice of Plant Tissue Culture Techniques	1					1				
花卉學 Floriculture	2					2				農園系
花卉學實習 Practice of Floriculture	1					1				農園系
果樹學 Pomology	2						2			農園系
果樹學實習 Practice of Pomology	1						1			農園系
應用農藥學 Pesticide Application	2						2			
雜草管理 Weed Management	2							2		
雜草管理實習 Practice of Weed Management	1							1		農園系
草坪管理 Turf Management	2							2		農園系
草坪管理實習 Practice of Turf Management	1							1		農園系
蘭花學 Orchidology	2							2		農園系

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2-1、國際學院熱帶農業暨國際合作系(四技) 必修科目表

選修科目總稱 Names of Elective Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		第三學年 3 rd Academic Year		第四學年 4 th Academic Year		備註 Remarks
		1 st semester	2 nd semester							
造園學 Landscape Architecture	2								2	
造園學實習 Practice of Landscape Architecture	1								1	
藥用作物學 Medicinal Crops Science	2								2	農園系
藥用作物學實習 Practice of Medicinal Crops Science	1								1	農園系
稻作學 Rice Science	2						2			農園系
稻作學實習 Practice of Rice Science	1						1			農園系
作物學 Science of Field Crops	2		2							
作物學實習 Practice of Crop Sciences	1		1							
作物營養管理與診 斷技術 Crop Nutrition Management and Diagnostic Techniques	2							2		
作物營養管理與診 斷技術實習 Practice of Crop Nutrition Management and Diagnostic Techniques	1							1		
食品生物化學 Food Biochemistry	2							2		
合 計 Total	45	0	3	3	0	9	11	13	6	

(六) 動物生產組專業必修科目

(Courses Required for Group Specializing in Animal Production)

必修科目總稱 Names of Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		第三學年 3 rd Academic Year		第四學年 4 th Academic Year		備註 Remarks
		1 st semester	2 nd semester							
動物科學導論 Introduction to Animal Science	2		2							動物科學與畜 產系
動物學 Zoology	2			2						動物組必修
動物學實習 Practice of Zoology	1			1						動物組必修
世界養殖概論 Introduction to World Aquaculture	2			2						
牧場實務實習 Practice of Animal Farm	2			1	1					動物科學與畜 產系
家禽飼養管理 Poultry Feeding and Management	1					1				動物科學與畜 產系
家禽飼養管理實習 Practice of Poultry Feeding and Management	1					1				動物科學與畜 產系
豬隻飼養管理 Pig Feeding and Management	1					1				動物科學與畜 產系
豬隻飼養管理實習 Practice of Pig Feeding and Management	1					1				動物科學與畜 產系
乳用家畜飼養管理 Dairy Livestock Feeding and Management	1					1				
乳用家畜飼養管理 實習 Practice of Feeding and Management in Dairy Livestock	1					1				
免疫學概論 Introduction to Immunology	2						2			
養殖場實習 Practice of Aquafarm	2							1	1	

必修科目總稱 Names of Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		第三學年 3 rd Academic Year		第四學年 4 th Academic Year		備註 Remarks
		1st semester	2nd semester	1st semester	2nd semester	1st semester	2nd semester	1st semester	2nd semester	
禽畜保健與傳染病 防治(1) Livestock Health and Transmissible Diseases (1)	2							2		獸醫系 輪授
禽畜保健與傳染病 防治實習(1) Practice of Livestock Health and Transmissible Diseases (1)	1							1		獸醫系 輪授 每週上課 2小時
水族動物疾病學 Aquatic Animal Diseases	3							3		有實習課 Including Practice 獸醫系
合 計 Total	25	0	2	6	1	6	2	7	1	

(七) 動物生產組專業選修科目

(Elective Courses Required for Group Specializing in Animal Production)

選修科目總稱 Names of Elective Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		第三學年 3 rd Academic Year		第四學年 4 th Academic Year		備註 Remarks
		1 st semester	2 nd semester							
水產生物學 Aquatic Biology	3	3								
動物解剖生理學 Anatomy and Physiology of Animal	3		3							生命科學系
動物解剖生理學實習 Practice of Anatomy and Physiology of Animal	1		1							生命科學系
禽畜環境生理學 Environmental Physiology of Domestic Animals	2			2						動物科學與 畜產系
動物舍規劃與自動 化 Animal House Arrangement and Automation	2			2						動物科學與 畜產系
動物營養學 Animal Nutrition	2				2					動物科學與 畜產系 兼任教師
動物育種學 Animal Breeding	3					3				動物科學與 畜產系
水產養殖學 Introduction to Aquaculture	3				3					有實習課 Including Practice
飼料生物學 Cultivation of Live Feed	3				3					有實習課 Including Practice
水族營養學 Fish Nutrition and Feed	3					3				有實習課 Including Practice
肉品加工 Processing of Meat Products	2						2			動物科學與 畜產系
肉品加工實習 Practice of Meat Products	1						1			動物科學與 畜產系
觀賞魚養殖與管理 Culture and Management of Ornamental Fish	2						2			

100.04.20 教務會議傳閱附件 2、(提案二) 新增、更名課程規劃
2-1、國際學院熱帶農業暨國際合作系(四技) 必選修科目表

選修科目總稱 Names of Elective Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		第三學年 3 rd Academic Year		第四學年 4 th Academic Year		備註 Remarks
		1 st semester	2 nd semester							
觀賞魚養殖與管理 實習 Practice of Culture and Management of Ornamental Fish	1						1			
乳品加工 Processing of Dairy Products	2					2				動物科學與 畜產系
乳品加工實習 Practice of Dairy Products	1					1				動物科學與 畜產系
牧場經營學 Livestock Production Management	2								2	動物科學與 畜產系
動物飼料學 Animal Feeds and Feeding	2							2		動物科學與 畜產系
水產遺傳育種學 Fish Genetics and Breeding	3								3	
馬學 Equine Science	2				2					動物科學與 畜產系
馬學實習 Practice of Equine Science	1				1					動物科學與 畜產系
禽畜保健與傳染病 防治(2) Livestock Health and Transmissible Diseases (2)	2								2	獸醫系 輪授
禽畜保健與傳染病 防治實習(2) Practice of Livestock Health and Transmissible Diseases (2)	1								1	獸醫系 輪授 每週上課 2 小時
合 計 Total	47	3	4	4	11	9	6	2	8	

(八)系選修科目

(Elective Courses Plant Production and Animal Production)

必修科目總稱 Names of Courses in Chinese and English	學 分 數 No. Credit s	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		第三學年 3 rd Academic Year		第四學年 4 th Academic Year		備註 Remarks
		1 st semester	2 nd semester							
食品科學概論 Introduction to Food Science	2		2							
生物化學(2) Biochemistry(2)	3					3				
食品加工與實習 Food Processing and Practice	3			3						
食品機械 Food Machinery	2			2						食品系
食品微生物與實習 Microbes Detection and Practice	3				3					食品系
食品殺菌技術與實習 Food Sterilization and Practice	3					3				食品系
醱酵生產技術與實習 Fermented Food Processing and Practice	3							3		食品系
校外實習 Practice of Industrial Training	2						2			
地理資訊系統概論 Introduction of GIS	2				2					
食用菌栽培 Cultivation of Edible Fungi	2								2	農園系
食用菌栽培實習 Practice of Cultivation of Edible Fungi	1								1	農園系
合 計 Total	26	0	2	5	5	6	2	3	3	

2-2、國際學院熱帶農業暨國際合作系(四技) 中英文摘要

熱帶農業暨國際合作系

(Department of Tropical Agriculture and International Cooperation)

一、必修科目 Required Courses

442040 生物技術

2 必 上

介紹生物計數之基本觀念及其所涵蓋之(1)遺傳工程及(2)細胞組織、器官培養、與細胞融合等兩大範疇。說明基因構造，表現原理及操作基因轉移，載體利用等所需之技術。簡介細胞，組織培養，細胞融合之技術。介紹利用生物技術在農業上之作物，家畜、魚類的改良，並應用於疾病防治及抗拒逆境上之現況及未來。介紹生物技術在微生物、食品營養、發酵上之應用及未來。

442040 Biotechnology

2 R F

Introduce the concept of biotechnology and its two major categories of (1) genetic engineering and (2) cell, tissue and organ culture and cell fusion. Interpret the structure and expression of gene, the technology for manipulation of gene transfer for utilization of gene introduce the development at nowadays and future.

362001 微積分

2 必 上

本課程從函數之連續與極限性來引導微分和積分的概念，分別討論多項式函數、三角函數、自然對數函數、雙曲線函數、多變數函數之特性與其微分、積分之技巧和應用、並介紹數列、級數、偏微分、多重積分、向量微分及微分方程式。

362001 Calculus

2 R F

This course is subjected to introducing the concepts of limits and continuity of functions, and then furthering to differentiation and integration, the cores of Calculus. Scopes will be covered from derivatives and integrations of various kinds of functions, such as polynomial, trigonometric, natural logarithmic, hyperbolic functions, etc. Applications of the skills of derivatives and integrations to differential equations will also be included.

262012 生物統計

2 必 上

本課程旨在使學生瞭解生物資料分析之統計原理、方法與統計相關基本名詞，授課內容包括數據資料之特性及整理方式介紹、敘述統計，機率與機率分布、估計、假設檢定、卡方分析、變方分析，迴歸與相關。

262012 Biometry

2 R F

The aims of this course are to introduce the principles and methods of statistics, as well as the related basic terminology for life science data analysis. The course covers the introduction of data characteristics and management methods. However, descriptive statistics, probability and probability distributions, estimation, hypothesis test, chi-square analysis, analysis of variance, as well as regression and correlation analysis are also included.

262013 生物統計實習

1 必 上

本實習依上課進度進行數據整理，以敘述統計、各項分布(常、二項式、多項式、卜瓦松、t-、卡方與F分布)、估計、假設檢定、變方分析、迴歸及相關等原理，應用生物數據實例進行練習。

262013 Biometry Lab.

1 R F

The lab. proceeds with the lectures of biometry. The practice of this course focus on exercises of biological data management and the application of descriptive statistics, useful distributions (Normal, binomial, polynomial, Poisson, t-, chi-square and F) theory, estimation protocol, hypothesis test, analysis

of variance, regression and correlations techniques on data analysis for biologists.

22005 有機化學 **2** **必** **下**

本課程乃著重於重要之碳化合物(包括烷、醇、醚、有機鹵化物, 芳香族化合物、醛、酮、酸、酯、胺)之官能基本反應, 各類之合成方法, 相互間之關係以及其實際之應用。

222005 Organic Chemistry **2** **R** **F**

A systematic study of the important classes of carbon compounds (alkane, alcohol, ether, organic halide, aromatic compound, aldehyde, ketone, carboxylic acid, ester and amine) -reactions of their functional groups, methods of synthesis, relations, and uses.

222006 有機化學實驗 **1** **必** **, 下**

本課程為配合非主修有機化學者之教材而開設, 期促使學生熟悉一般實驗技術, 並從實驗中增加對教材之了解, 除物理常數之測定外, 並依各官能基本之不同之化合物逐一實驗: 烷、烯、炔、苯、有機鹵化物、醇、醚、醛、酮、羧酸、羧酸衍生物及胺等, 每一實驗的重點是在不同官能基所產生的不同化學反應試驗。

222006 Organic Chemistry Lab. **1** **R** **, F**

This course is devised in conjunction with the lecture material of the nonmajor organic chemistry. It intends to provide students a profound understanding of subject-matter from laboratory work and familiarity with basic laboratory technique. In addition to measurements of physical constants, the course is carried out in a functional approach: alkanes, alkenes, alkynes, benzenes, organic halides, alcohols, ethers, aldehydes, ketones, carboxylic acids, and the derivatives of carboxylic acid, amines. Each experiment emphasizes on the common chemical properties ascribed to functional groups.

222109 行銷學 **2** **必** **, 上**

本課程旨在瞭解滿足社會各階層對商品或勞務需求所做的研究、分析、預測、產品發展、訂價、推廣、交易及實體配銷等系列的人類活動。包括:(1) 行銷之基本觀念、(2) 行銷體系與行銷環境、(3) 策略性行銷規劃與行銷管理、(4) 各種市場與購買者行為分析、(5) 市場需要之測定與市場區隔、(6) 產品決策、(7) 價格決策、(8) 溝通與促銷組合決策、(9) 通路決策

222109 Marketing **2** **R** **, S**

The major goal of this course is to understand a series of human action about all social stratification by making study, forecasting, product development, pricing, promotion, trade and physical distribution to satisfy needs of goods and services.

It includes: The concept of marketing, the marketing environment, strategic marketing planning and management, different kind of markets and consumer behavior analysis, market demand forecasting and segmenting, product decision, pricing decision, communication and promotion mix decision, place decision.

222015 生物化學 **2** **必** **, 上**

本課程主要提供學生有關生物化學的概念, 其內容包括四大部份:

細胞內大分子構造之介紹--包括醣類、蛋白質及脂質之構造、生化反應之催化及控制、代謝能量之產生及儲存、遺傳訊習簡介--包括儲存、轉移及表現。

222015 Biochemistry **2** **R** **, F**

The course is to offer concepts of biochemistry, including the following topics: macromolecules-carbohydrates, proteins, lipids. Biochemical reactions, their catalysis and regulation. Biosynthesis and storage of biological energy. Genetics-storage, transfer and expression of genetic

messages.

222016 生物化學實習 1 必 , 上

此實習之內容包括以下三大部：PH 值之測定法、緩衝溶液之製備、氨基酸之滴定曲線；蛋白質一般反應、氨基酸及蛋白質之定性分析、蛋白質之定量分析；醣類之定性分析與定量分析。

222016 Practice of Biochemistry 1 R , F

The course contains the following categories: determination of pH values, preparation of buffers, titration curve of amino acids. General reactions of proteins, qualitative and quantitative determination of amino acids and proteins. Quantitative and qualitative determination of carbohydrates.

222031 微生物學 2 必 下

本課程之目的，在使學生瞭解微生物的起源，化學的基本原理，顯微鏡與染色，原核生物與真核生物細胞之形態、構造及功能，微生物的生長與代謝，遺傳與生物技術及微生物的防治，以增進學生未來在研究植物病原微生物之相關基礎。

222031 Microbiology 2 R S

The purpose of this course is to study the microbiological science and to give students the basic knowledge further study of phytopathogenic microbiology. Course contents include the original of microbiology, chemical principles, microscopy and staining, morphology、structure and function of prokaryotic and eukaryotic cell, microbial growth and metabolism, microbial genetics and biotechnology, and the control of microorganisms.

222032 微生物學實習 1 必 下

本實習之目的在訓練並建立學生在微生物學領域之基本基礎與技術，課程內容包括顯微鏡在微生物大小測量之運用，細菌的染色，培養基之製備，移種技術，微生物之分離、培養及接種技術，微生物之生理生化測試，微生物之定量及物理與化學因子抗微生物活性之評估。

222032 Practice of Microbiology 1 R S

The purposes of this course were critically selected and tested to instruct students effectively in the basic principles and techniques within microbiological areas. Course contents include the microscopic measurement of microorganisms, bacterial staining, media preparation, culture transfer techniques, techniques for isolation, cultivation, and inoculation of microorganisms, physiological and biochemical tests of microorganisms, determination of cell number of microorganisms, and evaluation of the antimicrobial activity of physical and chemical agents.

222018 遺傳學 2 必 , 上

本課程之目的，在使學生瞭解生物如何遺傳、遺傳拼圖、細胞遺傳、變異、遺傳物質之構造、核酸複製、轉錄、轉譯、基因表現之調控、基因工程、族群遺傳學、及生物進化、遺傳學與社會之關係。

222018 Genetics 2 R , F

The purpose of this course is to provide undergraduate students knowledge of how organisms inherit, genetic mapping, cytogenetics, variation, the structure of genetic materials, DNA replication, transcription, translation, control of gene expression, genetic engineering, population genetics, evolution, and the relationship of genetics and the society.

222019 遺傳學實習 1 必 , 上

本課程之目的，在使學生透過實際操作與試驗，瞭解遺傳學之原理，實驗內容包括：碗豆七個性狀遺傳、植物根尖染色體觀察、果蠅唾腺染色體、減數分裂、統計方

法、細菌抗藥性、質體之抽取及限制酵素切割及電泳分離、血型、人類遺傳。

222019 Practice of Genetics 1 R , F

The purpose of this laboratory is to train undergraduate students with practical genetics, including the basic principles of genetics, inheritance of pea traits, root tip chromosomes, Drosophila salivary polytene chromosomes, meiosis, statistical methods, bacterial antibiotic resistance, plasmid isolation, restriction, and gel electrophoresis, blood type, and human genetics.

502003 農企業管理 2 必 下

本課程乃系統性地介紹一個農企業經理人應具備之技能，包括：(1)農企業管理學內涵(2)農企業經營規劃與決策(3)消息收集與分析(4)預測方法(5)農企業產品與生產規劃(6)農企業資金與預算(7)農企業成本與收益觀念(8)不同評價之成本項目與效益分析(9)農企業行銷(10)農業政策與環保問題(11)農企業組織(12)人力資源(13)農企業控制原則(14)農企業經營目標之設計。

502003 Agribusiness Management 2 R Peng, S

The course gives a systematic knowledge for agribusiness manager includes as follows:(1)The contents of Agribusiness; (2)Planning and Decision; (3)Information collection and Analysis; (4)Forecasting; (5)Products and Production planning; (6)Capital and Budget; (7)Cost and Revenue; (8)Cost evaluation and Benefit analysis; (9)Agribusiness marketing; (10)Agricultural policy and Ecosystem protection; (11)Agribusiness Organization; (12)Manpower Resources; (13)Controlling; (14)Management Indicators.

132045 分子生物學 2 必 下

課程包括有核酸、蛋白質的分子結構說明，核酸、蛋白質的生物合成及在生物代謝過程的分子調控。核酸的檢測方法及其應用。課程後段介紹基因選取、重組建構、轉形、轉殖表現及其應用。

132045 Molecular Biology 2 R

The course covers the introduction of basic structures of nucleic acids and proteins in molecular level. The biosynthesis of nucleic acids and proteins in molecular level will also be introduced in the class. Third part of the course includes the molecular regulation of nucleic acids and proteins in biological pathways.

222023 專題討論 1 必 , 上

本專題討論主要配合校外專家及學生，針對農園藝作物之生長、栽培管理、遺傳育種、採收處理等專題，進行專題報告。學生之專題報告、係由學生確立主題、資料收集、報告撰寫然後實際之口頭發表，期能提昇其資料收集與整理之能力，訓練其在公眾場合表達之能力。

222023 Seminar 1 R , F

The seminar will focus on agronomic and horticultural crops in the production, culture, breeding and genetic, postharvest handling etc. aspect for professional research studies. The students will participate in setting up major topics, report writing and actual seminar practice. The course will enhance the ability of organization so that students can speech in public for participants.

222001 農藝園藝概論 2 必 , 上

這是門概論課程，介紹園藝作物：果樹、蔬菜、花卉的生產、處理、和利用原理；觀賞植物在景觀和環境上的運用。認識相關的科技與產業，它們在經濟上的重要性和在國內的分布情況。了解園藝栽培在世界上對於提供養分和食物，改善環境生活品質，美化景觀，及醫藥利用上所扮演的角色。使學生對農藝作物之生長發育與環境因子之關係及對栽培管理技術有一整體性之瞭解。內容包括介紹農藝作物之分類、生

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 .

222010 植物生理學實驗 1 必 , 上

本實驗課程在使學生能以實驗印證理論，增進學生對理論之瞭解。實驗內容包括擴散作用、滲透作用、原生質分離之觀察、水勢、滲透勢、蒸散作用及根壓之測定，礦物營養診斷、輸導作用、呼吸作用、呼吸酵素之一般檢驗，植物蛋白質之抽取及分析、光補償點之測定及利用薄層色層分析法分離光合色素、葉綠素吸收光譜與定量之測定、植物生長調節劑生理功能之觀察等。

222010 Plant Physiology Lab. 1 R , F

The laboratory work is to acquaint students with understanding of both practical operation as well as theoretical aspects of the lecture subjects. The contents include the observation of diffusion, osmosis and plasmolysis, measurement of water potential and transpiration, plant nutrition and symptoms of mineral deficiency , measurement of root pressure, translocation of organic solutes in phloem, quantity of respiratory enzymes, extraction and quantitative determination of plant protein, separation of photosynthetic pigments by TLC, chlorophyll absorption spectrum and quantitative determination, physiological functions of growth regulators.

222024 作物育種學 2 必 , 上

作物育種技術主要介紹無性繁殖作物、自交、異交作物育種原理及方法，熟悉各種不同之育種理論及技術。講授內容計有以下之章節：1.緒論：介紹育種史及育種之重要性。2.作物育種之遺傳學基礎。3.自交不和合及雄不稔性。4.引種法。5.純系育種法。6.選拔育種法。7.雜交育種法。8.回交育種法。9.雜種優勢(F1)育種技術。10.抗病品種之育成。11.遠緣雜交。12.抗蟲育種。13.誘變育種。14.遺傳工程之現況及在農園作物上之應用。

222024 Crop Breeding 2 R , S

The goals of this course are to acquaint students with knowledge of principles and techniques used in crop breeding. Course contents include: 1. Introduction : history and importance of crop breeding. 2. Genetic background of breeding. 3. Self-incompatibility and male sterility. 4. Crop introduction. 5. Pure-line breeding. 6. Selection. 7. Hybridization. 8. Back cross. 9. F1 hybrid breeding. 10. Breeding for disease resistance. 11. Interspecific hybridizations. 12. Breeding for insect resistance. 13. Mutation breeding. 14. Genetic engineering in crop improvement.

222025 作物育種學實習 1 必 , 上

作物育種實習，主要介紹各農園藝作物之育種方法及育種技術，如豆科作物、禾本科作物、十字花科、茄科及瓜類等之育種技術，包括花器構造之認識，雜交方法，多倍體處理及後裔之處理等項目。

222025 Practice of Crop Breeding 1 R , S

In this course important agronomic and horticultural crops are introduced. Crops include legume crops, cereals, cruciferae vegetables, solanaceae vegetables and cucurbitaceae vegetables. Contents of laboratory exercises include observation of flower structure, hybridization methods, colchicine treatment and progeny selection etc...

222032 設施園藝 2 必 , 上

本課程主要介紹園藝設施種類、構造規劃和材料選擇。此外討論設施內光線、溫度、溼度、空氣等微氣候之特性、管理控制方法和作物的反應。並以水耕栽培為例、深入介紹無土栽培的運用和施肥、灌溉技術。另外簡介溫室病蟲害防治、生長調節劑

的使用、穴盤育苗等及相關的機械化設備。

222032 Horticultural Production Under Structures 2 R , F

This course is designed for students planning careers in commercial horticultural production under structures. The contents include types of structures and materials; microclimate in the greenhouse and its management; techniques of watering, fertilization; media and growth regulator handling; disease and pest control. Hydroponics, plug system and related appliances are also briefly introduced.

222033 設施園藝實習 1 必 , 上

實習以循環式水耕栽培為主要項目，同時練習養液配製、設施內環境變化觀察及管理，並做合理的病蟲害防治。另外練習孵豆芽；實際觀測各種設施架構、栽培方式和灌溉系統，了解其特色、優缺點和價格。

222033 Practice of Horticultural Production Under Structures 1 R , F

Circulated hydroponic production is the major topic of this course, which includes nutrient solution composing, environmental management and pests control. Projects also content bean sprout production, greenhouse structure and irrigation system measuring, and evaluating, as well as price estimation of irrigation systems.

262003 動物科學導論 2 必 下

讓學生對「動物科學與與畜產系」之學習領域與相關科學有一初步認識，便於衡量自己未來方向。引導認識本系教育目標、研究方向和主題，並認識學校實習畜牧場和技藝訓練中心畜牧組，以及介紹如何利用圖書館以及網際網路等管道，探索動物科學與畜產相關資源，循序漸進培養動物科學與畜產興趣及往後的規劃。

262003 Introduction to Animal Science 2 R F

Introduction Department of Animal science 2. Overview of animal science3. The evolution of livestock farming systems4. Our relationship with domestic animals is a symbiosis5. Animal behavior and farm animal management6. Environmental factors for animals7. Product identification and traceability in farm animal 8. Manure and wastewater treatment9. Organic biological farming and livestock10 .Environmental Hormones (Endocrine disruptor chemicals)11. Functional foods and Extracting bioactive compounds from animal products12. Biotechnology in animal nutrition, physiology and health

262001 動物學 2 必 上

本課程之設計主要是幫助學生了解動物之演化、分類與生理功能，內容包括器官的發育、細胞分裂與遺傳、動物行為與生態、原生生物、假體腔動物、軟體動物、環節動物、節肢動物、昆蟲、魚類、兩生類、爬蟲類、鳥類、哺乳類。

262001 Zoology 2 R F

The object of this course is helping the students to understand the evolution, classification and physiological function of the animal. The contents include: development of tissue, organ, system, cell division and inheritance, animal behavior and ecology, protozoa, pseudocoelomate body plan, molluscan, annelida, arthropod, hexapod, fish, amphibian, reptile, bird and mammal.

262002 動物學實習 1 必 上

本課程之設計主要是幫助學生學習動物的一般構造及功能，內容包括光學顯微

鏡使用、動物細胞及原生生物外部構造之觀察、蚯蚓及蝦解剖構造之觀察、以及脊椎動物之循環、呼吸、排泄、生殖、肌肉、消化與骨骼等系統解剖構造的瞭解。

262002 Zoology Lab

1 R F

The object of this course is helping the students to learn the general structure and function of animal. The contents include: utilization of light microscopy, observing the external features of animal cells and protozoas, observing the anatomic structures of pheretima, and crayfish, understanding the anatomic structures of circulatory, respiratory, excretory, reproduction, digestive, muscle and skeleton systems of vertebrates.

222014 世界養殖概論

2 必 , 上

本課程光介紹世界水產養殖現況及台灣養殖現況，後再討論有關養殖水質處理，養殖系統，養殖設備及依生物學的觀點介程各種具有經濟價值之水產生物之養殖技術。

222014 Introduction to World Aquaculture 2 R , F

The theme of the course provides the students the current knowledge of aquacultural techniques, survey of the fields, water qualities and treatments, culture systems, culture facilities, and biology and culture techniques of the commercially aquatic organism .

222013 牧場實務實習

1 必 , 上

本課程之目的在使學生在牧場實務實習中，將所學理論與實際配合，在操作中學習。課程內容如下：畜牧之現在及未來之展望，二、牧場工作簡介，三、養豬實習：(一)繁殖豬、(二)小豬、(三)肉豬，四、蛋雞實習，五、肉雞實習，六、種雞實習，七、孵化實習，八、肉牛實習，九、乳牛實習：(一)仔牛照顧、(二)繁殖管理、(三)產乳管理，十、牧草管理：(一)種草、(二)一般管理、(三)收穫、(四)製造乾草，十一、犬隻管理。

222013 Practice of Livestock Farm 1 R , F

The purpose of the course is to let students match the theory and practice, to reach the goal of training---learning by doing. The following items are included: 1. future and past of animal production, 2. introduction of animal farm, 3. practice of swine production, 4. practice of layer production, 5. practice of broiler production, 6. practice of feeder production, 7. practice of hatchery production, 8. practice of beef cattle production, 9. practice of dairy cattle production, 10. management of grassland, 11. management of dogs.

262020 家禽飼養管理

1 必 上

本課程介紹家禽飼養管理之理論與實務作業技術，包括：家禽品種，種蛋經營，孵化作業，育雛及一般飼養管理，雞舍與設備操作，疾病防治與產品屠宰、包裝及銷售等事務，使學生對家禽產業之整合，生產現況與未來發展有全盤之認識。

262020 Poultry Feeding and Management 1 R F

The objective of this course is to introduce the theory and practical operation technique of poultry to the students. The contents include : breeds and students of poultry, management of breeders, hatching operation, brooding and rearing, houses and equipment operation, disease control, processing and marketing products .

262021 家禽飼養管理實習

1 必 上

本課程實習內容主要配合「家禽飼養管理」課程，使學生實際進行生產過程所需要之操作訓練，包括：種蛋之處理、孵化技術、飼養試驗、配合課程之需要邀請現場人員作專題研討、並參觀實習，包括：自動化飼養系統、屠宰作業、雞蛋洗選

包裝等，使學生充分瞭解家禽生產之作業技術。

262021 Practice of Poultry Feeding and Management 1 R F

This practice course is associated with the poultry productive technique to enforce the students on the skill and technique part through field practice. Learning by doing is the basic concept of technique education. In this course students are allocated into groups to operate the whole process for poultry production, include : hatching eggs operations, hatchery technique and feeding trials. In addition there will be seminars and direct discussion with industry people, field trip to commercial farm processing plant, etc, Through this practice course students will get a comprehensive knowledge of poultry production.

262024 豬隻飼養管理 1 必 上

本課程目的在於介紹台灣高溫多濕的環境下，養豬事業之成就與豐富之經驗以及國內外養豬業之先進技術與科學知識。其內容包括豬隻生理解剖、遺傳育種、品種選拔與改良、生物技術與生殖、營養與飼料、飼養管理、環境與污染控制、經濟經營規模與市場產銷等知識，再配合實際操作，使學生參與養豬現場之訓練，以期成為務實之經營者。

262024 Pig Feeding and Management 1 R S

The purpose of this course is to introduce a technical basis and rich experience for successful production of swine industry under the high temperature and high moisture environments in Taiwan, and to provide the current new knowledge and technology of the world's swine science. The contents of this course advance in swine: physiology and anatomy, genetics and breeding, breeds selection and improvement, biotechnology and reproduction, feeds and nutrition, feeding and management, environment and waste control, economic size and marketing and so on. The practical training on-farm can be enhanced in this course.

262025 豬隻飼養管理實習 1 必 上

實習內容在使學生實際從事養豬技術、規劃及經營之訓練，以造就成為真正養豬經營之專業人才，諸如品種與選種評分、豬場清洗與消毒、分娩介助、發情觀察與配種、豬場紀錄規劃、豬舍建築設計與豬舍配置規劃、飼料需求量估計、飼養成本之概估、經濟經營規模擬定、投資報酬之分析、市場供需資料之搜集及總生產成本與收益之計算與分析。

262025 Practice of Pig Feeding and Management 1 R S

The contents of swine productive practice are to provide a training of students on technique, planning and management of swine production. It contains: swine breeding and selection, washing and sanitation of pig house, farrowing nurse, estrus observation and service, productive record, design and scaling of growing-finishing house and farrowing house, requirements of feeds, feeding cost, the decision of economic size, the analysis of investment and margin, collecting the information of the supply and demand on market, calculation and analysis of the total cost of production and total revenue.

262028 乳用家畜飼養管理 1 必 上

本課程主要著重於熱帶地區高溫多濕環境下乳用家畜飼養管理之理論與實務，對於擠乳管理、電腦管理系統，完全混合日糧飼養系統，畜舍降溫裝置，最新反芻營養科技資料以及乳用家畜較常發生之疾病與其防治加以闡述，以訓練學生對於經營農場更具信心。

262028 Dairy Livestock Feeding and Management 1 R . S

This course lays special emphasis on the feeding and management of dairy livestock in the high temperature and humid environment. This includes milking management, computer management

system, TMR feeding system, house cooling equipment, recent ruminant nutrition knowledge, disease and control of dairy cows, this will give the students more confidence in running the dairy farm.

262029 乳用家畜飼養管理實習 1 必 上

本課程之內容旨在讓學生熟悉乳用家畜管理技術，例如人工授精與妊娠診斷，公牛精液選擇，擠奶機功能檢測，血液檢查，粗料乾物質快速測定；營養代謝性疾病之認識與檢測；並鼓勵學生多與民間乳牛場接觸，以發掘現存之問題與設法解決達到理論與實際之配合。

262029 Practice of Feeding and Management in Dairy Livestock 1 R S

The purpose of this course is to give the students more familiar with the management tool of dairy livestock. This includes artificial insemination and pregnancy diagnosis, bull frozen semen selection, milking machine function testing, blood test of dairy cow, rapid testing of roughage dry matter contents, nutritional metabolic disorders. The students were encouraged to visit private dairy farm so that they could learn more problems and try to find solutions

222033 免疫學概論 2 必 ，下

本課程主要目的提供學生一個對免疫學的基本概念。隨著農場管理技術的進步，家畜的飼養密度和生長表現都持續的在提升。在這種情況下，動物更容易受到傳染病的危害而對產業造成嚴重的經濟損失。動物本身的免疫力在抵抗外來病原菌和病毒上扮演著重要的角色。本課程是著重在介紹免疫系統、各種免疫反應、宿主及病原交互作用、及疫苗，獲得這方面的知識能讓學生了解農場的疾病防治。

222033 General Immunology 2 R S

The objective of this course is to provide the students a basic background of immunology. The housing density and the growth performance of domestic animals keep increasing as the consequence of advanced farm management. Under this circumstance, animals are more susceptible to infectious diseases which lead to significant economic losses to the industry. The immunity plays a pivotal role in protecting the animals from invading pathogens and viruses. This course is focused on the introduction of immune system, different types of immune responses, host-pathogen interaction, and vaccination. Acquisition of such knowledge is fundamental for the students to understand disease-controlling strategies of animal husbandry.

222029 養殖場實習 1 必 ，上

課程將教導學生實際養殖場中各種養殖器具之操作、養殖場水質之管理、操作措施。各種魚蝦貝類之養殖及遇到緊急狀況(如:浮頭、泛池)之應變措施。

222029 Aquafarm Practice 1 R ，F

In this class, students will be ask to operate all practical equipment in farm and taught how to manage the farm in order to success in aquaculture.

222026 禽畜保健與傳染病防治(一) 2 必 ，上

使學生實際瞭解消毒及預防措施，並介紹禽畜常見的傳染病、寄生蟲病及其它疾病發生原因、症狀及其預防要領，並使疾病發生時能及時作正確處理。

222026 Livestock Health and Transmissible Diseases (I) 2 R ，F

This course will introduce the theory of selected important animal disease to students. It will provide the students knowledge to control animal diseases, aseptic procedure, and disease prevention conception.

222027 禽畜保健與傳染病防治實習 1 必 ，上

本課程係配合禽畜保健而開，主要使學生在操作觀察中瞭解各種禽畜常見疾病之

特徵，並其預防及消毒措施，使學生實習後對禽畜之保健預防有更進一步認識。

222027 Practice of Livestock Health and Transmissible Diseases 1 R ,F

This course lays on the methods of disease diagnosis and prevention. It provides the basic concepts and operative practices of swine, cattle, chicken and dog disease.

222022 水族動物疾病學 3 必 ,上

本課程講解比較魚類及其他動物之主要生理解剖構造之不同，以了解魚病發生之過程，介紹各種魚病之病因、診斷、疫學預防及控制。又附帶講解與公共衛生有關之魚類疾病。

222022 Aquatic Animal Diseases 3 R ,S

This Course emphasizes on major differences in fish and animal structure and physiological features for understanding of fish disease development, Etiology, diagnosis, epizootiology , prevention and control of disease in fish, including those important to the public health.

二、選修科目 Elective Courses

222035 蔬菜學 2 選 ,上

本課程之目的，在使學生獲得有關蔬菜栽培及生產之基本原理與技術等知識，講授內容包括：.蔬菜園藝之性質及利益、蔬菜之效用、蔬菜之種類及分類、蔬菜生產之類型、氣候及土壤與蔬菜生產之關係、蔬菜之育苗及塑膠布之應用、肥料及水分之管理、蔬菜生產之栽培管理、蔬菜採收及收穫後處理、蔬菜病蟲害防治、蔬菜品種與生產、蔬菜各論，就目前台灣所栽培之重要蔬菜種類加以闡述。

222035 Olericulture 2 S ,F

The goals of this course are to acquaint students with knowledge of basic principles and techniques of vegetable production. The topics include: Introduction of properties and benefits of vegetable production, food value of vegetables, classification of vegetables, types of vegetables production, the relationship between soil and weather condition of vegetables production, vegetables seedling growing and the application of mulching with PE, fertilizers and irrigation, cultivation management, control of disease and insects, varieties of vegetables, introduction of the individual vegetable crops in Taiwan.

222036 蔬菜學實習 1 選 ,上

使學生實際練習蔬菜之栽培及管理技術，包括蔬菜種類及種子之認識，整地、播種、灌溉、施肥、中耕除草、病蟲害防治、育苗、採收等生產技術之練習。期能使每一位學生栽培不同蔬菜，互相觀摩學習並提出栽培心得。

222036 Practice of Olericulture 1 S ,F

The objective of this course is to acquaint students practice the methods and technique of vegetable crop production, including identification of vegetables varieties and seeds, soil preparation, nursery, fertilizing, irrigation, cultivation, weed and pest control and harvest etc. Through discussion and practice of individual vegetables crop, let students understanding of both practical operation as well as theoretical aspects of the lecture subjects.

222011 特用作物學 2 選 ,下

本課程目的在培養嗜好作物之生產、改良人才。主要內容在敘述特用作物之意義、範圍及研究方法。選擇特用作物中之一類-嗜好作物如茶、菸、可可和咖啡等說明其栽培改良方法。

222011 Special Crops Science 2 S ,F

The objective of this course is to give students more confidence in their ability for producing and

improving the recreation crops. The main contents of this course will describe the definition, sort, and study method of special crops. We will describe the cultivation and improvement of the recreation crops, such as tea and tobacco plant etc.

222012 特用作物學實習 1 選，下

使學生實際認識各種嗜好作物及熟悉其栽培管理方法。

222012 Practice of Special Crops Science 1 S, F

The objective of this course is to give the students understanding the morphology of recreation crops, and practicing the cultivation methods.

222059 植物組織培養技術 2 選，上

該課程著重於討論植物組織培養之各種技術。並輔以最新國內外文獻，探討今後發展之方向。講授內容由培養的理念及操作時所需之器具、藥品、培養法、條件以及植物組織、細胞等培植體為材料之技術。除包括器官培養、癒合組織誘導、體胚發生、單細胞分離及培養等基礎技術外，並探討體細胞雜交，單倍體培養、基因轉移、二次代謝產物生產及種原保存等培養技術之利用價值。

222059 Plant Tissue Culture Techniques 2 S, S

The objective of this course is to discuss methods of tissue culture, and its applications on crop production and breeding. Students are trained to obtain knowledge through seminars. This course includes methodology of plant tissue culture, medium composition and preparation, callus induction, organogenesis, somatic embryo genesis, meristem culture, gene transfer and cell isolation and culture, the production of secondary metabolites in plant biotechnology, and germplasm preservation.

222060 植物組織培養技術實習 1 選，上

本實習著重於利用實驗室設備，由學生實際操作，並配合教學進度以了解植物組織培養技術之基礎操作方法，及熟悉諸如殺菌斧、無菌操作台、組織培養工具等之有效使用。實習內容由容器清洗、調製各種培養基開始，並以果樹、花卉、蔬菜等為培養材料，除了繼代培養、誘導癒合組織、體胚誘導、胚培養、無菌播種外，並行側芽、莖頂等器官之培養及基因轉移。

**222060 Practice of Plant Tissue Culture 1 S
Techniques**

The objective of this course is to offer students with practices of tissue culture, including equipments such as autoclave, clean bench, centrifuge and cutting techniques. Most materials are from horticultural crops. The practices involve training of glass washing, medium preparation, callus induction, somatic embryogenesis embryo culture, virus free seedling, bud, meristem and cell separation and culture technique and gene transfer.

222030 花卉學 2 選，上

本課程旨在介紹與花卉生產相關的科技、產業和應用範圍。內容包括定義，相關學科，分類，產業概況，花卉應用，植物生長發育及開花生理；營養生長與生殖生長的轉變機制、環境因子的影響，產期調節，採收後處理和運銷。並將主要作物依其特性分為：短日植物、日中性植物、球根植物、觀葉植物、花壇植物，簡介其商業化生產方式。

222030 Floriculture 2 S, F

The objective of this course is to introduce floriculture related sciences, technologies, and businesses. Included topics are: definition, classification, and scopes of floriculture; floral utilization; flowering

physiology and induction; postharvest management; introduction to commercial production of major short-day plants, day-neutral plants, bulbs, foliage plants and bedding plants.

222031 花卉學實習 1 選，上

實習單元有：穴盤育苗、田間及盆栽作物的栽培管理、草花辨認、花卉的利用設計及英文論文研讀。

222031 Practice of Floriculture 1 S, F

Topics of activities are: plug production, outdoor plants and potted plants growth and management, plant identification, floral utilization, and literature review.

222039 果樹學 3 選，下

本課程提供基本果樹生產管理技術，內容包括果樹栽培之環境要素、植株栽培及生理特性，開花結果習性，繁殖方法，育種，果樹栽培管理方法及各種果樹生產模式。

222039 Pomology 3 S, S

The course provides fundamental technology of fruit production and orchard management. Environmental factors, botanical and physiological characteristic, flowering, pollination and fruit bearing habits, propagation, breeding, orchard management and production of important fruit crops are covered.

222040 果樹學實習 1 選，下

本實習課程提供果樹學田間實地操作之訓練，包括：1.果樹之建立與管理，2.土壤肥料管理，3.果樹整枝修剪，4.果苗繁殖，5.果樹分級、包裝、採收後處理技術。

222040 Practice of Pomology 1 S, S

The course is designed for training of field practices of fruit crops. Emphasis will be placed on 1.establishment and management of orchard, 2.soil and soil fertility management, 3.pruning and training of fruit trees, 4.propagation and nursery practices, 5. grading, packing, and postharvest technology.

22110 應用農藥學 2 選，下

農藥為作物生產上不可缺少的工具，本課程將介紹農藥特性、類別、毒性、作用機制、噴藥器具，對人畜、作物及環境的影響，農藥管理的組織及法規亦在討論範圍內。

222110 Pesticide Application 2 S, S

Pesticides are essential tool in food production. This course will supply the necessary information about the property, classification, toxicity and mode of action of major pesticides. In addition, the pesticide application equipment, the effects on human and environment and pesticide regulations will also be discussed.

222094 雜草管理 1 選，上

本課程主要介紹雜草的認識、分類、鑑定、生理、生態及對作物、環境、人類的影響，繼而說明草害管理的演變及主要管理技術。

222094 Weed Management 1 S, F

Several topics of weed management are included: how to identify weeds, classification, physiology, ecology, effects of weeds on crops, environment and human beings, the history of weed management and management techniques.

222095 雜草管理實習 1 選，上

本實習主要介紹認識雜草及雜草的生態相，進而了解各種雜草的管理技術包括生物性、化學性殺虫劑特性之介紹及應用。

222095 Practice of Weed Management 1 S, F

This is a practical course of weed management. The purposes are how to know weeds, ecological distribution, management techniques, biological and chemical controls.

222096 草坪管理 2 選，上

本課程介紹草坪之種類及用途；適用於草坪之溫、熱帶各類草種，及其植株特性與繁殖方法，另草坪之設計、規劃、整地、栽植、管理、維護、病虫害種類及其防治方法，均逐一說明。

222096 Turf Management 2 S ,F

The course will introduce different types of turfgrasses and their uses especially those adapted to the temperate and tropical areas. On major turfgrass species, the plant characteristics and propagation techniques will be discussed. For the turf establishment and management, design, preparation, maintenance, pest management techniques will also be discussed.

222097 草坪管理實習 1 選，上

認識各類溫、熱帶草坪之草種、植株特性、繁殖方法，並實際讓學生進行草坪之整地、栽植、管理、病虫害認知與防治等，並配合實地參觀以加深印象。

222097 Practice of Turf Management 1 S ,F

The practical field culture and management techniques on turf will be conducted by students to know how to prepare turf sites, turfgrass propagation techniques, use of fertilizers, and pest control on our practice turf farm. Field trips to golf course and seminar on turf management will also be conducted.

222043 造園學 2 選，下

本課程包含 1.緒論：造園的意義、範圍、分類、人與自然的關係 2.造園史：東洋造園史、西洋造園史、中國造園史。 3.造園設計基礎 4.基地測量 5.基地分析 6.造園規劃和設計 7.植栽和植栽設計 8.造園材料 9.庭園管理與維護。

222043 Landscape Architecture 2 S ,S

This course includes : 1.Introduction ,2.The garden in history, 3.Basis of landscape architecture, 4.Site survey, 5.Site analysis, 6.Planning and design, 7.Plants and planting design, 8.Landscape materials, 9.Landscape maintenance and conservation.

222044 造園學實習 1 選，下

本實習包含：造園設計實務（園地測量、繪製設計圖樣）、造園施工實物（土工、木工、石工、水電工）、庭園管理與維護實務（器具之使用、樹木植栽之修剪及維、草皮之管理及維護）。

222044 Practice of Landscape Architecture 1 S ,S

This course includes : 1.Practices of landscape design(1)Site survey (2)Drawing landscape map.2.Practices of landscape construction(1)Earth-work,(2) Wood-work(3)Rock-work(4) Water and electric power 3.Practices of garden maintenance and conservation(1)Using and maintenance of instruments (2)Pruning (3)Maintenance and management of lawn.

222080 稻作學 2 選，下

使學生瞭解水稻之重要，關於稻之栽培起源，稻之原種，稻之分佈及產銷，次敘述稻之形態、生理以及本省栽培優良品種特性，後敘述栽培原理以及技術、收穫、調製及貯藏。台灣地區稻作機械化之展望。

222080 Rice Science 2 S ,F

In this course, the importance, cultivation, origin, primitive variety, distribution, production and marketing of rice are introduced. Then, the morphology, physiology, characters of good varieties in Taiwan

will also be discussed. The principles and techniques of cultivation, harvest, manufacture and storage will be introduced. The mechanization of rice production in Taiwan will be discussed.

112059 作物營養管理與診斷技術 2 選 上

本課程最主要是在闡明台灣耕地土壤的一些重要土壤問題及其解決之要領，同時說明作物營養管理的原則與方法，並介紹作物無機營養失調症狀及其診斷技術與改善方法。

112059 Crop Nutrition Management 2 S and Diagnostic Techniques

The course emphasizes the problems of cultivated soil in Taiwan and their amendment methods, the principle and methods of crop nutrition management, symptoms of nutrient disorders, diagnostic techniques and amendment methods.

112060 作物營養管理與診斷技術實習 1 選 上

本實習主要在使學生認識作物無機營養，包括大量元素及微量元素失調的症狀，以及熟悉作物無機營養：氮、磷、鉀、鈣、鎂、硫、銅、鐵、錳、鋅及硼的診斷技術與分析方法。

112060 Practice of Crop Nutrition 1 S Management and Diagnostic Techniques

The course offers hands-on practices on identifying symptoms of crop nutrient disorders including macro-elements and micro-elements and other diagnostic techniques, especially on plant and soil analysis including N, P, K, Ca, Mg, S, Cu, Fe, Mn, Zn, and B.

362066 食品生物化學 2 選 上

本課程在銜接生物化學之課程，提供修讀食品科學學生各類不同食物在加工前後及貯藏間生物化學變化的知識。課程內容包括肉類、魚類、蔬果、穀類、烘焙產品、乳製品等原料物質的變化。

362066 Food Biochemistry 2 S 上

In order to connect biochemistry course for food science students, this course is to provide knowledge of biochemical reaction usually occurring in various foods. The course contents include the biochemical changes of raw meat, fish, vegetables and fruits, cereal, baking and dairy products before and after processing or during storage.

222220 水產生物學 3 選 ，上

本課程之目的在於使學生對於在魚類及其製品之水產生物的繁殖與控制之方法有所了解，其內容包括水產生物之分類、水產生物之培養及水產生物之抑制原理。

222220 Aquatic Biology 3 S S

The objective of Aquatic Biology is to introduce the philosophy of development in fishery Biology and to understand how we control Biology in the fish and it's products. The emphasis of this course has been on the taxonomy of fishery Biology, culture of fishery Biology, and control philosophy of fishery biology.

262004 動物解剖生理學 3 選 下

本課程以解剖學為基礎，依生理系統介紹禽畜之身體各部位構造與功能，依次分別為骨骼、肌肉、神經、血管循環、呼吸、消化、吸收、代謝、排泄、內分泌及生殖

等系統。

262004 Anatomy and physiology of Livestock 3 S S

The object of this course will introduce animal anatomy and physiology with organ system. The lectures contain skeleton system, joints, muscles system, nerves system, cardiovascular system, respiratory system, digestion system, urinary system, endocrine system and reproductive system.

262005 動物解剖生理學實習 1 選 下

本課程將利用標本及實際解剖生物來介紹身體構造，並在實驗室以顯微鏡、檢測試劑及多項小型手術用具，透過實驗操作來進一步了解血液、心臟、循環、呼吸、泌尿及生殖之生理現象。

262005 Laboratory of the Anatomy and Physiology in Livestock1 R S

Students will learn animal anatomy with specimens and necropsy and will learn physiological function on blood cell, heart function, circulation, respiratory volume and reproductive cycle by microscopy and polygraph instruments.

262044 禽畜環境生理學 2 選 上

本課程主要討論環境因素、氣候條件以及動物的各種生理控制機構；進而探討環境對動物所造成的影響，以及克服的方法；從動物行為、飼養管理以及畜舍設計等方面來提高畜牧生產的效率。台灣地處亞熱帶，每年長達 6~7 個月的時間處在高溫高濕的緊迫環境，如何克服環境緊迫所造成的不良影響，提高畜牧生產，實為一重要課題。

262044 Environmental Physiology of Domestic Animals 2 S F

This course will discuss the environmental factors, climatic conditions and physiological mechanisms of domestic animals, and further investigate the effects of environments on the performance of animals. The important object of this course is to evaluate some methods to overcome the animal production problems due to the warm humid environments in Taiwan.

262031 動物舍規劃與自動化 2 選 上

畜舍策畫與自動化分為基本策畫所需、材料與原理、各論三部份。基本需要是根據家畜之結構環境、社會環境和氣候環境之需要而訂定；其二為材料與原理，包含隔熱、保溫、風扇、牆、各類設備等材料；各論將就豬、牛、羊、雞舍設計上所需條件、欄數、自動化與飼養管理、飼料、餵飼等之配合加以討論。

262031 Animal House Arrangement and Automation 2 S F

Animal house arrangement and automation will be divided into three parts: basic requirements, material and principle, and animal house for varied species. Basic requirement is concerned the following three environments: structure environment, social environment, and climate environment. Material and principle is discussed about the material used in animal house, and how to use the materials, i.e. insulation, heater, ventilation wall, division and etc. The house arrangement of four species of livestock and poultry will be discussed in detail. They are pig, poultry, cattle, goat, and sheep.

222017 動物營養學 3 選 , 下

本課程主要討論動物營養的基本概念，以及如何利用各種飼料原料配合成平衡的各種動物飼料，在台灣的環境下，從事家禽飼養。討論內容包括：營養素的代謝、營養需要量的測定及資料應用、飼料原料的選擇、及各種家禽的營養需要與飼料配製，包括：肉雞、蛋雞、種雞、火雞、肉鴨、蛋鴨及鵝等。

222017 Animal Nutrition 3 S , S

This course is designed to discuss the basic concepts of poultry nutrition and how to use feed ingredients to formulate balanced poultry feeds for poultry production, especially under Taiwan

environmental conditions. The contents include : metabolism of nutrients, nutrition requirements and application of information, feed ingredients, and feed formulation for all kinds of poultry, include : broilers, layers, breeders, turkeys, ducks and geese.

262022 動物育種學 3 選 上

本課程之目的在解析家畜育種學原理，並介紹各種育種技術於家畜改良計畫之應用。課程內容包括族群基因頻率、簡單與多基因遺傳性狀、選拔原理與應用、配種制度、數量性狀之遺傳模式、遺傳參數估計與應用、生物技術發展與家畜育種之應用。

262022 Animal Breeding 3 S F

The objectives of this course are to provide an understanding of the principles of animal breeding and to introduce the application of animal breeding techniques in farm animal improvement programs. Material includes gene frequencies in populations, simple-inherited and polygenic traits, selection, mating systems, genetic models for quantitative traits, estimation and application of genetic parameters, development of biotechnology and its application in animal breeding.

132003 水產養殖學 3 選 下

本課程為介紹世界水產養殖現況及台灣養殖現況，後再討論有關養殖水質處理、養殖系統、養殖設備及依生物學的觀點，介紹各種具有經濟價值之水產生物之養殖技術。

132003 Introduction to Aquaculture 3 S

The theme of the course provides the students the current knowledge of aquacultural techniques, survey of the fields, water qualities and treatments, culture systems, culture facilities, and biology and culture techniques of the commercially aquatic organism .

222034 飼料生物學 3 選 , 下

本課程專門講授水產餌料之培養技術，其中包括海洋酵母、矽藻、扁藻、鞭毛藻、纖毛蟲、輪蟲、水蚤等之培養技術及載體餌料生物之利用技術。

222034 Cultivation of Live Feed 3 S , S

The course is provided with the needs of students in one semester lecture. The topics are especially designed to enhance their training on the cultural techniques of living food, i.e., marine yeasts, diatoms, tetraselmis, rhodomanas, ciliata, rotifera, daphnia etc, and techniques on the carrier living food for fisheries.

132010 水族營養學 3 選

本課程之主要目的是在於使學生瞭解魚類與蝦類之營養需求，內容包括：魚類與蝦類之基礎營養學、營養物質之代謝、蛋白質與胺基酸之需求、脂肪酸之需求、及維生素與礦物質求。

132010 Fish Nutrition and Feed 3 S

The purpose of this course is to give the students more familiar with the requirement of nutrients and design technique of feed formulation for the fish and shrimps. Which contains the basic nutritional principle of fish, metabolism of all nutrients. Also research protein and amino acids, fatty acids, vitamin and minerals requirement.

262064 肉品加工 2 選 下

本課程介紹肉品加工有關技術之學理與所使用設備的原理。重點將著重於使學生瞭解各種加工技術，包括肉品之醃漬、嫩化、煙燻、乳化、乾燥、添加物使用與肉品保存等之原理與應用。

262064 Processing of Meat Products 2 S S

This course introduces technologies related to meat processing and principles of the equipments and facilities related. The purpose of this course is educating students with knowledge include meat marination, tenderization, smoking, emulsion, drying, food additives addition, meat product preservation, and etc.

262065 肉品加工實習 1 選 下

本課程配合肉品加工技術之正課，使得學生能在瞭解肉品加工技術有關之原理及設備的功能外，更能實際正確地操作各項設備，以製作各項產品，包括：醃漬肉排、香腸、火腿、臘肉、貢丸、叉燒、油雞等。

262065 Meat Products Lab. 1 S S

In this course, it educates students how to handling the meat processing equipments correctly. Moreover, students will apply these equipments to produce several meat products, including marinated chops, sausages, hams, Chinese bacon, Chinese meatball, BBQ pork, poultry products.

132052 觀賞魚養殖與管理 2 選 下

本課程介紹目前台灣觀賞魚的養殖和繁殖、水族造景和水草之管理、水族器材、水族箱之水質處理與管理和水族箱之養殖管理。

132052 Culture and Management of Ornamental Fish 2 S

The course is comprised of the artificial propagation and management of aquarium fish cultured in Taiwan、aquarium design and management of aquarium plant、Aquarium apparatus、the process and control of water quality in aquarium and the management of aquarium .

132053 觀賞魚養殖與管理實習 1 選

本實習介紹目前台灣觀賞魚的養殖和繁殖、水族造景和水草之管理、水族器材、水族箱之水質處理與管理和水族箱之養殖管理。

132053 Practice in Culture and Management of Ornamental Fish. 1 S

The course is comprised of the artificial propagation and management of aquarium fish cultured in Taiwan, aquarium design and management of aquarium plant, Aquarium apparatus, the process and control of water quality in aquarium and the management of aquarium .

262059 乳品加工 2 選 上

本課程講授乳之種類及成分、原料乳之品質、原料配合、加工原理、加工製程、品質管制及貯藏。乳製品種類包涵鮮乳、調味乳、乳粉、煉乳、發酵乳、冰淇淋、乾酪、乳酪及乳油。

262059 Processing of Dairy Products 2 S F

This course includes milk compositions, raw material quality, raw material recipes of dairy products, chemical changes of processing, processing scheme, quality control and storage. Major dairy products such as fresh milk, flavored milk, milk powder, concentrated milk, fermented milk, ice cream, cheese, butter and cream will be included.

262060 乳品加工實習 1 選 上

本實習配合乳品技術之課程，使學生熟悉乳品之製程及品質控制。內容包括生乳及鮮乳檢驗、乳成分及微生物檢驗、鮮乳及調味乳製造、發酵乳製造、冰淇淋製造及乾酪製造。

262060 Dairy Products Lab. 1 S F

The objective of this course is to give students practical training on formula, processing and quality control of dairy products. It includes chemical, physical and microbial examinations of raw milk and dairy products, manufactures of fresh milk, flavored milk, fermented milk, ice cream and cheese.

262088 牧場經營學 2 選 下

使學生瞭解經營牧場之一般原則、原理與如何應用經濟原則及牧場經營有關業務期降低經營成本，提高利益，其內容包括牧場生產資源之利用、牧場經營之經濟原則、禽畜生產預估、畜產品運銷、生產業務之配合利用、牧場建築與設備、環境污染控制、以及自動化生產的方式評估。

262088 Livestock Production Management 2 S S

To allow students to understand the general principles of managing animal production, and to know to apply the economic theories into the animal production with a view to decreasing production costs and increasing profits. This course is dealing with the utilization of animal production resources, the estimating of animal production, the marketing of animal products, the coordination of production business, the farm building and equipment and the control of environmental pollution.

262050 馬學 2 選 下

本課程係討論馬的飼養及管理有關的各項問題，內容包括有養馬事業的歷史與發展、馬的鑑別與選拔、品種與類型、營養與飼料、日常照料、行為與調教、馬廄管理、馬的放牧及衛生管理。

262050 Equine Science 2 S S

The course will deal with the feeding and management of horse. It will cover the history and development of the horses industry, selecting and judging horses, breeds and types of horses, nutrition and feeds for horses, feeding and management, horse behavior and training, pasture for horses, and horses health, disease prevention, and parasite control.

262051 馬學實習 1 選 下

本實習課程旨在探討馬的習性、飼養管理及御馬，並使學生習得馬飼養、清潔、修蹄、騎乘之基本技能。主要課程內容包括：馬的習性、馬舍管理、馬之調教清潔、馬蹄保護及騎乘。

262051 Equine Science Practice 1 S S

The purpose of this course is to give students more familiar with horse behavior, management, horse training, and horse driving. It contains: horse behavior and training, care and management, herd health, hoof care, and the skill of horses riding.

362028 生物化學(乙) 3 選 下

修讀學生需具備生化分子結構之基本概念，本課程將介紹此些生化分子在生物體內之代謝與合成，了解生物體如何由此些生化分子獲取能量及合成生長所需之大分子。其授課內容包括醣解作用，檸檬酸循環、電子傳遞鏈、肝糖合成、脂肪及含氮化合物之代謝與合成等項目。

362028 Biochemistry (B) 3 S S

Students should have the basic concepts of biomolecules before they take this course. This course is designed to introduce the metabolism and anabolism of biomolecules. The topics include glycolysis, citric acid cycle, electron transfer chain, glycogen synthesis, β -oxidation of fatty acid, biosynthesis of lipid, metabolism and anabolism of nitrogen-containing compounds.

362030 食品機械 2 選 上

本課程將介紹食品與相關機械之原理與應用。課程內容包括工廠電力系統，工程圖學，機械原理，電動機械，量測與控制，流體機械，加熱機具，殺菌機具，冷凍機具，乾燥機械，擠壓機，包裝機械 及其他食品自動化機械。

362030 Food Machinery 2 S F

Objectives of this course are to introduce the principles and applications of food machinery. Scope of

this course includes factory electricity, engineering drawing, the principles of machinery, electrical machines, measurement and control, fluid machinery, heating equipments, pasteurization and sterilization equipments, freezing equipments, dehydration equipments, extruders, packaging systems and other food process automatic machinery.

132066 校外實習 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。

132066 Extracurricular Intern 2 S

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.

272053 食用菌栽培技術 2 選 上

食用菌如洋菇、草菇、鮑魚菇、木耳、金針菇及香菇等菇類之生理、生態及形態之認識，栽培方法為基本內容。介紹各種菇類栽培之理論與實際配合，探究菇類生長之條件，對目前國內外流行而適合企業化經營之食用菌類特別作有系統之說明，以利選讀生將來應用。

272053 Edible Fungi Cultivation 2 S F

Edible fungi such as common mushroom, chinese mushroom, oyster mushroom, Jelly fungi mushroom and shiitake are the major subjects to be discussed in lectures. The physiology, ecology and morphology provide basic information to culture the mushroom. Knowing how to compost manure, isolates the mycelia theory and practical operation, especially emphasized on large-scale commercial cultivation of mushrooms in status and future of the world, and to meet the need of techniques and knowledge for mushroom production.

2-3、國際學院熱帶農業暨國際合作系(碩士班) 必選修科目表

熱帶農業暨國際合作系碩士班 (Curriculum Table for Master Program)

(一)教育目標

1. 培育熱帶及國際農業專業人才。
2. 促進農、林、漁、牧各方面之相關研究。
3. 培育高級專業人才，增進獨立與開發研究能力。
4. 提升農、林、養殖及畜牧業之專業技術。
5. 協助政府規劃及培訓援助友邦的農業技術人才。

(二)必修科目

必修科目總稱 Names of Required Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		備註 Remarks	
		1 st	2 nd	1 st	2 nd		
		semester	semester	semester	semester		
專題討論 Seminar	4	1	1	1	1	輪授	
應用華語(1) Applied Mandarin (1)	1	1				外籍生必修，1學分2小時	
應用華語(2) Applied Mandarin (2)	1		1			外籍生必修，1學分2小時	
農業發展與國際合作特論 Special Topics on Agricultural Development and International Cooperation	2		2			熱帶農業暨國際合作系	
農業研究方法 Agriculture Research Methods	2		2			熱帶農業暨國際合作系	
碩士論文 Thesis	6			3	3		
合計 Total	14	1	5	4	4	本國 生	
	16	2	6	4	4	外籍 生	

(三) 選修科目

選修科目總稱 Names of Elective Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		備註 Remarks
		1 st semester	2 nd semester	1 st semester	2 nd semester	
		試驗設計及數據分析 Experimental Design and Data Analysis	2	2		
農企業管理特論 Special Topics on Agribusiness Management	3	3				熱帶農業暨國際合作系
行銷管理專題 Special Topics on Marketing Management	3		3			熱帶農業暨國際合作系
免疫學概論 Introduction to Immunology	3	3				熱帶農業暨國際合作系
統計取樣法 Sampling Methods	2		2			熱帶農業暨國際合作系
全球研討會 Global Seminar	3	3				熱帶農業暨國際合作系
電顯技術 Electron Microscopy	2		2			熱帶農業暨國際合作系
專題研究 Special Research Project	2	1	1			熱帶農業暨國際合作系 指導教授
熱帶農業生態 Tropical Agriculture Ecology	2		2			熱帶農業暨國際合作系
植物環控生理學 Controlled Environment Plant Physiology	3		3			熱帶農業暨國際合作系
個體經濟特論 Special Topics on Microeconomics	3			3		熱帶農業暨國際合作系
永續農業發展與規劃 Development and planning in Sustainable Agriculture	2			2		熱帶農業暨國際合作系
農業發展核心競爭力策略規劃 Competitive Strategy and Core Planning in Agricultural Development	2				2	熱帶農業暨國際合作系
生物防治特論 Special Topics on Biological Control	2		2			熱帶農業暨國際合作系
國際漁業合作特論 Special Topics on International Fishery Cooperation	2		2			熱帶農業暨國際合作系
高等植物營養學 Advanced Plant Nutrition	3			3		熱帶農業暨國際合作系
農業技術轉移 Agriculture Technology Transfers	3				3	熱帶農業暨國際合作系
高等植物組織培養學 Advanced Plant Tissue Culture Techniques	3	3				熱帶農業暨國際合作系

選修科目總稱 Names of Elective Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		備註 Remarks
		1 st semester	2 nd semester	1 st semester	2 nd semester	
		天然物特論 Special Topics on Natural Products	2			
林產特論 Special Topics on Forest Products	2			2		熱帶農業暨國際合作系
木材微生物學 Wood Microbiology	3		3			熱帶農業暨國際合作系
高等生物材料顯微鏡學 Advanced Microscopy on Biological Materials	2			2		熱帶農業暨國際合作系
作物營養管理與診斷技術 Crop Nutrition Management and Diagnostic Techniques	2	2				熱帶農業暨國際合作系
作物營養管理與診斷技術實驗 Crop Nutrition Management and Diagnostic Techniques Lab.	1	1				熱帶農業暨國際合作系
地理資訊系統特論 Special Topics on Geographic Information Systems	2	2				熱帶農業暨國際合作系
溝通技巧 Communication Skills	3				3	熱帶農業暨國際合作系
訊息傳遞 Signal Transduction	2		2			熱帶農業暨國際合作系
食品經營特論 Special Topics on Food Management	2		2			熱帶農業暨國際合作系
魚類疫苗學 Fish Vaccinology	3		3			熱帶農業暨國際合作系
家禽學特論 Special Topics on Poultry Management	2		2			熱帶農業暨國際合作系
乳牛學特論 Special Topics on Dairy Cattle Management	2		2			熱帶農業暨國際合作系
植物生物化學 Plant Biochemistry	2		2			熱帶農業暨國際合作系
分子生物學 Molecular Biology	2		2			動物疫苗所
動物細胞培養 Animal Cell Culture	2			2		生命科學系
動物胚胎幹細胞建立與應用特 論 Special Topics on Application and Establishment of Embryonic Stem Cells	2	2				生命科學系
作物學特論 Advanced Crop Science	2	2				農園生產系

選修科目總稱 Names of Elective Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		備註 Remarks
		1 st semester	2 nd semester	1 st semester	2 nd semester	
		草坪生理及管理 Turf Physiology and Management	2			
高等作物育種學 Advanced Crop Breeding	2		2			農園生產系
種子科學與技術 Seed Science and Technology	2			2		農園生產系
熱帶作物生理學 Tropical Crop Physiology	2		2			農園生產系
植物逆境生理 Stress Physiology of Plants	2		2			農園生產系
果樹生理特論 Special Topics on Fruit Crop Physiology	2			2		農園生產系
高等果樹學 Advanced Pomology	2			2		農園生產系
高等蔬菜學 Advanced Olericulture	2			2		農園生產系
高等花卉學 Advanced Floriculture	2			2		農園生產系
高等園產品處理 Advanced Postharvest Technology of Horticultural Crops	2			2		農園生產系
休閒研究方法論 Research Methods in Leisure Studies	3		3			森林系
魚類學特論 Special Topics on Ichthyology	2	2				水產養殖系
新魚種養殖特論 Special Topics on New Fish Species Culture	2	2				水產養殖系
甲殼類生理學 Special Topics on Crustacean Physiology	3	3				水產養殖系
無脊椎動物免疫學 Invertebrate Immunology	3	3				水產養殖系
海洋生物技術特論 Special Topics on Marine Biotechnology	2		2			水產養殖系
家畜營養生理 Animal Nutritional Physiology	2	2				動物科學與畜產系
草食動物營養特論 Special Topics on Nutrition for Herbivores	2	2				動物科學與畜產系
高環境溫度與禽畜生產 High Temperature and Animal Production	2	2				動物科學與畜產系

選修科目總稱 Names of Elective Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		備註 Remarks
		1 st semester	2 nd semester	1 st semester	2 nd semester	
		實用畜產自動化特論 Special Topics on Application of Animal Products Automation	2	2		
熱帶畜牧特論 Special Topics on Tropical Livestock Production	2	2				動物科學與畜產系
畜產污染防治與資源利用 Livestock Pollution Control and Resource Utilization	2	2				動物科學與畜產系
畜舍策劃特論 Special Topics on Animal House Arrangement	2	2				動物科學與畜產系
細胞生物學特論 Special Topics in Cell Biology	2	2				
家畜繁殖管理特論 Special Topics on Livestock Reproductive Management	2	2				動物科學與畜產系
生殖技術特論 Special Topics on Reproductive Technology	2		2			動物科學與畜產系
應用動物育種技術 Applied Animal Breeding Technology	2		2			動物科學與畜產系
牛應用行為學 Applied Cattle Behavior	2		2			動物科學與畜產系
乳品加工特論 Special Topics on Milk Products Processing	2		2			動物科學與畜產系
肉品加工特論 Special Topics on Meat Products Processing	2		2			動物科學與畜產系
動物代謝調節 Animal Metabolic Regulation	2		2			動物科學與畜產系
飼料技術特論 Special Topics on Feed Manufacture Technology	2		2			動物科學與畜產系
安全畜產品生產特論 Special Topics on Safe Animal Production	2		2			動物科學與畜產系
動物行為和福利 Animal Behavior and Welfare	2			2		動物科學與畜產系
蛋品加工特論 Special Topics on Egg Products Processing	2			2		動物科學與畜產系
泌乳生理學 Physiology of Lactation	2			2		

選修科目總稱 Names of Elective Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		備註 Remarks
		1 st	2 nd	1 st	2 nd	
		semester	semester	semester	semester	
數量遺傳與動物模式論 Quantitative Genetics and Animal Model Methodology	2			2		動物科學與畜產系
禽畜副產物利用 Utilization of Animal and Poultry	2				2	動物科學與畜產系
動物基因轉殖特論 Special Topics on Animal Transgenics	2				2	動物科學與畜產系
植物病原學特論 Special Topics on Plant Pathogens	2	2				植物醫學系
高等昆蟲學 Advanced Entomology	2	2				植醫系
植物病害防治特論 Special Topics on Plant Diseases Control	2	2				植物醫學系
有害生物綜合管理特論 Special Topics on Integrated Pest Management	3			3		植醫系
高等植物病理學 Advanced Plant Pathology	2		2			植物醫學系
熱帶植物病害特論 Special Topics on Tropical Plant Diseases	2		2			植物醫學系
熱帶植物蟲害特論 Special Topics on Tropical Insect Pests	2		2			植物醫學系
昆蟲生態學特論 Special Topics on Insect Ecology	2		2			植物醫學系
農藥學特論 Special Topics on Pesticides	2			2		植物醫學系
生物技術特論 Advanced Biotechnology	2			2		植物醫學系
藥理學特論 Advanced Pharmacology	2		2			獸醫學系
分子病毒學 Molecular Virology	2	2				獸醫學系
基因調控 Gene Regulation	2	2				獸醫學系
食品科技研究法 Methodology for Food Research	3	3				食品科學系
高等食品化學 Advanced Food Chemistry	3		3			食品科學系
應用微生物學 Applied Microbiology	3			3		食品科學系

選修科目總稱 Names of Elective Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		備註 Remarks
		1 st semester	2 nd semester	1 st semester	2 nd semester	
		高等食品生物化學 Advanced Food Biochemistry	2		2	
食品製程之自動控制 Automatic Control in Food Processing	3		3			食品科學系
最適化在食品科技之應用 Optimization in Food Science and Technology	3		3			食品科學系
微生物生理與代謝 Microbial Physiology and Metabolism	3		3			食品科學系
生化工程 Biochemical Engineering	2			2		食品科學系
高等食品工程 Advanced Food Engineering	3		3			食品科學系
高等食品加工 Advanced Food Processing	2	2				食品科學系
食品機械特論 Special Topics on Food Machinery	2		2			食品科學系
作物需水量 Crop Water Requirements	3			3		土木工程系
灌溉方法 Irrigation Methods	3			3		土木工程系
排水工程 Drainage Engineering	3			3		土木工程系
農業研究資訊 Agricultural Research Information	2	2				水土保持系
農企業財務管理 Financial Management of Agribusiness	3		3			農企業管理系
農企業人力資源管理 Human Resources Management of Agribusiness	3		3			農企業管理系
農企業投資分析 Agribusiness Investment Analysis	3		3			農企業管理系
區域經濟與政策分析 Regional Economics and Policy Analysis	2		2			農企業管理系
中國園林藝術特論 Special Topics on Chinese Garden Arts	3		3			景觀暨遊憩管理研究所
文化景觀特論 Special Topics on Culture Landscape	3		3			景觀暨遊憩管理研究所
景觀建築與風水特論 Special Topics on Landscape Architecture and Feng-Shui	3			3		景觀暨遊憩管理研究所
造園設計特論 Special Topics on landscape Design	3	3				景觀暨遊憩管理研究所

選修科目總稱 Names of Elective Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		備註 Remarks
		1 st semester	2 nd semester	1 st semester	2 nd semester	
合 計 Total		266	83	113	62	12

226008 試驗設計及數據分析 2 選 謝清祥、上

本課程之目的在於訓練研究生如何利用統計及試驗設計之方法以從事基本之試驗研究，其主要內容包括：各種生物數據之性質及整理，數據均質性分析，迴歸與相關性分析，共變方分析、試驗設計方法及線型分析及上述試驗分析之電腦應用。

226008 Experimental Design 2 S H. H. Ching F
and Data Analysis

This course is to train students on how to use statistical and experimental methods on conducting research experiments. Its contents include: characteristics of biological data and its collection, homogeneous tests, regression and correlation analysis, covariance analysis, experimental designs and linear analysis, and computer applications of the above analyses.

226009 熱帶農業生態 2 選 下

本課程深入探討台灣農業發展過程及其展望。本課程內容包括農業於生態及歷史學上之關係，及熱帶水稻、豆類、玉米、甘蔗、蔬菜、花卉及水果之生產及生長環境。此外亦將探討農業生態系之動態及熱帶農業之展望。

226009 Tropical Agriculture Ecology 2 S S

This course is to introduce the fundamental concepts, theories and practices of biological control of pathogens, and insect pest and weeds. Its contents include: biological control's history, ecological bases, foreign exploration for beneficial organisms, methods of colonization, recovery and evaluation, and integration with chemical control and microbial control. In addition, studies of major biological control projects in terms of their success/failure and trend will also be discussed.

226010 農業發展與國際合作 4 選 謝順景郭忠吉
孫明賢、李柏淳
鄒麓生
下

本課程內容在介紹中華民國在臺灣五十年來之農業發展過程，從初期的土地改革政策和以農業為主之經濟發展，進入以工商業為主之現代化社會，同時在配合農業升級及回饋國際社會政策下推展各項國際合作計劃；目的在使同學能鑑往知來，為下一世紀之農業開創新局。

226010 Agricultural Development 4 S S. C. Hsieh 、C. C. Kuo
and International Cooperation M. H. Sun 、P. P. Li
Samson Tsou 、S. C. Tsai
S

This course is to provide an insight of agricultural development of Taiwan for the past 50 years, and also point out its new direction for the next century. Its contents include: land reform programs, agricultural trade and economic development, transformation from an agricultural to industrialized economy, and international cooperation.

226011 系統分析 3 選 、上

本課程將介紹以系統方法來解決農業及環境的問題。主題包括 1.系統模式 2.空間變數 3.遙感探測對農業 4.自然資源系統模式。

226011 System Analysis 3 S ,F

This course is to introduce how to use the systematic methods to solve the problems of agricultural and environment. Its contents include: system models; spatial variables; remote sensing; and nature resource system.

226012 技術轉移 3 選 謝順景、高德錚
吳明敏、

下

本課程在教授資訊分析及整合之基本知識與技術，及溝通技巧在轉移技術產品至客戶上之應用，學習重點包括在農業研究結果之轉移及農產品製造與處理設備上之實際經驗。

226012 Technology Transfers 3 S S. C. Hsieh、T. C. Kao
M. M. Wu
S

This course is to provide students with the basic knowledge and skills in the synthesis and analysis of information, and the utilization of communication tools in transferring products. Emphasis will be placed on the actual experience in transferring results of agricultural research and manufacturing or processing facilities for agricultural products.

226013 專題研究 2 選

本課程由教師輔導學生選定其有興趣之研究題目，進行文獻收集、討論及實驗設計，並將研究結果撰寫報告。

226013 Special Research Project 2 S

Each student will select his/her research topic of interest and be requested to search literature, discuss with faculty members, and design experiment. Finally, a report of research results will be required.

226014 高等作物育種學 2 選 、上

本課程以講授及討論不同主題之作物育種理論及育種技術，內容包括以下章節：

1.育種之演變 2.族群與變異 3.變異誘導與處理 4.體細胞雜交 5.基因轉移 6.選拔策略 7.抗生物性及非生物性之遺傳及育種 8.特殊性狀之育種 9.其他

226014 Advanced Crop Breeding 2 S , F

This course is to teach students plant breeding theories and technique. Its contents include: the evolution of plant breeding; population structure and variability; induced variation and its manipulation; somatic hybridization; gene transfer to plants; selection strategies; breeding and genetics on a biotic and biotic stress; and specific trait breeding.

226015 高等植物營養學 2 選 陳光堯、上

本課程介紹營養元素與作物生育的關係。將講述植物營養元素的種類、功能；植物對營養元素的吸收、運轉與再分佈；影響營養元素吸收的因素；各營養素的功能；營養元素與植物病蟲害及產量的關係等。

226015 Advanced Plant Nutrition 2 S Stanley Chen, F

This course is to introduce the relationship between nutrients and plant growth and development. Its contents include: classification and functions of nutrients; the uptake, trans-location and redistribution of different nutrients; the relationships between nutrients and crop yield and pests.

226016 高等植物營養學實習 1 選 陳光堯、上

本課程藉由進行植物營養元素的地下部與地上部吸收試驗、操作不同分析儀器如：氮分解與蒸餾裝置、光電比色計與原子吸收儀等，及熟悉各營養元素的分析方法，讓學生能獨立進行植物營養方面的試驗，並更瞭解植物對營養元素的吸收、運轉與功能。

226016 Advanced Plant Nutrition Lab. 1 S Stanley Chen, F

This lab session is to offer students practices in tissue analysis, uptake and translocation of nutrients as well as functions of different elements. The absorption of nutrients from roots and shoots will be compared. Familiarity in operation of different instruments, such as Kjeldal N2 analyzer, spectro-meter, atomic absorption spectrometer and tissue analysis of major and minor nutrients is expected.

226017 環控植物生理學 3 選 陳光堯、下

本課程在教授生物物理及生物化學在植物生理及生態上之應用，同時強調環境控制在農業研究上之重要性及其相關技術之運用；主要內容包括植物體與環境間各種形式之物質及能量的交換，如

水份、二氧化碳之擴散方式、平衡分析與能量運用等。

226017 Controlled Environment 3 S Stanley Chen, S
Plant Physiology

This course is to provide students with the basic knowledge of the applications of biophysics and biochemistry on plant physiology and ecology. The importance of a “controlled environment” and the technology of “environmental control” will also be covered. Its contents include: diffusion; chemical and energy potential gradients; solute movement in and out of plant cells; the interconnection of various energy forms; and energy and matter exchange between plant and environment (water vapor and carbon dioxide, energy budget analysis, and water movement from soil to plant to atmosphere).

226018 個體經濟特論 3 選 鍾惠雯、下

本課程之目的在於傳授學生經濟學理論。其主要內容包括：數學背景，生產與成本函數，顧客理論，自由競爭，及單一市場平衡。

226018 Special Topics on 3 S Rebecca H. Chung, S
Microeconomics

This course is to teach students microeconomic theory. Its contents include: mathematical background; production and cost functions; consumer theory; the competitive firms; and single market equilibrium.

226019 社會昆蟲學特論 2 選 、上

本課程在介紹群居昆蟲之生物及生態學基本知識，例如蜜蜂、螞蟻、白蟻等，教授之重點在於闡述其演化、食物、覓食行為、階級區分、繁殖、聚落及群體生活等各種學說。

226019 Special Topics on Social Insects 2 S ,F

This course is to introduce to students the basic knowledge of the biology and ecology of social insects, including bees, ants, and termites, with emphasis on the theories of evolution, food, foraging behavior, caste differentiation, reproduction, colonies and communities.

226020 社會昆蟲學特論實習 1 選 、上

本實習之目的在使學生熟悉群居昆蟲形成聚落和其群體生活之各別及綜合現象，學生將由實際操作及田野觀察中學習蜜蜂、螞蟻、白蟻聚落之形成及維護。

226020 Special Topics on Social 1 S ,F
Insects Lab.

This lab session is to familiarize students with the formation of colonies and communities of social insects and their interactions through hands-on experiments and field observations. Colonies of bees, ants, or termites will be initiated and maintained by students.

226022 高等昆蟲學 2 選 、上

繼基礎昆蟲學後，本課程從昆蟲之發生演化、行態、生理、生態等角度探討昆蟲之適存與多樣性，提供昆蟲於自然與人為環境下之角色與功能的思考空間。

226022 Advanced Entomology 2 S ,F

This course is to introduce fundamental of entomology in insect evolution, morphology, physiology, behavior and ecology, and their adaptation and diversity. Also included in the contents are the roles and functions of insects in the national and agricultural environments.

226023 植物保護與永續農業 2 選 、上

本課程將探討臺灣植物病蟲害之發展史及其防治對策，本課程將著重於現行動植物檢疫法規及制度、農藥及其藥害、農業環境與植物生產之關係。低投入永續農業、替代農業、與永續農業之關係亦將討論。此外本課程亦探討永續農業世界上執行之現況。

226023 Plant Protection in 2 S ,F
Sustainable Agriculture

This course is to review the history of the occurrence of plant disease insect pests in Taiwan and their control measures. Its contents include: the current plant quarantine and inspection systems; pesticides and the problems associated with their uses; and agricultural environment and plant production. The linkage of plant protection and sustainable agriculture will also be discussed. In addition, organic agriculture, low-input sustainable agriculture, alternative agriculture and their relationship with sustainable agriculture will be discussed. Finally, a critical review of worldwide projects on sustainable agriculture will be made.

226024 生物防治特論 2 選 、下

本課程介紹植物病蟲害生物防治之基本概念，生態學上之理論及利用。課程內容包括生物防治之發展史、生態基礎、國外天敵之探尋、天敵群落之建立，回收及評估，以及生物防治與化學防治及微生物防治之綜合利用。除此之外，還包括主要生物防治之計畫其成功、失敗及展望。

226024 Special Topics on Biological Control 2 S , S

The course is to introduce the fundamental concepts, ecological theories and practices of biological control of plants pathogens, insect pests and weeds. Its contents include: biological control's history; ecological bases; foreign exploration for beneficial organisms; methods of colonization, recovery and evaluation; and integration with chemical control and microbial control. In addition, studies of major biological control projects in terms of their success/failure and trend will be introduced.

226025 昆蟲行為學特論 2 選 、上

本課程深入探討動物行為學之理論，昆蟲社會及種間之行為，消息傳遞及演化。本課程著重在於環境因子對昆蟲行為之影響。

226025 Special Topics on Insect Behavior 2 S , F

This course is to review the theories of ecology, social and inter-specific behavior, communication, and evolution of insects. Emphasis will be placed on the effects of environmental factors on the behavior of insects.

226026 農企業管理特論 3 選 鍾惠雯、上

本課程之目的在於傳授學生基本財務觀念及管理技能。其主要內容包括：財務會計，經理的角色，瞭解農企業管理，行銷在農企業管理，及農企業的成功。

226026 Special Topics on Agribusiness Management 3 S R. H. Chung, F

This course is to teach students basic financial concepts and management skills. Its contents include: what is agribusiness; the role of a manager; understanding agribusiness management; marketing in agribusiness management; financial accounting, investment analysis; and success of agribusiness.

226027 論文寫作 2 選 、上

本課程旨在訓練研究生對資料蒐集、整理及表達的能力。學生選擇碩士論文有關的主題，蒐集文獻、閱讀、整理成摘要，然後提出報告討論。

226027 Thesis Writing 2 S , F

This course is to train graduate students the ability in searching literature, organizing materials and giving presentations. Students are required to select a topic in the field of those related to their thesis, search and review literature, and draw up an abstract.

226028 行銷管理特論 3 選 鍾惠雯、上

本課程之目的在於傳授學生行銷理念及知識。其主要內容包括：瞭解行銷管理，分析行銷機會，發展行銷策略，策畫行銷節目，及管理行銷人力資源。

226028 Special Topics on 3 S R. H. Chung, F

Marketing Management

This course is to teach students the concepts and knowledge of marketing. Its contents include: understanding marketing management; analyzing marketing opportunities; developing marketing strategies; planning marketing programs; and managing the marketing effort.

226030 害蟲化學生態 2 選 、上

本課程主要目的，在於使學生具備下列新知識—包括寄主植物與害蟲互動之植物化學基礎，特別於產卵，害蟲危害寄主植物之生物，植物害蟲與寄生蟲互動之植物化學基礎，植物化學促進費洛蒙之產生，寄主植物之抗性反感染性抵制，反寄主植物與害蟲在蟲害產地上相關性之化學基礎。

226030 Chemical Ecology of Insect Pests 2 S P. Y. Lai, F

This course is to introduce students the knowledge in chemical ecology of insect pests on host plants. Its contents include: insect and host colant interaction; mechanisms and strategies of plant finding especially for oviposition; biochemistry of damage on host plant; role of phytochemicals in insect pest–parasitoid interaction; involvement of phytochemicals in stimulation of pheromone production; host plant susceptibility and resistance; mechanism of host plant resistance in various plant families; and exploitation of chemical basis of host plants–insect pest association in pest management.

226031 植物生態學特論 2 選 、下

本課程旨在教授學生植物生態，包括：植物社會的觀念、生態系的結構與功能、生態系中生物地質化學循環、全球變遷與陸生生態系、生物多樣性觀念，假說，研究、生物多樣性與保育、族群生態學之介紹、競爭與相剋作用、植物群落的形成機制、分子生態學觀念、分子生態學研究法、分子演化生態學和植物，昆蟲及動物間之共同演化。

226031 Special Topics on Plant Ecology 2 S ,S

This course is to teach students the knowledge in plant ecology. Its contents include: concepts of plants community; structure and functions of ecosystems; biogeochemical cycle of terrestrial ecosystems; global change and terrestrial ecosystem; biodiversity; biodiversity and conservation; population ecology; competition and allelopathy; mechanism of formation of plant population; molecular ecology; evolutionary molecular ecology; and coevolution of plant-insect-animal.

226032 植物化學生態學 2 選 、下

本課程旨在介紹學生植物化學生態知識，包括：簡介植物化學生態學、酚酸化合物之萃取及鑑定、類黃素之萃取、純化及鑑定、可見光紫外光譜、質譜及核磁共振光譜之解析、酚酸類化合物之生態角色、類黃素之生態角色、松烯類化合物之萃取、純化及鑑定、松烯類化合物之生態角色、植物鹼之萃取、純化及鑑定、植物鹼之生態角色、相生相剋物質之簡介、真菌毒物質及黃麴毒素、費洛蒙及其他化學傳訊素、植物對外來攻擊之防禦物質、共同演化：植物-昆蟲-動物之交互作用。

226032 Phytochemical Ecology 2 S ,S

This course is to introduce the knowledge in phytochemical ecology. Its contents include: isolation and identification of phenolics; isolation and identification of flavonoids; UV-visible, MS, NMR spectroscopic interpretation; ecological roles of terpenoids; isolation and identification of alkaloids; ecological roles of alkaloids; allelochemicals in general; mycotoxins and aflatoxins; pheromones, kairomone, and allomones; phytoalexins; and co-evolution of plant-insect-animal interactions.

226033 永續發展(通識課程) 2 選 、上

為加強二十一世紀全民對永續發展的正確概念，永續發展通識課程內容涵蓋：永續發展的定義、永續發展的國際趨勢、我國永續發展的原則及策略綱領、永續發展的壓力—現況—影響—反應 (Pressure—State—Impact—Response，簡稱 PSIR 模式)，其涵蓋生物多樣性、水資源、能源、人口、經濟、環境污染、環境指標、指數、全球變遷、溫室效應等。此亦提供跨校及社會人士之聆聽，目的在提昇我國對永續發展及綠色矽島之發展概念以達國際永續生存與發展。

226033 General course of sustainable development 2 S , F

This course is to strengthen students the concepts of sustainable development in the 21st century. Its contents include: the definition of sustainability; sustainable development; international trend of sustainability; framework and principles of sustainability; pressure-state-impact-response of sustainability; the aspects of biodiversity; water resource, energy, population, economic, and environmental problems; environment indicator; global change; and greenhouse effect. This course is welcome the general public to sit in. The objective of the course is aiming at establishing the concept of sustainable development to all individual citizens in Taiwan.

226034 細胞遺傳學 2 選 、下

本課程提供大學部高年級及研究生研習。課程內容包括細胞遺傳史、染色體之細微構造及染色技術、染色體之變異與演化、細胞遺傳與植物育種之關聯性等。

226034 Cytogenetics 2 S , S

This course is to introduce the knowledge in cytogenetics. It contents include: the history of cytogenetics; the fine structure of chromosomes and staining technique; the diversity and evolution of chromosome; and the relationship between plant breeding and cytogenesis on tropical vegetable production.

226035 數量遺傳學 2 選 顏才博、上

本課程之目的，在使學生瞭解數量性狀的特質、遺傳行為、估算方法和育種上之應用

226035 Quantitative Genetics 2 S Tsair B. Yen, F

This course is to introduce the characteristics of quantitative traits, genetic behavior, measurement methods, and its applications in breeding.

226036 應用微生物學 3 選 王均琍、上

本課程在講授有益作物生長之有益微生物，如固氮菌，菌根菌，溶磷菌及枯草桿菌等，介紹其作用機制及應用方法。

226036 Applied Microbiology 3 S C. L. Wang, F

The course is to introduce the beneficial microorganisms. Its contents include: nitrogen fixation microorganism; arbuscular endomycorrhizal fungi; and phosphate-solubilizing microorganism and Bacillus. Research and application techniques are also introduced.

226037 植物組織構造與功能專論 2 選 王均琍、下

本課程在講授植物之各種組織，如分生、輸導、分泌及保護組織，其生長、發育及分化之過程。闡明各組織所具有之構造及生理功能。

226037 Special Topics on the Structures and Functions of Plant Tissues 2 S C. L. Wang, S

The course is to introduce the knowledge in the structures and functions of meristematic, conductive, secretary and protective tissues. The process of plant growth, development and differentiation are also introduced.

226038 作物學特論 2 選 古明萱、上

本課程旨在介紹永續農業在水稻田及其生態體系壓力下之關係，內容包括永續農業在資源利用、資源管理、資源與生態體系、水稻田生物物理性、營養及水份需求之維持等。

226038 Advanced Crop Science 2 S M. S. Guu, F

This course is to introduce the concepts of sustainable agriculture in relation to rice farming and stressed ecosystems. Its contents included: sustainability and resource utilization, resource management; resource and stressed eco-systems; biophysical basis of sustainability of rice farming; and maintenance of the nutrient requirements and water supplies of rice.

226049 Advanced Horticultural Product Handling 2 S L. S. Ke, S

This course is to provide a thorough overview of how plants and live plant products respond after harvest. It focuses on the basic principles governing postharvest physiology; cellular and sub-cellular structures of harvested products; and metabolic alterations and changes in biochemical constituents after harvest. In addition, it also discusses the basic environmental factors that cause stresses after harvest. Finally, this course also includes the current postharvest technologies used world wide.

226050 應用分子生物學 3 選 陳福旗、下

本課程旨在教授有關分子生物學基礎及其在農業、醫學等之應用。內容包含核酸構造、DNA 複製、轉錄作用、轉譯作用、基因體研究、蛋白質體研究、基因調控、基因之操作與基因工程、農業的應用、醫學的應用、其他應用。

226050 Applied Molecular Biology 3 S F.C. Chen, S

The course is to offer basic molecular biology and its application in agriculture and medicine. The contents include: nucleic acid structure; DNA replication; transcription; translation; genomics; proteomics; gene regulation; gene manipulation and genetic engineering; application in agriculture; and medicine and other areas.

226051 農業生物技術 3 選 陳福旗、下

本課程旨在討論分子生物及生物技術於農學上的展望。

226051 Agricultural Biotechnology 3 S F. C. Chen, S

The course is to discuss the development and perspectives of various aspects of molecular biology and biotechnology in agriculture.

226054 綜合蔬菜生產 4 選 上

本課程在探討熱帶地區蔬菜作物之特性及生產模式，將利用田間資料、互動電腦程式、幻燈片、電視等各種教材及設備，介紹蔬菜作物之基本生物及生態學、系統性之商業生產、以及各種熱帶地區之蔬菜生產模式。

226054 Integrated Vegetable Production 4 S F

This course is to characterize and discuss the major vegetable crops and their production systems in the tropics. Its contents include: biology and ecology of vegetable crops, commercial vegetable production systems, lowland rice-based vegetable production systems, and homestead vegetable production systems in the tropics.

226055 電顯技術 2 選 顏才博、上

本課程主要介紹電子顯微鏡的基本原理與應用 內容包括兩部分:(一)穿透式電子顯微鏡之構造，材料之固定與包埋、超薄切片、負染色與金屬投(二)掃描式電子顯微鏡之構造，樣品製作、臨界面乾燥等。

226055 Electron Microscopy 2 S Tsair B. Yen, F

The course is to offer a complete understanding of the principles and application of electron microscope. Its contents include: construction of transmission electron microscope TEM; chemical fixation and embedding staining and metal shadowing; construction of scanning electron microscope (SEM), and preparation of specimen for SEM.

226056 電顯技術實驗 1 選 顏才博、上

本課程著重電子顯微鏡之實際操作，內容包括(一)金屬、網與支持膜製備、生物樣品之負染色、固定、包埋、超薄切片與染色，以及穿透式電顯觀察照相(二)掃描式電顯樣品之製作，臨界面乾燥及儀器操作。

226056 Electron Microscopy Lab. 1 S Tsair B. Yen, F

This lab session emphasizes on technical training in electron microscopy. Its contents include:

226069 Special Topics on Pesticides 2 S C. Y. Hsin, S

This course is to provide the development and classification of pesticides. Its contents include: the physiochemical factors in pesticide formulation; the biochemical reactions of pesticides in living organisms; the environmental impact of pesticides; and the use of biotechnology on plant protection.

226070 植物害蟲鑑定與檢疫技術 2 選 上

本實習課程內容包括各種害蟲診斷及檢疫技術之訓練，害蟲防治方法之介紹以及綜合管理技術。

226070 Identification and Quarantine of Insect Pests 2 S F

This course is to introduce various technologies of diagnosis and quarantine of pest diseases. Its contents include: the practical training of diagnosis; quarantine of insect pests, and their methods of integrated management.

226071 植物病害診斷與檢疫技術 2 選 鄭秋雄、上

本課程主要介紹植物病害之各種診斷技術與檢疫技術。課程內容包括病徵學、病原形態學、血清學、生物檢定及分子生物學等病害診斷技術與植物檢疫技術之介紹。

226071 Diagnosis and Quarantine of Plant Diseases 2 S C. C. Cheng, F

This course is to introduce various technologies of diagnosis and quarantine of plant diseases. Its contents include: pathogenic morphology; serology; and bioassay and molecular biological diagnosis of plant diseases and plant quarantine.

226072 生物技術特論 2 選 鄭秋雄、上

本課程主要介紹生物技術之基本概念及其在植物保護上之應用。課程內容包括基因構造及功能、基因表現及基因重組技術、細胞融合技術、組織細胞培養技術等基本概念及生物技術應用於植物病蟲害之診斷與抗病、抗蟲、抗藥、抗環境逆境品種之選育。

226072 Special Topics on Biotechnology 2 S C. C. Cheng, F

This course is to introduce the concept of biotechnology and applying in the plant protection. The contents include: the structure and function of gene; the technologies of gene expression and recombinant DNA; cell fusion, tissue and cell culture; biotechnology applications in the diagnosis of plant diseases, insect pest and the selection, and breeding of disease-resistant, insect-resistant, drug-resistant, and environmental stress-resistant plants.

226073 植物病毒學特論 2 選 陳滄海、上

本課程主要強調由分子層次討論植物病毒的蛋白質構造與核酸組成，病毒在植物體內之增殖與移行、媒介傳播之機制，遺傳與變異，以及病毒之分子鑑定與檢測新技術之進展。

226073 Special Topics on Plant Virology 2 S T. H. Chen, F

This course is to give a comprehensive understanding of molecular biology of plant viruses to help students obtain theoretical and practical knowledge of plant virology. Its contents include: molecular structure of virion and genome; mechanisms of virus replication; movement and transmission; variation; and advances on technology of virus identification and detection.

226074 植物病態生理學 2 選 梁文進、上

植物病態生理學課程乃在教導學生了解植物病原體在疾病發展過程中，其引發疾病之武器及機制，植物對病原體抗拒之防禦系統，植物病原體之交互作用所引起植物生理生化之變化，及病原體致病力與植物抗病力之遺傳學。

226074 Physiological Plant Pathology 2 S W. J. Liang, F

This course is to introduce the mechanisms of pathogen infection in the disease cycle. Its contents include: the defensive systems of host plants against the pathogens; the effects of pathogens on plant physiological functions; and the genetics of virulence in pathogens and resistance in host plants.

on Farm

This course is to provide students with the knowledge of why and how the soil and water loss in the tropics. To minimize the loss of soil and water is the key of success in farming. The leveling, grading and drainage designs of farm land are also introduced.

226080 生態環境規劃 3 選 盧惠敏、下

生態環境規劃是從靜態的視覺景觀形式的實質規劃，擴展到生態保護、社會參與、歷史文化及動態規劃方法討論的課題。

以生態的觀點出發，討論環境規劃的內容理論與方法，首先討論影響環境規劃的生態元素(土地、空氣、水)進而探討環境規劃內容，包括景觀、運輸通道、社區、城市、區域規劃、動態保護等，規劃設計理論與實例探討。

226080 Ecology Environment Planning 3 S H. M. Lu, S on Farm

This course is to introduce the knowledge and concepts of planning to sustain ecology environment. Its contents include: ecology conservation; society participation; historical culture; and dynamic site planning. Emphases will be on opportunities and constraints for development.

226081 造園設計特論 3 選 羅清吉、上

本課程主要教學目的,在使學生習得造園設計的相關理論與程序，了解各項設計分析技巧，並熟練景觀設計繪圖運用景觀設計之電腦軟體。

226081 Special Topic on landscape 3 S C. C. Lo, F Design

This course is to provide landscape design principles and procedures so that students will be able to understand and familiar with various design analysis techniques and design drawing softwares.

226082 飼料生物培養技術特論 2 選 上

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

226082 Special Topics on Live 2 S F Food Cultivation

This course is to introduce the recently developed techniques on culturing live foods, with specific live food being chosen for discussion such as diatoms, Eugenia, rotifer, brine shrimp, copepod, and fly larva.

226083 軟體動物養殖特論 2 選 、上

本課程內容分為兩部分：軟體動物養殖的複習及閱讀已發表在國內外著名期刊和軟體動物養殖相關的論文為主。

226083 Special Topics on 2 S ,F Mollusk Culture

This course is to introduce technique on culturing mollusk with emphases on reviewing mollusk culture and literature reviewing of recently published related papers.

226084 魚類學特論 2 選 、上

本課程內容分為兩部分：魚類學的複習介紹及閱讀已發表在國內外著名期刊的和魚類學相關之論文為主。

226084 Special Topics on Ichthyology 2 S ,F

This course is to provide students with the updated knowledge in Ichthyology with emphases on reviewing culture practices and literature reviewing of recently published related papers.

226085 新魚種養殖特論 2 選 、上

本課程針對現金尚未養殖，不久將來有可能成為養殖的魚種，討論其分布形態，生態，習性，生

226090 Invertebrate Immunology 3 S Cheng Winton, F

This course is to teach students immune mechanism of crustacean and molluscs, and the effects of intrinsic and extrinsic environmental factors to immune mechanism in crustacean. Its contents include: immune system of crustacean; immune system of mollusks; and modulation of immunity in invertebrate.

226091 酵素利用技術特論 2 選 葉信平、下

本課程係專門討論酵素之純化技術及固定化酵素技術，並將固定化酵素在醫學、化學、飼料及速食品上之利用均詳加討論，提供學生嶄新的生化科技。

226091 Special Topics on Enzyme Utilization 2 S , S

This course is to introduce the techniques on the purification and immobilization of enzymes. Its contents include: the application of enzymes to the fields of medicine, chemistry, animal feeds and human instant food.

226092 自動化養殖特論 2 選 葉信平、下

本課程內容包括餌料生物生產、繁養殖場生產、超集約循環水養殖系統、外海箱網等之自動化。

226092 Special Topics on Aquaculture Automation 2 S Shinn-Pyng Yeh, S

This course is to introduce the technique on the automation of live food production, fish propagation and aquaculture farm production, intensive re-circulating aquaculture system, and offshore cage culture.

226093 海洋生物技術特論 2 選 葉文吉、下

本課程主要內容包括：1)海洋巨型生物系統的應用 2)海洋生物在水產養殖上的應用 3)海洋污染物的生物分解 4)海洋生物能源的開發

226093 Special Topics on Marine Biotechnology 2 S Wen-Chi Yeh, S

This course is to arouse students' interest in marine biotechnology. Its contents include: marine macrobiotechnology systems; application of biotechnology in aquaculture; biodegradation of marine pollutants; and development of marine bioenergy.

226094 循環水養殖技術特論 2 選 孫寧、下

本課程乃針對目前世界淡水資源日缺及環保意識高漲下，養殖發展之新趨勢—養殖循環水技術之研發—而作有系統之介紹，以提供學生新之觀念及知識。課程內容以室外魚池循環過濾系統及室內超集約養殖循環過濾系統為討論之二個主要單元，另外，室外封閉式循環過濾養殖系統亦為討論之項目。本課程將對以上系統之理論與實際討論。同時亦將討論國內、外為防止超抽地下水而做之有關環境保護之立法，同時，為配合實際教學效果，將做媒體教學及現場參觀，以達學生具體吸收之目的。

226094 Special Topics on Aquaculture with Recirculatory System 2 S Lin Sun, S

This course is to introduce the newly developed technology and theory in re-circulatory aquaculture system. The open pond system and the high density indoor re-circulatory culture system will be the main topics to be introduced, and the outdoor high density closed re-circulatory system for fish culture will also be introduced. In addition, this course will discuss the environmental protection laws in the world, which were enacted to prevent the over pumping of ground water.

226095 水產經營與管理特論 2 選 孫寧、下

養殖經營與管理與其生產技術同等重要。本課程乃針對養殖經營與管理之理論並配合一些實例及本人之國內、外經驗，來充實學生此方面之知識。由於碩士班之學生將來很有機會負責養殖企業，因此其經營管理之背景十分重要。本課程之主要討論單元為(1)養殖企業與養殖產品之特性。(2)養殖場地點之選擇與養殖場之規劃。(3)養殖投資成本之估算方法及年度生產計畫之擬訂。(4)投

資國內、外養殖企業之投資計劃之擬訂。(5)養殖場及養殖企業之管理重點。將以上各單元作有系統之介紹給學生。

226095 Special Topics on Aquaculture 2 S Lin Sun, S
Management

This course is to provide students with the knowledge of aquaculture management. Its contents include: the characteristics of aquaculture business and aquaculture products; how to locate and plan a fish farm; how to estimate the capital for aquaculture investment, and how to plan the annual production; how to set up aquaculture business investment plan in Taiwan and overseas; and principles for fish farming management.

226096 池塘管理技術特論 2 選 下

本課程係專門集中於池底管理，水質管理，水色管理以及池中污染生物管理等之實務工作之討論，其中討論之對象包括池塘淨化菌之應用，中國五行五色之觀水法及池塘生物制衡技術，提供學生池塘管理新技術。

226096 Special Topics on Fish 2 S ,S
Pond Management

This course is to introduce newly developed techniques on pond bottom management, pond water colors management, and pond polluted organism management. Its contents included: the application of pond cleaning microbe the application of Chinese natural rule "fire pathways" and "five colors"; and the application of the predators.

226097 家畜營養生理 2 選 謝豪晃、上

本課程主要探討家畜營養與生理之關係，瞭解如何從營養觀點在維持正常健康之動物，以及不適當的營養對動物所造成之影響。

課程內容包括：(1)各種營養素之營養生理功能。(2)討論各種動物之消化系及其營養生理。(3)進一步探討不同生理功能及生理階段之特殊營養需。

226097 Animal Nutritional Physiology 2 S H. H. Hsieh, F

This course is to discuss the relationship between nutrition and physiology in animals. Its contents include: the physiological functions of all nutrients, including carbohydrate, lipid, protein, vitamins, and minerals; the digestive physiology in different animals; and the special nutritional needs in various physiological functions and phases.

226098 動物行為和福利 2 選 夏良宙、上

本課程之目的在使學生能瞭解動物行為和福利，以為將來從事畜牧生產之基本資料。課程內容包括：一、動物行為學，二、行為生理，三、意願，四、衝突行為，五、學習，六、社會行為(1)社會基本結構，七、社會行為(2)影響社會行為因素，八、社會行為(3)溝通，九、異常行為，十、生態行為，十一、牛之行為，十二、羊之行為，十三、豬之行為，十四、雞之行為，十五、動物福利，十六、動物福利與動物行為之關係。

226098 Animal behavior and welfare 2 S Liang Chou Hsia, F

This course is to provide the knowledge about animal behavior and welfare. Its contents include: animal behavior; behavior physiology; motivation; conflict behavior; learning; social behavior: organization of society; social behavior: factors which influence on social behavior; social behavior: communication; abnormal behavior; ecological behavior; cattle behavior sheep behavior; pig behavior; poultry behavior; animal welfare; and animal welfare and animal behavior.

226099 熱帶畜牧特論 2 選 上

本課程介紹熱帶區畜牧之生產，其內容包括土地資源之利用與環境生態維護，水資源之利用，熱帶作物與牧草生產及農作副產物之利用，熱帶地區高溫高濕環境對家畜生產之影響，從禽畜營養、生理、遺傳育種與畜舍等方面探討改進熱帶地區畜牧生產效率與生態環境之維護。

226099 Special Topics on Tropical Livestock Production 2 S , F

This course is to introduce the livestock production in tropics. Its contents include: the utilization of land resource; environmental and ecological control; tropical crops and grass production; utilization of agricultural by-products; and the effects of high temperature and high moisture. Emphasizes will be made on the improvement on the livestock production.

226100 草食動物營養特論 2 選 夏良宙、上

本課程之目的在於介紹反芻動物生態系統之生物學，並探討此系統之問題與無法解決之困擾，並引導研究生未來研究之方向，課程內容包括(1)闡述反芻動物生態系統，植物—微生物—動物交互作用與飼養策略，(2)飼料作物化學(3)瘤胃功能與微生物學(4)後瘤胃之吸收與代謝(5)後腸發酵。

226100 Special Topics on Nutrition for Herbivores 2 S L. C. Hsia, F

This course is to introduce the biology and problems of the ruminant ecosystem.

Its contents include: description of ruminant ecosystem; forage chemistry; rumen function and microbiology; post-ruminal absorption and metabolism of host animals; and hindgut fermentation.

226101 高環境溫度與禽畜生產 2 選 夏良宙、上

本課程之目的在探討高環境溫度下，家畜禽生產所遇到的問題及解決之方法。課程內容包括：一、熱帶畜牧對動物生產之影響，二、環境之定義，三、溫度相關知識，四、溫度對生理之影響，五、溫度和營養之關係，六、高溫對豬之影響，七、高溫對牛之影響，八、高溫對羊之影響，九、高溫對種雞之影響，十、高溫對肉雞之影響，十一、高溫對蛋雞之影響，十二、高溫對其他動物之影響，十三、高溫對牧草生產之影響，十四、結論。

226101 High temperature and Animal Production 2 S Liang Chou Hsia, F

This course is to study the effect of high temperature on animal production, and how to solve the problems. Its contents included: animal production problems in tropics; definition of environment; definition of temperature; the effect of temperature on physiology; the effect of temperature on nutrient metabolism; the effect of high temperature on pigs; the effect of high temperature on cattle; the effect of high temperature on sheep and goat; the effect of high temperature on breed chicken; the effect of high temperature on broiler; the effect of high temperature on layer; the effect of high temperature on other animal; the effect of high temperature on forage grass; and conclusion.

226102 實用畜產自動化特論 2 選 夏良宙、上

本課程之目的在探討畜牧生產自動化之一些方法，並檢討其優劣點。課程內容包括：一、養豬自動化：(1)餵飼，(2)檢定，(3)環控，(4)清糞，(5)廢水管理。二、養雞自動化：(1)餵飼，(2)環控，(3)清糞，(4)廢水管理，(5)集蛋。三、養牛自動化：(一)餵飼，(二)環控，(三)清糞，(四)廢水管理，(五)集乳，(六)芻料收穫。

226102 Special Topics on Application of Automation on Animal Production 2 S Liang Chou Hsia, F

This course is to provide students with the understanding on automation of animal production. Its contents include: automation on pig production; automation on poultry production; and automation on dairy cattle production.

226103 生殖技術特論 2 選 、下

由於動物生殖現象存有相當程度之變化，本課程將試著引導學生充分了解一般共同生殖要點及各動物生殖細節之不同，並著重生殖技術方法之介紹，使學生對哺乳動物生殖有全面認識。

課程內容著重(1)性別、性腺功能、懷孕分娩(2)一般生殖技術(3)生物技術應用於生殖。

226103 Special Topics on Reproductive Technology 2 S , S

This course is to discuss the general fundamental facts and difference on reproduction of mammals. Its contents include: gonad function, pregnancy and parturition; basic reproductive technique; and modern biological technique on reproduction.

226104 應用動物育種技術 2 選 、下

本課程目的在讓學生了解家畜育種技術之應用，課程內容包括傳統遺傳與族群遺傳及統計在家畜育種之應用，遺傳率與重複勢之評估，育種價之計算，近親係數與親屬關係之求證，雜交系統與雜交優勢之利用，多性狀之選拔，DNA 輔助標記之利用及家畜改良等。

226104 Applied Animal Breeding Technology 2 S , S

This course is to introduce students the practical applications of animal breeding. Its contents include: classical and population genetics; statistical tools; estimates of heritability and repeatability; estimates of breeding values; verification of inbreeding relationships; crossbreeding system and expected heterosis; selection for multiple traits; and the use of DNA marker and livestock improvement.

226105 家禽學特論 2 選 夏良宙、下

本課程之目的是探討最新家禽方面之知識如何應用在飼養管理上，課程包括：1.簡介；2.種雞之飼養管理 3.肉雞之飼養管理；4.蛋雞之飼養管理；5.土雞之飼養管理；6.鴨之飼養管理；7.鵝之飼養管理 8.駝鳥之飼養管理；9.鵪鶉之飼養管理；10.火雞之飼養管理；11.孵化；12.產蛋；13.策略聯盟；14.家禽疾病；15.禽舍和設備；16.肉品及加工；17.市場行銷。

226105 Special Topics on Poultry Management 2 S L. C. Hsia, S

This course is to apply the theoretic knowledge on poultry rearing. Its contents include breeder management; broiler management; layer management; local chicken management; duck management; geese management; ostrich management; quail management; turkey management; hatchery; hen eggs; vertical coordination; avian disease; poultry house and equipment; and meat and processing; marketing management.

226226 乳牛學特論 2 選 夏良宙、下

本課程之主要目的在將最新乳牛相關之研究和現場之管理結合之學科，課程內容包括：1.一般管理；2.青貯料製作；3.乾草製作；4.TMR 之製作；5.更新母牛飼養管理；6.乾母牛飼養管理；7.產乳牛飼養管理；8.繁殖管理；9.乳房健康；10.腳蹄健康；11.畜舍規劃；12.廢棄物管理；13.動物福利；14.開發中國家之乳牛飼養管理。

226226 Special Topics on Dairy Cattle Management 2 S L. C. Hsia, S

This course is to apply recent research results on dairy production management. Its contents include: general management; how to make silage; how to make hay; how to make TMR; management of replacement of dairy cow; dry cow management; milking cow management; reproductive management; health of udder; management of hoof; dairy house management; waste management; animal welfare; and dairy cattle production in the developing countries.

226107 牛應用行為學 2 選 夏良宙、下

本課程之目的是探討牛之行為及如何應用在現場，課程內容包括：1.簡介；2.意願；3.學習行為；4.家畜化行為改變；5.攝取行為-攝食；6.攝取行為-牧野吃草；7.攝取行為-飲水；8.玩耍行為；9.排遺行為；10.舒適行為；11.起立臥走跑跳；12.行為和遺傳；13.社會行為-交流溝通行為；14.社會行為-打鬥行為；15.社會行為-性行為 16.社會行為-社會關係；17.社會行為-親子行為；18.社會行為-空間行為；19.問題行為；20.尋找庇護所行為；21.結論。

226107 Applied Cattle Behavior 2 S L. C. Hsia, S

This course is to study the application of cattle behavior knowledge in field. Its contents include: motivation; learning behavior; behavior change during domestication; ingestion behavior-feed intake; ingestion behavior-grazing; ingestion behavior-drinking; play behavior; excretion behavior; comfort behavior; general behavior; behavior and genetics; communication behavior; aggressive behavior; sex behavior; social relation behavior; maternal behavior; space behavior; problem of behavior; and shelter seeking.

226110 分子生物學 2 選 下

本課程將以基本分子生物學為基礎，針對學生研究之主體，選擇適合之專題研究報告探討其在分子生物學上之意義，以加深學生在分子生物學上的知識。課程主要著重在：1)基因的基本理論結構 2)基因的表現及其控制理論 3)基因轉殖的分子生物學 4)細胞結構的分子生物學。

226110 Special Topics on Molecular 2 S , S

This course is to introduce the fundamental knowledge of molecular biology. Its contents include: gene structure; gene expression and control theory; special topics of gene transfer; and cell structure.

226111 區域經濟與政策分析 2 選 上

本課程旨在使學生具有分析區域經濟問題所需具備的觀念與方法，以及訓練學生面對區域經濟發展問題，能提出有效的解決方案。其課程大綱如下：

- (1) 區域經濟基本概念
- (2) 區域經濟模型
- (3) 區域理論與經濟成長
- (4) 區域產業結構
- (5) 區域間的貿易
- (6) 區域間的勞動力移動
- (7) 區域的就業成長
- (8) 區域政策的緣起及目標
- (9) 區域政策的工具
- (10) 區域政策的新方向
- (11) 區域政策效果的測度
- (12) 區域政策的成本及效益

**226111 Regional Economics 2 S , F
and Policy Analysis**

This course is to provide students with a better understanding of why regional economics behave as they do. Its contents include: the fundamental concepts of regional economy; the regional economic models; regional theory and economic growth; regional industrial structure; interregional trade; interregional labor migration; regional employment growth; the origins and objectives of regional policy; regional policy instruments; new direction in regional policy; measuring the effects of regional policy; and the costs and benefits of regional policy.

226112 農企業財務管理 3 選 下

本課程之目的在於探討農企業財務管理之程序、實務及政策。課程內容包含公司財務領域中幾個重要部分，包括進行財務決策時面臨之環境、財務計畫與資本預算、如何在不確定下作決策、風波與報酬、營運資金管理策略及長期資金管理策略等。課程中亦將輔以個案研討以協助學生更進一步了解農企業之財務決策。

**226112 Financial Management 3 S S
of Agribusiness**

This course is to provide students with the procedures, practices, and policies of financial

management for the better performance of agribusinesses. Its contents include: the environment of financial decisions; the basic financial planning and investment; decision making under uncertainty; and risk and return. Several case studies will be given and discussed to facilitate the learning by students.

226113 農企業人力資源管理 3 選 , 下

本課程旨在探討農企業經理人及人力資源部門如何管理人力資源，並瞭解農企業經營和人力資源的管理活動必須創造出吸引工作應徵者、留住優秀員工、激勵員工與員工再訓練之功能，以提昇組織整體的生產力，獲取競爭優勢，進而達成企業生存、發展與獲利的目標。

**226114 Human Resources Management 3 S , S
of Agribusiness**

This course is to discuss how manager and human resource department of agribusinesses can manage personnel/human resources to achieve their goals. Its contents include: understanding yourself; understanding human resource management; and understanding customers.

226114 園藝產品經營 3 選 、下

本課程之重點在探討於國際貿易自由化之趨勢下：1.園藝產品業應如何因應市場需求、穩定產銷，以促進產業永續發展。2.探討運用企業經營理念於園藝產品業之研究：(1)相關政策法規，(2)規劃與決策，(3)成本收益與獲益力分析，(4)行銷規劃與管理，(5)組織與領導，(6)管制與評估。

**226114 Seminar on Managing Agribusiness 3 S , S
of Horticultural Products**

This course is to discuss how to manage agribusiness of horticultural products efficiently under trade liberalization. Its contents include: stabilization of the production and marketing of horticultural products: market-oriented; the related agricultural policy and regulations; planning and decision; cost, benefit, and profitability analysis; capital and finance; marketing planning and management; organization and leadership; and control and evaluation.

226115 溝通技巧 3 選 、下

本課程的教學目標為：藉由先哲的語言智慧，西方伯恩、凱茲、洛克、湯麥士、丹諾、劍橋與哈佛的經驗學說，提供學生謹言、慎言、能言、善言、言仁、言義的溝通技巧、並撰寫專題研究報告。本課程的主要內容如下：一、易經的言辭智慧 二、孔子的言語智慧 三、老子的言語智慧 四、孟子的仁民論證 五、荀子的言語智慧 六、墨子的說話藝術 七、非子談說之術 八、鬼谷的言辭韜略 九、戰國策儒士言範 十、伯恩的交流分析 十一、凱茲的衝突管理 十二、洛克的的互動雙贏 十三、湯麥士效能訓練 十四、丹諾的舌戰辯辭 十五、劍橋的溝通協商 十六、哈佛的雙贏協商。

226115 Communication Skills 3 S , S

This course is to provide students with communication skills and wisdom of speech. Its contents include: the speech wisdom of Confucius; the speech wisdom of Lao Zi; Mencius's police of argument benevolence; the speech wisdom of Xun Zi; the speech wisdom of Mo Zi; communication skills of Han Fei Zi; the strategic-diplomatic speech of Guigu Zi; a model of speech of Confucian school in Chan-Kuo Tse; the Chew Tsew's speech of benevolence and character; transactional analysis of Eric Beme; conflict management of Katz, H. H; Rock's PRAM model of win-win; Dr.Thomas Gordon's efficiency training; Clarence Darrow's defense scheme; communication and negotiation of Bridge University; and the win-win negotiation of Harvard University.

226116 農企業投資分析 3 選 洪仁杰、下

本課程之目的，在使學生瞭解農企業投資的重要概念與投資分析方法，主要內容包括現值模型之性質、現值模型之建構、現值模型之經濟分析、貸款分析、財務投資、交易成本與土地買賣決策、重置原則與租賃決策、計畫分析、以及研究發展與技術移轉之評價。

**226116 Agribusiness Investment 3 S R. J. Hung, S
Analysis**

This course is to provide students with the knowledge and skills for the current models and

investment analyses in agribusiness. Its contents include: introduction to present value models; constructing present value models; economic analysis using present models; loan analysis; financial investments; transaction costs and land purchase/sale decisions; replacement principles and leasing decisions; project analysis; and valuation of research, development, and technology transfer.

226117 高等食品加工 2 選 黃卓治、上

本課程主要以膜處理技術、冷凍利用技術、無菌包裝技術、真空加工技術、高壓蒸汽及過熱蒸汽利用技術、高壓利用技術、電磁波利用技術、超臨界氣體萃取技術、氧去除技術、水溫利用技術、生化反應器利用技術、工廠生產技術為單元，介紹其加工利用技術。

226117 Advanced Food Processing 2 S T. C. Huang, F

This course is to offer the technologies and applications of food processing. Its contents include: membrane processing; freezing; aseptic packaging; vacuuming, high pressure and over heat steam treatment; high pressure; micro wave; supercritical extraction; oxygen scavenger; biochemical reactor; and plant production.

226118 高等食品化學 3 選 廖遠東、下

藉由對食品化學基本原理之了解，進而應用到食品工業以克服在製造上或貯藏期間所造成的技術問題。課程內容將包括可食性植物組織、動物組織、修飾澱粉、食用纖維之功能特性及綜合性化學反應及其機制之探討。特別的專討如水膠體、 ω -3 脂肪酸及機能性食品，亦在討論範圍之內。

226118 Advanced Food Chemistry 3 S E. L. Liaw, S

This course is to provide the basic principles and applications of food chemistry. Its contents include: the chemical reaction mechanisms and functional properties of edible plant tissue; muscle tissue; modified starch; dietary fiber; and hydrocolloids. In addition, emphases will also be made on ω -3 fatty acids and functional foods.

**226119 食品科技研究法 3 選 廖遠東、黃卓治
林頌生、上**

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。

**226119 Methodology for Food Research 3 S E. L. Liaw、C. T. Huang
C. S. Lin, F**

This course is to describe experimental designs, general techniques and methodology related to food researches. Its contents include the knowledge of current research efforts on carbohydrates; lipids; proteins, and other components in foods.

226120 食品生化特論 2 選 黃卓治、下

本課程繼生物化學之課程，提供學生有關細胞層次(包括微生物、植物、動物)之基本生命科學有關知識，內容涵蘊細胞之主要構造功能及特性如氧化、還原化，討論胺基酸、寡糖類、高度不飽和脂肪酸、生物胺類之生物反應並討論細胞中與食品加工、貯藏、醱酵生產有密切關係之反應，著重於生化反應在食品加工中之意義。

226120 Advanced Food Biochemistry 2 S T. C. Huang, S

This course introduce knowledge of is to advanced food materials. Its contents include: structure and function of microbial; plant and animal cells; food processing plan and preservation related metabolic pathway; and biochemical reactions such as oxidation, reduction and hydroxylation. Functional properties of amino acids, oligo saccharide, polysaccharide, polyunsaturated fatty acids, biological amines will be emphasized.

226121 食品製程之自動控制 3 選 , 下

- 1.介紹各式自動控制元件的自動控制簡單原理,如何將各組元件組成自動控制機械。並說明其操作原理,課程將以成功的產品作例子,以投影片與幻燈片,解釋自動化生產的實務操作。
- 2.介紹反饋系統的觀念和其數學模擬技巧,轉換函數和狀態空間法於控制系統上的分析和設計,瞬時反應分析法,根軌分析法,頻率反應分析法,非線性控制系統。
- 3.指導圖控軟體操作之方法與設計,並要求學生學習操作與設計,圖控軟體並應用在現有圖控設備上。

226121 Automatic Control in Food Processing 3 S , S

This course is to introduce different types of automatic control units and its operation methods. Its contents include: transient-response analysis; root-locus method; frequency responses method; and non-linear control system.

226122 食品經營特論 2 選 , 下

課程內容首先介紹食品工廠或經營之主要因素一人之相關問題,如員工、顧客心理、人際關係、溝通技巧、領導統御。進而說明企業單位人事組織、架構與運作方式。另外涵概產品行銷策略、食品市場特色、市場調查技巧及生產管理,讓學生培養未來在管理階層中,應據具備之決策能力、財務報表、成本會計之基礎理論與運作方法,了解企業之財務狀況、經營成果,建立成本概念。

226122 Food Management 2 S , S

This course is to teach management concepts and skills in food industry. Its contents include: organization; communication; sales and marketing; financial and accounting; human resource management; and production management.

226123 最適化在食品科技之應用 3 選 林貞信、下

由於能源成本的增加及環保意識的覺醒,造成食品工業在食品製造及加工程序的顯著改變,以適應相對帶來的限制;為了得到最佳的生產環境和最大的生產利潤,及配合這些食品製造及加工程序的改變,使得工廠設計、操作方法及條件得做必要的修正。本課程將針對最適化背景的介紹(什麼是最適化、為什麼要最適化及最適化基本的特色)、運用的原理(方程式介紹、數值方法應用)以及作個案研究以練習實際問題等方式來了解最適化對食品科技的重要性。

226123 Applications of Optimization in Food Science and Technology 3 S J. S.Lin, S

This course is to provide students with concepts and applications of optimization in food science and technology. Its contents include: introduction of optimization (what is it? why is it necessary? its fundamental features); theory of optimization (basic functions and numerical methods); and case studies of practical applications.

226124 微生物生理與代謝 3 選 , 下

- 一、講授微生物生長所需之營養、微生物之增殖與死滅以及環境因子對微生物生長之影響等在生理上之關係。
- 二、講授微生物對物質的代謝,諸如能源與生長的關係,微生物之好氣代謝與嫌氣代謝、微生物之醱酵及呼吸等在代謝上之關係。

226124 Physiology and metabolism of microbes 3 S , S

This course is to offer the knowledge and mechanism of microbes in terms of physiology and metabolism. Its contents include: interrelationship between microbial nutrition and growth, microbial propagation and death; the effect of the environmental factors on microbial growth; the relationship between energy and growth; aerobic and anaerobic metabolism of microbe; and microbial fermentation.

226125 生化工程 2 選 , 上

本課教學目標為教授:物理化學基礎及實驗方法;應用物理化學於食品之材質分;食品生產、加工製程中各項物理化學性質之變化及其對最後製成品之影響;最終達成使學生具備能力以開發具高穩定、非凡營養價值、良好醫療保健效果之新型食品。教授對象為食品系研究生。課程將涵蓋:1.基礎熱力學—包含熱力學第一、第二、第三定律,狀態函數熱性質及自由能,相變化與相平衡,以及溶液之熱力學模式。2.食品加工程序中,分子之交互作用—包含凡得瓦爾(Vander Waals)力、氫鍵,膠體(colloid)電化學性質溶液活性(activity)及化學潛勢(chemical potential),水活性,蛋白質、碳水化合物與澱粉之水合熱力、動力學。3.凝膠(gel)與乳液(emulsion)凝膠之組合、結構分析,凝膠之機械與光譜性質,凝膠形成動力學;乳液之穩定性,食品乳化劑,微膠囊化(microencapsulation)技術應用。4.食品成份結構分析技術—流變性質測定(或稱組織測定),X射線繞射(XRD),電子顯微鏡(SEM,TEM),霍氏紅外光譜(FTIR),近紅外光譜(near-IR)、核磁共振(NMR),示差掃描熱分析(DSC)。5.基本食品物化特性—固態食品與液態食品之流變性質、機械性質,擠壓加工概述。6.食品結構與組織之關聯—肉品、烘焙食品之結構組織特性,食品加工過程中組織與結構之變化。

226125 Biochemical Engineering 2 S ,S

This course is to introduce fundamental physical chemistry; experimental techniques; applied physical chemistry in material analysis of foods; changes of physicochemical properties in foods during processing, and the effect on final products. Its contents include: fundamental thermodynamics; molecular interaction in food processes; gels and emulsions; analytical techniques of structure and components of foods; fundamental physicochemical properties of food; and relationship between food structure and texture.

226126 藥理學特論 2 選 ,下

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。

226126 Special Topics on Pharmacology 2 S ,S

This course is to introduce the recent research information on pharmacology at cellular and molecular levels. Its contents include: receptor types; signal transduction pathways; CNS and autonomic pharmacology; pharmacology of inflammation; allergy; platelet functions; and chemotherapeutic approaches.

226127 分子病毒學 2 選 廖明輝、上

本課程的目的,在使學生瞭解獸醫分子病毒學的一般改概念,並探討病毒的複製機制、基本的分子生物學、致病機轉、宿主與寄生的關係及其免疫機制。

226127 Molecular Virology 2 S M. H. Liao, F

This course is to study the general concepts of veterinary medicine virology. Its contents include: the virus replication; basic molecular biology; pathogenesis; and relationship between hosts and parasites; and immune mechanism.

226128 魚病臨床微生物學 2 選 ,下

本課程提供魚類病原微生物之診斷理論與實用技術。內容涵蓋(1)正確病歷登入,(2)病材、病原妥適之收集、運輸及保存,(3)實驗室之安全防護,(4)各種病原,包括細菌、黴菌及病毒之分離培養,(5)快速精確之生化、免疫及分生技術之鑑定,(6)藥物感受性測定及正確藥物治療。

226128 Clinical Microbiology of Fish Diseases 2 S ,S

This course is to provide a theoretical and practical framework for understanding the clinical microbiology in the field of aquatic animal health problems. Its contents include: history; collection, transportation, and preservation of pathogens and specimens; safety in the microbiological laboratories; isolation of various pathogens; rapid and accurate identification using morphological, biochemical, immunological and molecular biological methods; and antimicrobial sensitivity tests for drug therapy.

226129 林木生態生理學特論 2 選 ， 下

本課程目標為瞭解環境因子對林木的主要生理作用的影響，包括正常情況及處於逆境時之反應。課程中將著重物理環境之太陽輻射，水，溫度，養分及污染物對林木主要生理作用，水，溫度，養分及污染物對林木主要生理作用，包括光合作用，蒸散作用，水分及養分吸收，生長，休眠及光呼吸作用的影響，同時將就林木生理與林木之生存，生長及生產力之間的關係予以討論。最後將討論在不同生育環境林木之適應機制。

226129 Special Topics on Ecophysiology 2 S , S
of Wood Plants

This course is to understand the effects of environmental factors, under normal as well as stressful conditions, of tree species. The environmental factors which will be addressed include solar radiation, water, temperature, nutrients, and pollutants. Its contents include: photosynthesis; transpiration; water and nutrient absorption; growth; dormancy and photorespiration; relationship between physiology and survival, growth and productivity; and adaptive mechanism of tree species to their habits.

226130 林木生態生理學特論實習 1 選 郭耀綸、下

本實習課目的在讓學生操作環境因子及林木生理作用測定儀器,由實際資料中分析整理環境因子對林木生理之作用情形,藉以了解兩者間之關係。課程內容包括:

- 1.氣溫、葉溫、太陽輻射、土壤水分、雨量、濕度及風之測定方法
- 2.植物水勢之日變化
- 3.林木光合作用日變化及其受環境因子之影響
- 4.乾旱對林木生理作用之影響及林木之耐旱機制
- 5.太陽輻射對林木形態發育及生理作用之影響

226130 Practice of Special on 1 S Y. L. Kuo, S
Ecophysiology of Wood Plants

This lab session is to provide practical experiences in eco-physiology of woody plants with emphases on the field methods and instrumentation. Its contents include: measurement of temperature, leaf temperature, solar radiation, soil moisture, precipitation, humidity, and wind speed; diurnal course of plant water potential; diurnal changes of plant photosynthesis and the environmental factors; effects of drought on plant physiology and drought resistance mechanisms; and effects of solar radiation on the morphological and physiological characteristics of trees.

226131 地理資訊系統特論 2 選 陳朝圳、上

本課程主要目的在訓練學生對空間資料之處理能力，並以森林資源為對象講解如何應用地理資訊系統處理林業相關問題。其內容包括：

- 1.地理資訊系統之基本組成。
- 2.地理資料結構。
- 3.空間資料之收集與處理。
- 4.空間資料管理。
- 5.森林資源地理資訊系統之架構。
- 6.森林資源地理資訊系統之執行與分析。
- 7.空間圖籍資訊之產生。
- 8.地理資訊之應用與未來趨勢。

226131 Special Topics on Geographic 2 S C. T. Chen, F
Information Systems

This course is to offer a technique training about how to analyze spatial data, and how to use GIS to solve the problems of forest resources. Its contents include: GIS functional elements; data structures; data acquisition and preprocessing; data management; the GIS structure of forest resources; manipulation and analysis of FRGIS; product generation of special information; GIS application; and future trends.

226132 地理資訊系統特論實習 1 選 陳朝圳、上

本實習以 ARC/INFO 地理資訊系統為工具，訓練學生如何建立空間資料庫及如何應用。

- 1.地理資訊系統與 ARC/INFO。
- 2.地理資訊系統計畫之擬定。

- 3.如何於 ARC/INFO 中取得空間資料。 4.空間資料之位相關係之建立。
- 5.如何於 ARC/INFO 中取得屬性資料。 6.地理資料庫之管理。
- 7.地理資料分析。 8.地理資訊之展示。
- 9.應用實例。

226132 Practice of Special Topics on 1 S C. T. Chen, F
Geographic Information Systems

This course is to train students how to build and use the spatial information by employing ARC/INFO software. Its contents include: introduction to GIS and ARC/INFO; starting your ARC/INFO project; getting spatial data from ARC/INFO; making spatial data usable; getting attribute data from ARC/INFO; managing the database; performing geographic analysis; interpreting the results of the analysis; and GIS application.

226133 遊憩與觀光之理論基礎 3 選 、下

本課程嘗試引導學生閱讀與課堂討論過去三十年來有關於遊憩與休閒的研究文獻，包括理論性與實徵性的。此課程之目的有三：(1) 促使學生了解休閒與遊憩在社會層面的功能；(2) 促使學生了解休閒與遊憩在個體層面的功能；(3) 使學生熟悉休閒、遊憩方面學術期刊所刊載的研究成果。

226133 Foundations of Recreation and 3 S ,S
Leisure Studies

This course is to guide students, through reading and class discussion, to be familiar with a large number of conceptual and empirically-based studies in recreation and leisure for the past three decades. Its contents include: functions of leisure and recreation; functions of leisure and recreation for individuals; and major research journal outlets in recreation and leisure studies.

226134 休閒研究方法論 3 選 、下

本課程將提供研究生完成其論文所需的基本研究方法知識與技能。這些技巧包括(1) 研究問題之建構(2) 研究設計(3) 資料搜集與分析的方法(4) 研究結果的展現與報告的撰寫。此外，本課程內容除了傳授與研究方法有關的知識外，還特別著重於實例的操練，包括使用電腦軟體進行資料的處理與分析。

226134 Research Methods in Leisure Studies 3 S ,S

This course is to provide the basic knowledge and skills in leisure studies. Its contents include: problem development; study design; methods of data collection and analysis; and research findings and conclusions. In addition, this course will emphasize, through examples and practice, on the application of statistical software to analyze data.

226135 森林生態學特論 2 選 楊勝任、下

本課程主要介紹植群分布與相關環境因子研究法。其授課內容包括介紹、植群分析的基礎概念、野外植群描述方法、原始資料矩陣特質、相似性與相異性計算、分布序列法、極點分布序列、生態報告研讀、DCA 軟體介紹、Z-M 學派植物社會分類、列表比較法、植群分類法、數式分類法。

226135 Forest Ecology 2 S S. Z. Yang, S

The course is to introduce the basic concepts of forest ecosystem, i.e., composition, classification, distribution, and succession of vegetation relative to environmental factors. Its contents includes: consideration in vegetation analysis; description of vegetation in the field; raw data matrix properties; measurement of similarity and dissimilarity; ordination (polar ordination); ordination (Bray and Cutis); introduction of DCA program; Z-M school, tabular comparison, classification of vegetation, numerical classification; and case studies.

226136 森林生態學實習 1 選 楊勝任、下

本課程的目的在於讓同學在實際操作各種族群與植群資料搜集與調查方法。其授課內容包括利用生態統計軟體做各種資料分析。內容包括植群分析例子研讀、植群分類、列表比較法、交互平均

法，主成份分析，對應分析、極點分布序列分析、結果解釋等等。

226136 Practice of Forest Ecology 1 S S. Z. Yang, S

This course is to offer students practice on sampling methods and data preparations using computer software. Its contents include: case studies of vegetation, using computer programs to analysis the data, vegetation classification, tabular comparison, reciprocal averaging method, principle component analysis, correspondent analysis, polar ordination analysis, interpretations of results.

226137 第二外語 (西班牙或法語) 4 選

本課程供初學西班牙文同學選修。內容包括發音(字母、母音、子音、拼音、音節、重音及音調)、會話練習、簡單課文選讀與文法等。讓同學具聽說讀寫基本能力。

**226137 Second Foreign Language 4 S
(Spanish or French)**

The course is designed for the beginning learners to learn Spanish or French. It contains pronunciation (alphabet, vowel, consonant, spelling, syllable, accent and intonation), conversation practice, selected readings and grammar etc. It aims to help students gain basic four skills of Spanish or French, listening, speaking, reading and writing.

226138 第二外語 (日文二) 2 選

配合初級日語的課文課程內容，由淺入深導入文法、句型，再輔入適當讀物及課後作業，務使學生能充分理解，吸收並應用之。另外並定期舉行聽寫等測驗，俾始能達到聽、說、讀、寫並進的效果。

**226138 Second Foreign Language 2 S
(Japanese)**

In coordination with the contents of the elementary Japanese, grammar, sentence patterns are introduced to students in a planned way and selected reading materials for the better understanding of this language. In addition, tests in Japanese such as listening comprehension and writing are offered regularly for the object of improving their ability to know Japanese.

226139 綜合害蟲管理特論 3 選

討論農業生態系統中重要作物之病原、害蟲與其他有害生物綜合管理的策略與方法。

**226139 Special Topics on Integrated 3 S
Pest Management**

The strategies and tactics of integrated management of pests in agricultural ecology of important crops are discussed.

226140 免疫學概論 3 選 李嘉偉 上

本課程的主要目的是提供學生一個對免疫學的基本概念，隨著農場管理技術的進步，家畜的飼養密度和生長表現都持續的在提升，在這種情況下，動物更容易受到傳染病的危害而對產業造成嚴重的經濟損失，動物本身的免疫力在抵抗外來病原菌和病毒上扮演著重要的角色，本課程式著重在介紹免疫系統、各種免疫反應、宿主及病原交互作用、及疫苗、獲得這方面的知識能讓學生了解農場的疾病防治。

226140 General Immunology 3 S J. Lee F

The objective of this course is to provide the students a basic background of immunology. The housing density and the growth performance of domestic animals keep increasing as the consequence of advanced farm management. Under this circumstance, animals are more susceptible to infectious diseases which lead to significant economic losses to the industry. The immunity plays a pivotal role in protecting the animals from invading pathogens and viruses. This course is focused on the introduction of immune system, different types of immune responses, host-pathogen interaction, and vaccination. Acquisition of such knowledge is fundamental for the students to understand disease-controlling strategies

of animal husbandry.

226141 統計取樣法

2 選

顏才博 上

此課程主要在介紹各種統計取樣法，及其在自然資源調查與農業研究上之應用。學生將學習各種取樣設計原理、其運用時之條件限制、相關之統計分析、樣本數之決定及可信度之運算。在課程中除了講解理論外亦配合內容使用統計軟體，以期學生能瞭解各種統計取樣法，並正確地運用於自然資源調查與相關之研究。

226141 Sampling Methods

2 S

T. B. Yen, F

Offer English and Chinese sections. Prereq., basic Biometrics or equiv.; consent of instructor. The objective of this course is to introduce different sampling methods and practical use in the natural resources inventory and other agricultural researches. Students will be familiar with various sampling designs employed to inventory, their utility and associated underlying assumptions as well as computing estimators and their associated measures of reliability with sample size determination in particular sampling design. Students will gain insight and understanding about the process of planning and executing an inventory with the appropriate use of certain statistical procedure over others in specific situations.

226142 國際漁業合作特論

2 選

李栢淳，下

本課程旨在教導學生瞭解目前國際漁業與水產養殖之發展趨勢，以及我國提供技術協助非洲、中南美洲與加勒比海以及亞太地區等開發中國家發展漁業與水產養殖事業。藉由計畫週期之方法論，對於成功與不成功案例進行比較分析，俾能對我國對外漁業與水產養殖合作之整體運作策略與模式有所認識。

226142 Special Topic on International

2 S

P. P. Li, S

Fishery Cooperation

The curriculum aims to instruct the students to recognize the current development trend of international fisheries and aquaculture industries. The Republic of China (Taiwan) provides technical assistance in terms of fisheries and aquaculture techniques for developing countries in Africa, Central and South America, Caribbean as well as Asia and Pacific region. By way of the methodologies of Project Cycle executed, engaging in comparative analysis on successful and unsuccessful project, to facilitate understand the comprehensive operational strategies and approaches on Taiwan's international fisheries and aquaculture cooperation.

226143 植物病害防治特論

2 選

何婉清，上

植物病害防治特論是由流行病學的觀點來探討植物病害的預防及治療措施，其防治原理則分別為拒病、避病、降低或除去植物病原菌的接種濃度，增強寄主的抗病及免疫能力，直接應用各種措施來保護寄主免於病原菌的侵入，以及綜合應用上述各防治原理的整合防治措施。包括法規防治、栽培防治、化學及物理防治、生物防治以及綜合防治等。

226143 Special Topics on Plant

2 S

W. C. Ho, F

Diseases Control

Special topics on plant diseases control are intended to review and discuss the control measures of plant diseases. The various control methods can be classified as regulatory, cultural, biological, physical and chemical measures. The concept of integrated plant disease control is also discussed.

226144 植物病害防治特論實驗

1 選

何婉清，上

以預防重於防治的觀點，探討植物病害的發生預測、診斷和防治技術，其方法包括發生預測技術，傳統及分子生物之病害診斷技術，法規防治措施，栽培防治法，物理及化學防治技術，生物防治技術以及綜合防治措施等。其防治原理的應用則包括拒病、避病、降低或去除植物病原菌的接種濃度，增強寄主的抗病及免疫能力，直接應用各種措施來保護寄主免於病原菌侵入，以及綜合應用上述各種防治原理的綜合防治措施。

226144 Lab. Special Topics on

1 S

W. C. Ho, F

2-5、國際學院熱帶農業暨國際合作系(博士班) 必選修科目表

熱帶農業暨國際合作系博士班 (Curriculum Table for Ph.D. Program)

(一) 教育目標

<ol style="list-style-type: none"> 1. 促進農、林、漁、牧各方面之相關研究。 2. 培育高級專業人才，增進獨立與開發研究能力。 3. 提升農、林、養殖及畜牧業之專業技術。 4. 協助政府規劃及培訓援助友邦的農業技術人才。
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(二) 必修科目

必修科目總稱 Names of Required Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		第三學年 3 rd Academic Year		備註 Remarks	
		1st semester	2nd semester	1st semester	2nd semester	1st semester	2nd semester		
專題討論 Seminar	4	1	1	1	1			輪授	
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						
應用華語(1) Applied Mandarin (1)	1	1						外籍生必修， 1學分2小時	
應用華語(2) Applied Mandarin (2)	1		1					外籍生必修， 1學分2小時	
博士論文 Dissertation	12					6	6		
合 計	20	5	5	1	1	6	6	本 國 生	
	22	6	6	1	1	6	6	外 籍 生	

(三) 選修科目

選修科目總稱 Names of Elective Courses in Chinese and English	學 分 數	第一學年 1 st Academic Year	第二學年 2 nd Academic Year	備註 Remarks
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100.04.20 教務會議傳閱附件 2、(提案二) 新增、更名課程規劃
2-5、國際學院熱帶農業暨國際合作系(博士班) 必選修科目表

		1st semester	2nd semester	1st semester	2nd semester	
自然資源之利用與生產 Utilization and Production of Natural Resources	3		3			熱帶農業暨國際合作系
進階專技英文寫作 Advanced Scientific Writing	2			2		熱帶農業暨國際合作系
穿透式電子顯微鏡特論 Special Topic of Transmission Electron Microscopy (TEM)	3		3			熱帶農業暨國際合作系
科學研究方法 Scientific Research Methods	2		2			熱帶農業暨國際合作系
試驗設計及數據分析 Experimental Design and Data Analysis	2	2				熱帶農業暨國際合作系
高等蔬菜作物 Advanced Olericulture	3	3				農園生產系
草坪生理及管理 Turf Physiology and Management	2			2		農園生產系
迴歸分析 Regression Analysis	2			2		農園生產系
蘭花學 Orchidology	3			3		農園生產系
高等熱帶果樹 Advanced Tropical Fruits Science	3	3				農園生產系
高等花卉學 Advanced Floriculture	3	3				農園生產系
分子診斷技術學 Molecular-based Diagnostic Techniques	2	2				生物科技研究所
酵素與蛋白質工程學 Enzyme and Protein Engineering	2	2				生物科技研究所
高等魚類與漁業生物學 Advanced Fish and Fisheries Biology	3	3				水產養殖系
高等昆蟲基礎學 Advanced Foundations in Entomology	3	3				植物醫學系
真菌學特論 Special Topics on Mycology	2	2				植物醫學系
高等昆蟲病理學 Advanced Insect Pathology	3	3				植物醫學系
乳牛繁殖學 Reproduction of dairy cattle	3		3			動物科學與畜產系
芻料營養評估 Forage Evaluation	3		3			動物科學與畜產系
乳牛哺乳學 Lactation and Milking of Dairy Cattle	3			3		動物科學與畜產系
肉牛生產學 Beef cattle production	2			2		動物科學與畜產系
乳牛牧草學 Grass for Dairy Cattle	2			2		動物科學與畜產系

100.04.20 教務會議傳閱附件 2、(提案二) 新增、更名課程規劃
2-5、國際學院熱帶農業暨國際合作系(博士班) 必選修科目表

選修科目總稱 Names of Elective Courses in Chinese and English	學 分 數 No. Credits	第一學年 1 st Academic Year		第二學年 2 nd Academic Year		備註 Remarks
		1 st semester	2 nd semester	1 st semester	2 nd semester	
		單胃動物營養特論 Special Topics on Monogastric Animal Nutrition	3	3		
分子病毒學 Molecular Virology	2	2				獸醫學系
基因表現系統 Genetic Expression System	2	2				獸醫學系
鄉村研究之理論架構及實證應用 Theoretical Frameworks and Empirical Application in Rural Research	3	3				農企業管理系
人口與糧食 Population and Food	3				3	農企業管理系
高等人力資源管理 Advanced Human Resource Management	2			2		農企業管理系
合 計	61	36	14	18	3	

*附註:本系選修課程包含全校博士班選修課。

2-6、國際學院熱帶農業暨國際合作系(博士班) 中英文摘要

熱帶農業暨國際合作系

Department of Tropical Agriculture and International Cooperation

一、必修科目 Required Courses

229001 專題討論 6 必

本課程旨在訓練研究生對資料蒐集、整理及表達的能力。學生選擇與論文有關的題目，蒐集文獻、閱讀、整理成摘要，然後提出報告討論，並由參與教師評分。

229001 Seminar 6 R

This course is to train graduate students the ability in searching literature, organizing materials and presentation. Students are required to select a topic in their thesis, search and review literature, and draw up an abstract and a final report as well. Presentations are scheduled twice a semester for every student.

229003 國際農業發展趨勢特論 4 必 上

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

229003 Special Topics on Developing Trends of International Agriculture 4 R F

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.

229004 農業政策與經濟特論 4 必 , 上

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。

229004 Special Topics on Agriculture Policies and Economics 4 R , F

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.

二、選修科目 Elective Courses

229006 高等昆蟲病理學 3 選 , 上

本課程將介紹高等昆蟲病理學，其內容包括：機械的、物理的和化學的傷害，營養和新陳代謝疾病，健康昆蟲體內細胞外之微生物和細胞內之微生物抗病及免疫，癥狀和病理學，細菌感染，真菌感染，病毒感染，原生動物和線蟲類感染，昆蟲病理學的應用和生物防制。

229006 Advanced Insect Pathology 3 S , F

This course is to introduce advanced topics on insect pathology. Its contents include: mechanical, physical, and chemical injuries; diseases of nutrition and metabolism; extracellular microbiota of healthy insects; intracellular microbiota; resistance and immunity; symptoms and pathologies; bacterial infections;

fungus infections; viral infections; protozoan and nematode infections; applied insect pathology; and biological control.

229014 蘭花學 3 選 陳福旗

本課程在教授有關蘭花研究及生產之知識，內容包括生長習性與構造、分類與地理分佈、礦物營養、開花生理、光合作用、菌根菌與共生作用、種子發芽及幼苗生長、栽培與管理、遺傳與育種、重要蘭屬介紹、病蟲害管理、切花彩收後生理。

229014 Orchidology 3 S F. C. Chen

This course is to introduce the knowledge of orchid research and production. Its contents include: growth habitats, classification and distribution, mineral nutrition, flowering physiology, photosynthesis, mycorrhizae and symbiosis, seed germination and seedling growth, cultivation and management, genetics and breeding, pests and disease management, and postharvest physiology.

229015 高等蔬菜作物 3 選 , 上

本課程提供大學部高年級及研究生研習。課程內容討論有關蔬菜的栽培生理及遺傳育種特性、過去本省重要蔬菜發展之源由、現今蔬菜生產之特色及展望。

229015 Advanced Vegetable Crops 3 S S

This course is to introduce the physiology and genetic breeding of vegetable crops; origin and characteristics of today's vegetable industry in Taiwan, and special features and uniqueness of vegetable production in Taiwan.

229017 高等魚類與漁業生物學 3 選 , 上

本課程之重點在於介紹魚類對環境之適應現象及調節機制，包括形態、行為及生理等層面，漁業生物學特性，資源盛衰及管理。

229017 Advanced Fish and Fisheries Biology 3 S , F

This course is to introduce the phenomena and regulatory mechanisms involved in the adaptation of fishes to environments in terms of morphology, behavior and physiology. The fundamental aspects of fishery biology and resource management will further be discussed.

229018 高等海洋魚類生物學 3 選 , 下

本課程之教學重點在於海水魚與海洋環境之關係，內容包括環境特性，海水魚棲息及適應之多樣性，形態行為與環境適應之關連性等。

229018 Advanced the Biology of Marine Fishes 3 S , S

This course is to introduce the inter-relationship between marine teleosts and their environments. Its contents include: the nature and characteristics of environments, diversification of habitats, adaptation patterns of marine fishes, and correlation of fish morphology and behaviors with the adaptation patterns to environmental changes.

229019 高等保育生物學 3 選 , 下

高等保育生物學原理；熱帶林之生物多樣性及生物質量；保育之策略。

229019 Advanced Conservation Biology 3 S , S

This course is to introduce the principles of conservation biology, diversity and biomass in tropical forest; and strategies for conservation.

229020 真菌學特論 2 選 , 上

本課程針對真菌之生理生化及其代謝之闡述，以說明真菌之細胞壁合成及分解，與孢子發芽、菌絲生長的關係。真菌營養生長轉變生殖生長之內外影響因子與生化代謝之生理關係。

229020 Special Topics on Mycology 2 S , F

This course is to elaborate the physiology, biochemistry and metabolism of fungi. It will emphasize the biosynthesis and decomposition of cell walls of fungi, and the relationship among sporulation, germination and mycelial growth. Additional emphasis will also be placed in discussing the inner and outer influencing factors that affects the conversion from vegetative growth to reproductive growth of fungi.

229021 酵素與蛋白質工程學 2 選

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。

229021 Enzyme and Protein Engineering 2 S

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

229022 分子病毒學 2 選

本課程的目的，在使學生瞭解獸醫分子病毒學的一般概念，並探討病毒的複製機制、基本的分子生物學、致病機轉、宿主與寄生的關係及其免疫機制。

229022 Molecular Virology 2 S

The purpose of this course is to study the general concepts of basic and veterinary medicine virology, whereas describes the virus replication, basic molecular biology, pathogenesis, relationship of host and parasite and immune mechanism.

229023 基因表現系統 2 選

本課程將著重於原核基因及真核基因之表達，並介紹常用之宿主表達系統。

229023 Genetic Expression System 2 S

This class emphasizes the expression of prokaryotic and eukaryotic genes, and introduce the common use of host expression system.

229024 分子診斷技術學 2 選

本課程將介紹分子生物技術檢測微生物、動植物之基因及其表面抗原。

229024 Molecular-based Diagnostic 2 S

Technique

The course introduces the applications of molecular-based techniques to detect the genes and surface antigens of microbial, animals and plants.

229025 鄉村研究理論架構及實證 3 選

應用

本課程旨在增加學生對於鄉村研究流程之理論、發展假說與應用之間連結的認知。特別強調使用定性研究方法從事鄉村研究。藉由導讀、課程討論研討與評論對理論與實證研究有進一步的認知，並增加學生在組織及課程研討的技能及經驗。

229025 Theoretical Frameworks and 3 S

Empirical Application in Rural Research

The goal of this course is to increase student knowledge and understanding of the research process that links theory and hypothesis development and empirical applications in rural areas. Special emphasis will be placed on the use of qualitative methods in conducting research in the rural area. Students will enhance their skills and obtain experience in organizing and leading class discussions; reading, interpreting and integrating theoretical and empirical studies; writing a book review; and writing essays that integrate ideas from assigned materials with student evaluations of the materials.

229026 高等熱帶果樹 3 選

本課程針對熱帶果樹之產地與地區、台灣與世界熱帶果樹之生產、種原交流、品種及育種、繁殖—無性與有性、芽接與嫁接之地區差異、砧木之演進、生育與環境、栽培管理—傳統與現代、產期調控—從熱帶柑橘到龍眼之品種、產能—從芒果之授粉昆蟲飼養至百香果之自交親和性、營養

—與品質及生理障礙、開花生理與地區效應、品質控制—環境與栽培技術之效應、採後處理與檢疫、國際市場與障礙等加以論述。

229026 Advanced Tropical Fruits 3 S
Science

The course covers special topics of tropical fruit crops on production and locations, fruit production in Taiwan and world, germplasm collections and breeding, propagation—budding, grafting and rootstock, growth and environments, traditional and current cultural managements, forcing culture in the tropics and subtropics, bearing efficiency, nutrition and quality, flowering physiology and location effect, postharvest and quarantines, international trade and barrier.

229027 高等花卉學特論 2 選

本課程之目的乃是深入探討花卉園藝技術，主要內容為：1、花卉種源保存與開發。2、花卉種苗生產技術。3、花卉栽培介質與養份、水分管理。4、花卉開花生理與調節。5、花卉商品設計與流通。6、花卉栽培技術各論。

229027 Advanced Floriculture 2 S

This course is designed for advanced study on floriculture of specific topics. They are: 1. Germplasm preservation and development. 2. Techniques of floral seeds and seedling propagation. 3. Management of substrates, fertilization and water in floriculture. 4. Flowering physiology and regulation. 5. Product design and sales. 6. Flower forcing of special crops.

229028 高等生物統計 2 選

本課程旨在使學生能了解並利用適當之統計方法來分析資料及陳述，表示資料，以獲得正確的結論與資訊。所介紹之統計方法包括敘述性統計，Z-test，t-test，x²-test, ANOVA,及其他相關性統計方法。

229028 Advanced Biometry 2 S

This course teaches students the understanding and usage of proper methods in analyzing data to obtain correct conclusion and information. The statistical methods taught in this course include descriptive statistics, Z-test, T-test F- test, x²-test, ANOVA, and other related fields.

229029 芻料營養評估 3 選 夏良宙、上

芻料營養評估需要非常精細又複雜之技術，本課程之主旨主要是提供詳盡之方法，去做芻料之營養評估，課程內容包含下列主題：芻料評估對人畜之重要性；以動物成績為飼料評估之標準；芻料能量計算；能量評估及芻料代謝管理；芻料蛋白質計算；以酵素方法計算消化率；芻料降解計算；物理化學的方法評估芻料營養；氣體生產堆積法評估芻料；礦物質；維生素；抗營養因子；芻料攝取量評估之重要性；飼料之動物病原菌；脂質化學分析；動物飼料之多醣化學評估。

229029 Forage Evaluation 3 S Liang Chou Hsia、上

Forage evaluation is a complex technologies. The purpose of this course is to provide the detailed ways on how to evaluate forage. The course will include the following topics, which are the major ways to evaluate the quality of roughage. The detailed contents include: The importance of forage evaluation for humans and animals; Animal performance as the criterion for feed evaluation; Estimating the energy value of forages; Energy evaluation, management of forage metabolism; Estimating the protein value of forages; Enzyme techniques for estimate digestibility; The in situ techniques for the estimation of forage degradability; Physicochemical approaches; Cumulative gas-production techniques for forage evaluation; Mineral; Vitamin; Antinutrition factors; The importance of intakes in feed evaluation; Animal pathogen in feed; Chemical analysis of lipid fractions; Chemical evaluation polysaccharides in animal feed

229030 日式園林藝術特論 2 選 蔡龍銘、下、無

本課程內容包括：日式庭園之理念〈神仙思想、佛教思想、藝術人文思想、自然思想〉。日式庭

園之形制〈石景、水景、山水之庭、茶庭、禪庭、枯山水〉。日式庭園之構築〈構築材料、構築元素、構築方法〉

229030 Special Topics on Japanese Garden Art 2 S L. M. TSAI, S, Nil

The contents of this course includes: the creative inspiration (god spirit, Buddhism, humanistic, art and nature). The design principles such as the development of Japanese gardens, rock landscape, mountain and water landscape, tea garden, Zen Buddhism garden, dry landscape .The creation of a Japanese garden such as materials, elements and methods.

229031 建築暨景觀風水特論 2 選 下

本課程的目的在研讀中國風水經典之作，以了解中國風水的理論與實際做為建築與景觀規劃設計的參考依據...

229031 Special Topics on Architecture and Landscape Architecture Geomancy(Fengshui) 2 S 下

This course is to study the some classics of Chinese Fengshui in order to understand its theory and practice as the fundamental reference for the planning and design of architecture and landscape architecture.

2-7、農學院養殖系(博士班) 必選修科目表

水產養殖系博士班

(一)教育目標

配合國內、外水產養殖相關產業脈動、國家教育目標與相關政府政策、本校發展計畫及本所特色，培育學生具有社會與學術道德倫理，並具備實務應用與技術開發能力之水產養殖領導創新研發專才。

(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	
博士論文 Dissertation	12			6	6	
合 計	16	1	1	7	7	

(三)選修科目

中 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
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 in Sustainable Aquaculture	2	2				
甲殼類繁殖專論 Advanced Topics on the Propagation and Culture in Crustacea	2	2				
水產生物技術應用專論 Advanced Topics on Application of Biotechnology in Aquaculture	2	2				
分子生物學專論 Advanced Topics in Molecular Biology	2	2				
魚類營養學專論 Advanced Topics in Fish Nutrition	3	3				
甲殼類生理學專論 Advanced Topics in Crustacean Physiology	3	3				
魚類生理學專論 Advanced Topics on Fish and Cruatacean Physiology	2	2				
水產資源保育與開發專論 Advanced Topics on Resource Reservation and Sustainable Utilization in Aquaculture	2	2				
藻類繁殖專論 Advanced Topics in Seaweed Cultivation	3	3				
魚類多樣性專論 Advanced Topics in Diversity of Fishes	2	2				
藻類生理生態專論 Advanced Topics on Physiological Ecology of Seaweed	3	3				
國際漁業合作專論 Advanced Topics on International Fishery Cooperation	2	2				
魚類免疫學專論 Advanced Topics in Fish Immunology	2	2				
水產行銷專論 Advanced Topics on Market in Aquaculture	2	2				
高等水產養殖研究法 Advanced Research Methodology in Aquaculture	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	
智慧財產權專論 Advanced Topics on Intellectual Property Law	2	2				
魚類環境生理學專論 Advanced Fish Physiology and Ecology	2		2			
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 Pratice of Experimental Designs and Biostatistical Analysis	1		1			
養殖經濟與經營管理專論 Advanced Topics on Economics and Management in Aquaculture	2		2			
水族藥理學專論 Advanced Topics in Aquatic Pharmacology	2		2			
水族內分泌學專論 Advanced Topics on Fish and Crustacean Endocrinology	2		2			
魚類繁養殖學專論 Advanced Topics on Propagation and Culture of Fishes	2		2			
魚類分子系統分類學專論 Advanced Topics on Molecular Systematics of Fishes	2		2			
水族飼料配製專論 Advanced Topics on Mixture and Manufacture of Aquatic Feed	2		2			
水族疾病診療專論 Advanced Topics on Aquatic Disease Diagnosis and Control	2		2			
無脊椎動物免疫專論 Advanced Topics on Invertebrate Immunology in Aquaculture	3		3			
水產品安全與衛生專論 Advanced Topics on Sanitation of Aquatic Products	2		2			
細胞與分子營養學專論 Advanced Topics on Cellular and Molecular Nutrition	2		2			
分子演化專論 Advanced Topics in Molecular Evolution	2		2			
高等分子遺傳學 Advanced Molecular Genetics	2		2			
脂質營養學專論 Advanced Topics in Lipid Nutrition						

100.04.20 教務會議傳閱附件 2、(提案二) 新增、更名課程規劃
2-7、農學院養殖系(博士班) 必選修科目表

中 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
藻類個案研究 Special Case Study in Algae	2		2			
合 計	72	38	34			

2-8、農學院養殖系(博士班) 中英文摘要

水產養殖系 (Department of Aquaculture)

一、必修科目 Required Courses

138001 專題討論 4 必

本課程為研究生參與專題的發表及討論。主要目的在於訓練學生對文獻之彙整，表達工具之製備，專題的學術發表技巧及態度，和討論應對的訓練。

138001 Seminar 4 R

The lecture is designed for the scientific presentation of participated students on the special topics in the field of fisheries. Development of scientific presentation capabilities is primarily intended. Included are literature retrieval and organization, preparation of presentation tools, presentation and discussion skills and attitudes, and others.

138002 博士論文 1 2 必 各教師

每位博士班研究生選定論文題目，在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。

138002 Thesis 1 2 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

138003 餌料生物培養技術專論 2 選 劉俊宏

本課程係著重於世界新穎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。

138003 Advanced Topics on Live Food 2 S C. H. Liu Culture in Aquaculture

The course is focused on the current developed techniques on the cultivation of live foods, and the related research methods in the world. In addition, the nutrition of live foods and techniques of nutritional improvement are chosen for discussion.

138004 養殖環境管理與永續利用專論 2 選 葉信平

本課程包括回顧永續發展的由來及其在水產養殖上之應用、其次為國內外推行永續水產養殖的現況：含有機養殖魚類、水產養殖對環境的衝擊及因應之道、範例國家探討—以臺灣、日本、中國大陸、挪威、泰國等國為代表。

138004 Advanced Topics in Sustainable 2 S S. P. Yeh Aquaculture

This lecture comprises of the historical reviews of the sustainable development and its application to aquaculture, and prospects of current employment of sustainable aquaculture: green grow the fishes, environmental impact from aquaculture and its solution, and examples of major countries of aquaculture production such as Taiwan, Japan, mainland China, Thailand and Norway.

138005 甲殼類繁養殖專論 2 選 鄭文騰

介紹甲殼類最新繁養殖技術，以及其生態、生殖生理及生物技術等研究新知之應用。以選定之甲殼類物種進行各階段繁養殖之深入探討。

138005 Advanced Topics on 2 S W. T. Cheng Propagation and Culture in Crustacean

Overall introduction on the current techniques and future trends of artificial propagation in crustacean, and the application of new knowledge in ecology, reproductive physiology, and biotechnology. The further discussions are conducted of the propagation in selected crustacean.

138006 水產生物技術應用專論 2 選

探討水產生物技術在繁殖力的改進、生長的促進、環境適應性的改良、水產疫苗的研發與應用。

138006 Advanced Topics on 2 S Application of Biotechnology in Aquaculture

Introduce the application of biotechnology on the promotion of reproductive capacity and growth, improvement of the adaptation to environment, and the development and application of vaccine in aquaculture.

138007 分子生物學專論 2 選 葉文吉

本課程以分子生物學為基礎，針對學生研究主題，探討其在分子生物學上之意

義，並詳細介紹基因結構、調控機制、基因轉殖的分子生物學。

138007 Advanced Topics in Molecular Biology 2 S W.J. Yeh

Based on the fundamental knowledge of molecular biology the course will be focused on the structure of gene, the regulating mechanisms and gene transfer in molecular biology, which are depended on students' researches.

138008 魚類營養學專論 3 選 邱謝聰

魚類與甲殼類需要之營養素包括蛋白質、脂肪、維生素與礦物質等、營養素之消化與代謝、非營養素之有害物質、營養素之各別需求量及飼料之組成要件等。

138008 Advanced Topics in Fish Nutrition 3 S S. T. Chiu

Nutrients for fish or shrimp included protein、lipid、vitamin and mineral ,digestion and metabolism, nonnutrition diet components and feed formulation.

138009 甲殼類生理學專論 3 選 鄭文騰

本課程之目的是教導學生了解甲殼類生理調節機制，其內容包括甲殼類內部結構、滲透壓及離子的調節、消化吸收與代謝、氧氣的吸收與運送、酸鹼的平衡調節、生殖生理等。並藉由最近甲殼類生理學研究之介紹，使學生瞭解甲殼類生理學相關研究之現況。

138009 Advanced Topics in Crustacean Physiology 3 S W. T. Cheng

The purposes of this course are teaching students about the mechanism of physiological regulation in crustacean. The courses will include 1) internal anatomy, 2) osmotic and ionic regulation, 3) digestion and metabolism, 4) oxygen uptake and transport, 5) regulation of acid-base balance and reproductive physiology of crustacean. In addition, the newly advanced researches in crustacean physiology will also be introduced in the course to make students better understand the research status of crustacean physiology.

138010 魚類生理學專論 2 選 陳英男

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。

138010 Advanced Topics on Fish and Crustacean Physiology 2 S Y.N. Chen

This course is aimed at introducing the knowledge on major physiological mechanisms in fish and crustacean. Special advanced physiological topics are selected for further article research and discussion to update knowledge for undergraduates.

138011 水產資源保育與開發專論 2 選 葉文吉

探討水產養殖資源保育與資源永續利用間如何取得平衡，並因應國際情勢的變遷，建立水產資源保育與永續利用之策略，使學生獲得理論與實務結合的相關知識。

138011 Advanced Topics on Resource Reservation and Sustainable 2 S W.J. Yeh

Utilization in Aquaculture

Lead the students to investigate the solution to obtain the balance and to establish the strategies between resource reservation and sustainable utilization.

138012 藻類繁養殖專論 3 選 翁韶蓮

課程將就不同之經濟海域繁養方面之技術問題作深入探討。包括孢子與配子之組織培養原生育之配置，孤雌生殖之原因與方法等及各種經濟海藻海上養殖技術及養殖管理方法。

138012 Advanced Topics in Seaweed 3 S S.L. Wong Cultivation

Lectures will focus on culture and propagation those major economic seaweeds. it will including spore and gamet tissue culture. method in manulation of protoplast. Parthogenesis, etc. Futhermore, different mass cultivation of economic seaweed in world will be compared among special and countries.

138013 魚類多樣性專論 2 選 曾美珍

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。

138013 Advanced Topics in 2 S M.C. Tseng Diversity of Fishes

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.

138014 藻類生理生態專論 3 選 翁韶蓮

課程包括藻類之 1.型態、生活史和分化 2.生態系中海藻群落之關係 3.藻類間之交互作用 4.光和光合作用出及生產力 5.營養鹽對成長與生理之影響 6.溫度和鹽度對生理之影響 7.水流與藻類生理 8.污染 9.藻類大規模養殖等。

138014 Advanced Topics on 3 S S.L. Wong Physiological Ecology of Seaweed

Class will be divided into several sections. Communities and morphogenesis formerly served to review the intnoduction of the organisms and their interactions within community. Biological inteaction between (and among) species. Light、photosynthesis and primary production. Effect of nutrients, temperature and salinity on physiology and grocoth of algae. Water motion relates to algae physiology. Kinds of pollution algae in the world.

138015 國際漁業合作專論 2 選 葉信平

本課程旨在教導學生瞭解目前國際漁業與水產養殖之發展趨勢，以及我國提供技術協助非洲、中南美洲與加勒比海以及亞太地區等開發中國家發展永續漁業與水產養殖事業。藉由計畫週期之方法論，對於成功與不成功案例進行比較分析，俾能對我國對外漁業與水產養殖合作之整體運作策略與模式有所認識。

138015 Advanced Topics on 2 S S. P. Yeh

International Fishery Cooperation

The curriculum aims to instruct the students to recognize the current development trend of international fisheries and aquaculture industries. And the technical assistance in terms of sustainable fisheries and aquaculture techniques for developing countries in Africa, Central and South America, Caribbean as well as Asia and Pacific region from the Republic of China (Taiwan). By way of the methodologies of Project Cycle executed, engaging in comparative analysis on successful and unsuccessful project, to facilitate understanding of the comprehensive operational strategies and approaches on Taiwan's international fisheries and aquaculture cooperation.

138016 魚類免疫學專論 2 選

簡介魚類免疫學基礎後，以分子生物學探究體液性免疫反應及細胞免疫反應之機制，並討論魚類免疫學研究走勢。

138016 Advanced Topics in Fish Immunology 2 S

Brief introduce fish immunology, and then discuss the molecular humoral and cellular immunity. The future tendencies of the researches in fish immunology are also conducted.

138017 水產行銷專論 2 選

從產業、管理與科技觀點探討水產行銷議題，內容將包涵行銷管理學的基本概念與水產行銷實務，並同時探討科技與行銷之結合，如網路行銷的討論。

138017 Advanced Topics on Market in Aquaculture 2 S

To discuss the issue of aquatic market via industry, management and science and technology, and the contents include the concepts of marketing management and the case study in aquaculture. In the meantime, the discussion on the combination of market and technology is also conducted such as internet marketing.

138018 高等水產養殖研究法 2 選 鄭文騰

介紹水產養殖領域之相關研究法，如個案研究法和實驗研究法等，加強學生在從事水產養殖研究設計之相關概念與基礎。

138018 Advanced Research Methodology in Aquaculture 2 S W.T. Cheng

We provide the introduction on the methodology in aquaculture, such as case study and experimentation, to enhance the concept and basic to students in their researches.

138019 智慧財產權專論 2 選

課程介紹專利法、專利說明書之閱讀及運用技巧，專利之檢索及製作專利地圖等原理，使學生對專利具備基礎知識，及製作專利地圖之能力。

138019 Advanced Topics on Intellectual Property Law 2 S

This course introduce intellectual property laws, patent documents reading and using, principles for searching patent and making patent map. It provides the basic knowledge of intellectual property laws for undergraduates .

產養殖現場常用藥品分別講述，使學生能具有藥理學基礎，建立正確用藥的概念。

138024 Advanced Topics in Aquatic Pharmacology 2 S M.C. Tseng

The contents of the course include the introduction of the source in aquatic drugs, pharmacokinetics and pharmacology. Moreover, descriptions of common using drugs also are The contents of the course include the introduction of the source in aquatic drugs, pharmacokinetics and pharmacology. Moreover, descriptions of common using drugs also are available for students to set up the concepts of safe drugs using.

138025 水族內分泌學專論 2 選 陳英男

本課程介紹水生動物之魚類與甲殼類內分泌種類與調控機制，並檢索蒐集特定主題之最新學術資料進行研討，使學生具備最新之水產動物內分泌學專業知識。

138025 Advanced Topics on Fish and Crustacean Endocrinology 2 S Ying-Nan Chen

Introduction and discussions on endocrines and their involvements in physiological processes in fish and crustacea will be emphasized. Special endocrinological topics are selected for further article research and discussion to update knowledge for undergraduates.

138026 魚類繁殖學專論 2 選 陳英男

本課程介紹魚類繁殖與養殖技術發展現況與學理基礎，並選定部分主題檢索其最新學術與產業資訊進行研討及產業參訪，使學生獲取最新之技術發展與產業現況資訊，具備繁殖魚類之知識與技能。

138026 Advanced Topics on Propagation and Culture of Fishes 2 S Y.N. Chen

This course is aimed at introducing the techniques and knowledge in breeding and cultivating economical fishes. Special topics on the progress of scientific theory and industry are selected for further discussion to update knowledge for undergraduates.

138027 魚類分子系統分類學專論 2 選 曾美珍

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演化的研究中所使用的分子及外部形質特徵，粒線體 DNA 鹼基的取代，粒線體 DNA 細胞色素 b 基因建構種間親緣關係，使用細胞核 DNA 當作遺傳標誌建構物種的親緣關係，主要組織相容複合物在魚類建構親緣關係的研究。

138027 Advanced Topics on Molecular Systematics of Fishes 2 S M.C. Tseng

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

138028 水族飼料配製專論 2 選 邱謝聰

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。

**138028 Advanced Topics on Mixture 2 S S.T. Chiu
and Manufacture of Aquatic Feed**

Introduce the needs of the aquatic organisms and the various model of feed in nutrients and their specific characteristics, and also show the latest manufacturing technique and processes in feed.

138029 水族疾病診療專論 2 選 張欽泉

深入探討水產動物重要之病毒性、細菌性與原蟲類疾病之發生原因及最新的診療技術等。

**138029 Advanced Topics on Aquatic 2 S C. C. Chang
Disease Diagnosis and Control**

The lecture includes the infecting mechanism of serious viral, bacterial and protozoal diseases in the aquatic organisms, and the latest diagnostic technique.

138030 無脊椎動物免疫專論 3 選 鄭文騰

本課程除了介紹無脊椎動物免疫系統外，內容主要是免疫機制的調節徑路及可能影響免疫系統之內在或環境因子介紹。

**138030 Advanced Topics on Invertebrate 3 S W.T. Cheng
Immunology in Aquaculture**

The lecture includes the infecting mechanism of serious viral, bacterial and protozoal diseases in the aquatic organisms, and the latest diagnostic technique.

138031 水產品安全與衛生專論 2 選 邱謝聰

水產品安全必需保證足夠的食物來源，食物通路。獲得營養水產品的適當的食物和食物用途必需保證食物衛生和安全。本課程希望學生瞭解維持水產品安全之方法。

**138031 Advanced Topics on Sanitation 2 S S.T. Chiu
of Aquatic Products**

Food security is currently built on food availability by ensuring sufficient food sources, food access by obtaining appropriate foods for a nutritious diet, and food use via comprehending proper use in terms of knowledge on nutrition and care, as well as ensuring food sanitation and safety, including free of fear and/or food antiterrorism. This curriculum hoped that the student understands method of the maintenance aquatic products security.

138032 細胞與分子營養學專論 2 選

介紹細胞與分子營養學的研究方法、細胞內營養物質的動態平衡、基因表達和蛋白水解、核酸和分子生理作用以及遺傳修飾食物和水產食物過敏的分子機理等。

**138032 Advanced Topics on Cellular 2 S
and Molecular Nutrition**

Introduction of the methodology in cellular and molecular nutrition, the active balance of nutrient in cell, gene expression and hydrolysis of protein, genetically modified organism (GMO), and the molecular mechanism of allergy in aquatic food.

2-9、農學院生物科技系(四技) 必選修科目表

四年制 生物科技系 (Department of Biological Science and Technology)

(一)教育目標

訓練學生具有生物學、生態學、生物技術等方面的知識，成為將來繼續深造或就業的基礎，並可在生物多樣性永續利用的部門及生物科技產業從事實務工作，為國家培育生命科學領域的中級人才。

(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			
國文 Chinese	4	2	2							
大一英文 Freshman English	4	2	2							
英語聽講練習 101~104 English Listening & Speaking Practice	2	0	0	1	1					
憲法 Constitution	2				2					
體育 Physical Education	2	1	1							
軍訓 Military Training	0	0	0							
生活服務教育 Student Life Service Education	0	0	0							
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									畢業前修畢
合 計	27	7	7	3	5	2	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	
普通化學(1) General Chemistry(1)	3	3								
普通化學實驗(1) General Chemistry Lab. (1)	1	1								
生物學(1) Biology (1)	3	3								
電子計算機概論 Introduction to Computers	0		0							
生物技術 Biotechnology	2		2							
生物統計 Biometry	2			2						
生物統計實習 Practice of Biometry	1			1						
生態學 Ecology	2				2					
實務專題 Special Projects	2						1	1		
合 計	16	7	2	3	2	0	1	1		

(四)專業必修科目

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	
生物學實驗(1) Biology Lab. (1)	1	1								
普通物理學(1) General Physics (1)	2	2								
普通物理學實驗 General Physics Lab.	1	1								
生物學(2) Biology (2)	3		3							
生物學實驗(2) Biology Exp. (2)	1		1							
分析化學 Analytical Chemistry	3		3							
有機化學 Organic Chemistry	3			3						
有機化學實驗 Organic Chemistry Exp.	1			1						
細胞生物學 Cell Biology	3			3						
微生物學 Microbiology	3				3					
微生物學實驗 Microbiology Exp.	1				1					
生物化學(1) Biochemistry (1)	3				3					
生物化學實驗 Biochemistry Exp.	1				1					
遺傳學 Genetics	3				3					
進階生物技術 Advanced Biotechnology	2					2				
分子生物學 Molecular Biology	3					3				
生物化學(2) Biochemistry (2)	3					3				
專題討論 Seminar	2							1	1	
生物科技產業分析 Biotechnology Industry Analysis	1							1		

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	
	植物解剖學 Plant Anatomy	2			2						
	植物解剖學實驗 Plant Anatomy Exp.	1			1						
	脊椎動物學 Vertebrate Zoology	3			3						
	脊椎動物學實驗 Vertebrate Zoology Exp.	1			1						
	植物分類學 Plant Taxonomy	2			2						
	植物分類學實驗 Plant Taxonomy Exp.	1			1						
	動物解剖學 Animal Anatomy	2			2						
	動物解剖學實驗 Animal Anatomy Exp.	1			1						
	免疫學 Immunology	2				2					
	科學方法 Scientific Method	3				3					
	生物顯微鏡學 Introduction to Biological Microscopy	2				2					
	動物分類學 Animal Taxonomy	2				2					
	腫瘤生物學 Cancer Biology	2				2					
	病毒學 Virology	2					2				
	無脊椎動物學 Invertebrate Zoology	2					2				
	無脊椎動物學實驗 Invertebrate Zoology Exp.	1					1				
	動物組織學 Animal Histology	2					2				
	動物行為學 Animal Behavior	2					2				
	動物生理學 Animal Physiology	3					3				
	動物生理學實驗 Animal Physiology Exp.	1					1				
	植物生理學 Plant Physiology	3					3				
	植物生理學實驗 Plant Physiology Exp.	1					1				
	消化道微生物 Gastrointestinal Microbiology	3					3				大碩合班

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	
	外溫四足動物學 Herpetology	3					3				大碩合班
	演化生物學 Evolutionary Biology	3						3			
	植物逆境生理學 Plant stress Physiology	2						2			
	酵素學 Enzymology	3						3			
	海洋生物學導論 Introduction to Marine Biology	3						3			
	真菌學 Mycology	2						2			
	植物生長與發育 Plant Growth and Development	2						2			
	植物細胞與組織培養 Plant Cell and Tissue Culture	2						2			
	植物細胞與組織培養實驗 Experiment in Plant Cell and Tissue Culture	1						1			
	野生動物生態及經營管理 Wildlife Ecology and Management	2						2			
	發酵化學 Fermentation Chemistry	2						2			
	族群生態學 Population Ecology	2						2			
	族群遺傳學 Population Genetics	3						3			
	應用微生物學 Applied Microbiology	2						2			大碩合班
	分子病毒學 Molecular Virology	3						3			大碩合班
	生物晶片 Biochips	2						2			大碩合班
	奈米生物科技 Nanobiotechnology	2						2			大碩合班
	訊息傳遞 Signal Transduction	2						2			大碩合班
	疫苗與診斷試劑之開發 Development of Vaccines and Diagnostics	2						2			大碩合班
	基因重組及表現 Genetic recombination and Expression System	2						2			大碩合班
	天然物化學實驗 Experiments in Natural Product Chemistry	2						2			大碩合班
	動物基因轉殖 Transgenic Biotechnology	2						2			大碩合班

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	
	生化分析 Bioanalytical Chemistry	2						2			大碩合班
	疾病模式生物學 Disease Model Biology	2						2			大碩合班
	醫用胚胎學 Medical Embryology	3						3			大碩合班
	動物適應與仿生科技 Animal adaptations and bionics	3						3			大碩合班
	動物老化生物學 The biology of animal aging	2						2			大碩合班
	保育生物學 Conservation Biology	2							2		
	實驗動物操作技術 Manipulation of Laboratory Animals	2							2		
	實驗動物操作技術實習 Manipulation of Laboratory Animals Exp.	1							1		
	內分泌學 Endocrinology	2							2		
	基因體學 Genomics	2							2		
	生物多樣性調查技術 Techniques of Biodiversity survey	2							2		
	生物資訊學導論 Introduction of Bioinformatics	2							2		
	生物技術與污染防治 Environmental biotechnology	2							2		大碩合班
	細胞凋亡 Apoptosis	3							3		大碩合班
	親緣地理學 Phylogeography	3							3		大碩合班
	分子演化學 Molecular Evolution	3							3		大碩合班
	分子演化學實習 Molecular Evolution Practicum	1							1		大碩合班
	化學生態學 Chemical Ecology	2							2		大碩合班
	天然物化學 Natural Product Chemistry	3							3		大碩合班
	蛋白質工程學 Protein Engineering	3							3		大碩合班
	有機分析 Organic Analysis	3							3		大碩合班
	蛋白質體學 Proteomics	2							2		大碩合班
	蛋白質體學實習 Proteomics experimental course	1							1		大碩合班

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	
	動物細胞培養 Animal Cell Culture	2							2		大碩合班
	分子診斷技術學 Molecular-Based Diagnostic Technique	2							2		大碩合班
	動物幹細胞建立與應用 Application and Establishment of Stem Cells	2							2		大碩合班
	動物幹細胞建立與應用實習 Application and Establishment of Stem Cells Practice	1							1		大碩合班
	植物功能性基因體學之應用 Plant Functional Genomics and Applications	2							2		大碩合班
	植物功能性基因體學之應用實驗 Experiments in Plant Functional Genomics and Applications	1							1		大碩合班
	入侵生物學 Biological Invasion	2								2	
	自由基生物學 Free Radical Biology	2								2	
	智慧財產權 Intellectual Property	2								2	
	性演化與性擇 Sexual Selection and Evolution of Sex	3								3	
	合 計	171	2	6	13	11	23	58	49	9	

註：本系學生至少應修滿 131 學分始得畢業(其中必修應修 82+1 通識教育講座學分，選修應修 48 學分)

2-10、農學院生物科技系(四技) 中英文摘要

四技 生物科技系 Department of Biological Science and Technology

一、必修科目 Required Courses

- 202001 生物學(1)** **3 必** **胡紹揚、上**
生物學為生命科學重要之基礎科目，屬於總論性質的課程。本課程內容包含生命的化學組成，細胞結構、遺傳組成與變異、生物演化機制等，修完本課程學生將能對生物體的生命現象有基知識。
- 202001 Biology(1)** **3R** **S. Y. Hu, F**
Biology lecture is a foundational course of life science. The content of this course comprise the chemistry of life, cell structure, genetics, mechanisms of evolution, and ecology. After complete this course, students can understand the basic knowledge of life phenomenon.
- 202002 生物學實驗(1)** **1 必** **徐志宏&廖培鈞、上**
本實驗課程在使學生能以實驗印證理論，增進學生對理論之瞭解。實驗內容包括顯微鏡操作、生物含細菌、真菌、原生動物、植物與動物細胞的觀察、擴散作用、滲透作用之測定等。
- 202002 Biology Exp.(1)** **1R** **D. J. H. Shyu & P. C. Liao, F**
The laboratory work is to acquaint students with both practical operation and theoretical aspects of the lecture subjects. The contents include the operate microscope, look and describe the organism including bacteria, fungi, protozoa, plant and animal cell, measurement of diffusion, osmosis.
- 202003 生物學(2)** **3 必** **胡紹揚、下**
本課程介紹生物學中近代發展之情形，著重於現代遺傳學，分子生物學之介紹。
- 202003 Biology(2)** **3R** **S. Y. Hu, S**
The objective of this course is to introduce the recent development of biology, focusing on the introduction of modern genetics and molecular biology.
- 202004 生物學實驗(2)** **1 必** **徐志宏&廖培鈞、下**
本課程包括：1.顯微鏡之操作 2.顯微鏡之觀察 3.基本動物及植物之觀察 4.基礎之動物、植物生理實驗 5.基礎之生化實驗 6.基礎之遺傳實驗。
- 202004 Biology Exp.(2)** **1R** **D. J. H. Shyu & P. C. Liao, S**
This course offers : 1. Operation of microscope 2. The observation of materials by microscope including animal materials and plant materials. 3. Fundamental experiments of animal physiology and plant physiology. 4. Fundamental Biochemistry lab. 5. Fundamental genetics lab.
- 202005 分析化學** **3 選** **徐睿良、下**
分析化學主要含概定性與定量的分析方法以及離析的分析方法，本課程的主要目的為使學生瞭解組成樣品物質中各成份相對含量的離析、驗證與確認等工作。所探討的主題包括(1)分析化學的化學原理(2)實驗數據準確度與精密度的評定(3)介紹當前分析化學得各種技術。

202005 Analytical Chemistry 3R J. L. Hsu, S

The course in analytical chemistry deals principally with qualitative and quantitative methods of analysis and methods of analytical separation. The major objective of this course is to familiarize the students with separating, identifying, and determining the relative amounts of the components making up a sample of matter. The discussion topics will include the following:(1) the chemical principles of analytical chemistry, (2) judging the accuracy and precision of experimental data, (3) introduction of a wide range of techniques in modern analytical chemistry.

202006 有機化學 3 必 張誌益、上

本課程乃著重於重要之碳化合(包括烷、烯、炔、醇、醚,有機鹵化物,芳香族化合物,醛,酮,酯與胺)之官能基反應,各類有機物之合成方法,相互間之關係以及其實際之應用。

202006 Organic Chemistry 3R C. I. Chang, F

A systematic study of the important classes of carbon compounds (alkane, alcohol, ether, organic halides, aromatic compounds, aldehyde, ketone, carboxylic acid, ester and amine) reactions of their functional groups, methods of synthesis, relations and uses. Proteins are presented.

202007 有機化學實驗 1 必 張誌益、上

本課程為配合非主修有機化學的教材而開設,期使學生熟練一般實驗技術及操作,進而對教材理論的了解及應證。除物理常數之測定外,其他依官能基的種類逐一實驗;烷、烯、炔、苯、鹵烷、醇、酚、胺、醚、醛、酮、羧酸、羧酸衍生物、脂類、醣類、核酸與蛋白質。每一實驗的重點是由官能基所產生的化學、物理性質。部分實驗亦包括簡易少量的合成。

202007 Organic Chemistry Exp. 1R C. I. Chang, F

This course is devised in conjunction with the lecture material nonmajors in organic chemistry. It provides students a profound understanding of subject-matter from laboratory work and familiarity with basic techniques. In addition to measurements of physical constants, the course is carried out in a functional approach: alkanes, alkenes alkyens, benzenes, organic halides, alcohols, ethers, aldehydes, ketones, carboxylic acids, and the deritatives of carboxylic acid, amines. Each experiment emphasizes the common chemical properties ascribed to functional groups.

202008 細胞生物學 3 必 顏嘉宏、上

本課程主要提供學生學習細胞生物學相關之基礎理論,將介紹生物各界之細胞型態與特徵、細胞之胞器與作用、胞膜及胞器膜的功能、細胞基因之構造、原核與真核細胞之細胞差異、細胞增殖作用、細胞周期與凋亡作用及其調節機制。

202008 Cell Biology 3R C.H. Yen, F

General concepts on Cell Biology will be introduced in this course, which include an overview of cells, cell types and their features, cell structure and functions, cell membranes and plasma membranes, the organization of cellular genomes, differences between prokaryotes and eukaryotes, the proliferation of cells, cell cycle and apoptosis.

202009 微生物學 3 必 張格東、下

本課程之目的,在使學生瞭解醫用微生物的基本知識,範圍涵蓋臨床上常見的

病原菌，及其生化實驗室菌種鑑別的方法。

202009 Microbiology **3R** **K.T. Chang, S**

An up-to-date study of essential microbiology in the concepts of basic and clinic application. it features mainly on the pathogenic bacterias that cause the diseases of the human being.

202010 微生物學實驗 **1 必** **張格東、下**

本實習之目的在訓練並建立學生在醫用微生物學領域之基礎技術，課程內容包括顯微鏡的運用，正常菌叢在皮膚，上呼吸道，腸胃道，及泌尿道的採集與鑑別，訓練學生完成菌種鑑別報告。

202010 Microbiology Exp. **1R** **K.T. Chang, S**

An interactive study of microbiology in laboratory. It features mainly on knowing of differential diagnosis of pathogenic bacterias on skin, upper respiratory tract, gastrointestinal tract and urinary tract of the human body.

202011 生物化學(1) **3 必** **鄭雪玲、下**

本課程包括基礎生化，探討有關醣類，核酸，脂肪及蛋白質的結構，功能，和代謝機制。

202011 Biochemistry (1) **3R** **S. L. Cheng, S**

The course features the fundamental biochemistry including the structure, the function, and the metabolism of carbohydrates, nucleic acids, fatty acid and proteins.

202012 生物化學實驗 **1 必** **鄭雪玲、下**

本實習之目的在訓練並建立學生在生物化學領域之基本基礎與技術，課程內容包括儀器操作，pH 值之測定，醣類之定量，蛋白質之定量和活性分析，SDS-PAGE 之準備和電泳，核酸之定量和分子操作，限制酶消化之作用。

202012 Biochemistry Exp. **1R** **S. L. Cheng, S**

The purposes of this course are critically selected and tested to instruct students effectively in the basic principles and techniques within biochemistry areas. Course contents include the operation of machines, measurement of pH value, quantification of carbohydrate and protein, quantification of nucleic acid, SDS-PAGE, molecular cloning, and restriction enzyme digestions.

202013 遺傳學 **3 必** **胡紹揚、下**

本課程的目的在介紹遺傳的基本原理及其應用。主要內容包含孟德爾遺傳定律、有絲分裂和減數分裂、基因的連鎖和遺傳定位、DNA 的構造及複製、突變的機制及 DNA 修補、基因的表達、和族群遺傳等。

202013 Genetics **3R** **S. Y. Hu, S**

This course is aimed at introducing the basic principles and applications of Genetics. The main content includes Mendelian genetics, mitosis and meiosis, gene linkage and genetic mapping, the structure and replication of DNA, mechanisms of mutation and DNA repair, gene expression, and population genetics.

202014 進階生物技術 **2 必** **輪授、下**

本課程將提供學生生物技術的新近發展，課程中將介紹與討論包括能源、生物

醫學、活性天然物、蛋白質工程、蛋白質體學、代謝體學等研究成果。

202014Advanced Biotechnology 2R Rotation, S

The course offers students current developments in biotechnology. The researches of biofuel, protein engineering, proteomic, biomedicine, molecular diagnosis, bioactive compounds and metabolomic will be introduced and discussed in this course.

202015 分子生物學 3 必 周映孜、上

課程包括有關核酸蛋白質的分子結構說明，核酸及蛋白質的合成及代謝。其中特別強調原核生物之基因調控和分子轉錄特性的說明。真核生物之基因調控與結構和分子轉錄特性的比較。

202015 Molecular Biology 3R Y.T. Jou, F

The course introduces following topics: 1. The basic structure of nucleic acids and proteins at the molecular level. 2. The biosynthesis and metabolism of nucleic acids and proteins at the molecular level. 3. The genetic regulation and molecular transcriptions of prokaryotes. 4. The genetic regulation and molecular transcriptions of eukaryotes.

202016 生物化學(2) 3 必 鄭雪玲、上

本課程主要著眼於病理生化學。藉由生化機制的觀點來探討暗藏於疾病下可能的問題癥節。

202016 Biochemistry (2) 3R S. L. Cheng, F

An up-to-date study of pathobiochemistry. It features mainly on the discussion of abnormal biochemical status that is beneath in human diseases.

202017 專題討論 2 必 各教師、上下

本課程擬經由報告之收集、研讀與彙整，除令學生從而習得相關之專業知識外，亦期能由之獲得資料之分析、歸納與邏輯思考之能力，並藉由書面報告、口頭發表及討論之歷練，以培養學生之論文撰寫能力及口頭表達能力。

202017 Seminar 2R All Teachers, F、S

The purpose of this course is to give students training on searching information, reviewing references, designing experiment, collecting and analyzing data. The subjects cover modern aspects of animal science and farm operation. Students must give oral presentation and dissertation.

202018 生物科技產業分析 1 必 徐睿良、下

本課程主要介紹有關生物科技的產業現況與未來趨勢分析。除了介紹生物科技在各式產業的應用外，也將邀請具產業實務經驗之業界教師分析有關生物技術在產業上的應用實務，並從市場、法規、行銷、生產、品管及專案管理等層面進行產業現況與趨勢之分析，藉此拓展同學職涯規劃的視野。

202018 Biotechnology Industry Analysis 1 R J. L. Hsu, S

The goal of this course is to introduce the application scopes of biotechnology and to analyze the current status and future trends in biotech industries. Biotech industry analysis about the technologies in practice, industry overview and trends, regulation, marketing, manufacture, quality assurance and control, and project management will be also provided by some invited experts from industries.

二、選修科目 Elective Courses

202019 生物繪圖技術 2 選 周映孜&廖培鈞、上

本課程旨在介紹並學習生物繪圖的技術，包括生物外形、特徵或分佈圖或模式圖等的繪圖原理、要點與技法等。學生將可資應用於作業或報告撰寫，甚至未來專長建立或其研究工作。期末並配合學生之成果展，進一步觀摩學習，並比較與欣賞。授課內容分為若干單元，各單元將有實作練習，包括生物繪畫歷史、鉛筆素描、針筆應用、分布圖、模式圖等。

202019 Techniques of Biological Illustration 2S Y.T. Jou & P. C. Liao, F

The main purpose is to introduce biological illustration and give guides how to apply techniques to show biological illustration. It includes the illustrations for external morphology, character, distribution map and model diagram. Students with this skill can apply to write homework and report, even establish an expertise or research works in the future. Via final exhibition of students' works, students can compare and admire biological illustrations. This course divided several units with practical excises, including history of biological illustration, skills for pencil illustration, skills for technical pen, distribution map and model diagram.

202020 微積分 3 選 陳政治、下

本課程從函數之連續與極限性來引導微分和積分的概念，分別討論多項式函數、三角函數、自然對數函數、雙曲線函數、多變數函數之特性與其微分、積分之技巧和應用、並介紹數列、級數、偏微分、多重積分、向量微分及微分方程式。

202020 Calculus 3S C. C. Chen, S

This course introduces the concepts of limits and continuity of functions, and then extends to differentiation and integration, the cores of Calculus. Covered are derivation and integration of various kinds of functions, such as polynomial, trigonometric, natural logarithmic, hyperbolic functions, etc. Applications of the skills in derivation and integration of differential equations will also be included.

202021 植物形態學 2 選 廖培鈞、下

本課程之目的在研習主要植物如苔蘚、真菌、維管束植物等之構造、功能及歧異性，並使學生了解植物性狀及演化之關係。

202021 Plant Morphology 2S P. C. Liao, S

The purpose of this course is to study and learn about the structure, function, and diversity of major groups in plants, including algae, fungi, non-vascular and vascular plants. It will give the students an understanding of characteristics and evolutionary relationships in plants.

202022 植物形態學實驗 1 選 廖培鈞、下

本實習之目的在經由田間指導及實驗室觀察使學生了解植物基本構造，功能及歧異性。

202022 Plant Morphology Exp. 1S P. C. Liao, S

This laboratory is designed to provide a fundamental understanding of the structure, function, and diversity of plants through field guide and laboratory observation.

202023 植物解剖學 2 選 徐志宏、上

本課程主要講授植物體內部之解剖構造與功能。內容包括細胞之詳細介紹、薄壁組織、厚角組織、厚壁組織、維管組織、分泌組織與分生組織之特性、構造及功能，進而探討根、莖、葉、花、果實、種子等器官之解剖特性。

202023 Plant Anatomy **2S** **D. J. H. Shyu, F**

The purpose of this course is to acquaint students with the anatomical structure and function of plants. The main topics included in this course are structure and function of plant cells, parenchyma, collenchyma, sclerenchyma, vascular bundle, secretory parenchyma and meristem. The anatomical characteristics of root, stem, leaf, flower, fruit and seed of higher plants are also discussed.

202024 植物解剖學實驗 **1 選** **徐志宏、上**

本課程主要為配合植物解剖學的實驗課程中實際操作常用之技術，並且觀察及了解植物體內部之解剖構造與功能。內容包括細胞之詳細介紹、薄壁組織、厚角組織、厚壁組織、維管組織、分泌組織與分生組織之特性、構造及功能，進而探討根、莖、葉、花、果實、種子等器官之解剖特性。

202024 Plant Anatomy Exp. **1S** **D. J. H. Shyu, F**

This experiment course is designed to practice commonly used techniques of plant anatomy to acquaint students with the plant anatomical structure and function. The main topics included in this course are structure and function of plant cells, parenchyma, collenchyma, sclerenchyma, vascular bundle, secretory parenchyma and meristem. The anatomical characteristics of root, stem, leaf, flower, fruit and seed of higher plants are also discussed.

202025 脊椎動物學 **3 選** **蔡添順、上**

課程提供一個脊椎動物學的訓練，包括脊椎動物的形態、解剖與功能的比較。課程內容包括生命的週期、表皮系統、骨骼系統、呼吸系統、循環系統、消化系統、泌尿生殖系統及內分泌系統，提供脊椎動物學的知識做為學生日後學習生物多樣性或實驗動物科學的基礎。

202025 Vertebrate Zoology **3S** **T. S. Tsai, F**

Lecture provides the discipline of vertebrate biology, including the vertebrate morphology, comparative anatomy and function. Courses contain the life history, integument, skeletal system, respiratory system, circulatory system, digestive system, urogenital system and endocrine system

202026 脊椎動物學實驗 **1 選** **蔡添順、上**

課程提供學生具有脊椎動物解剖實習，包括魚類、兩棲、爬蟲、鳥類及哺乳類等脊椎動物的形態、解剖與功能的比較。內容包括各種脊椎動物表皮、骨骼、呼吸、循環、消化、泌尿生殖及內分泌系統之觀察與解剖。

202026 Vertebrate Zoology Exp. **1S** **T. S. Tsai, F**

Lecture provides the practice of vertebrate dissection, including the comparative morphology, anatomy and function on fish, amphibian, reptile, bird and mammal. Courses contain the integument, skeletal system, respiratory system, circulatory system, digestive system, urogenital system and endocrine system.

202027 植物分類學 **2 選** **周映孜、上**

研究植物分類發展史、命名、重要種子植物分類群特徵數辨識、樹種的重要分布。

202027 Plant Taxonomy **2S** **Y.T. Jou, F**

This course covers: 1. the aim of taxonomy 2. history summary 3. nomenclature 4. concepts of taxa 5. the construction and use 6. phytophany and the terminology of plant description 7. angiosperms.

202028 植物分類學實驗 **1 選** **周映孜、上**

本實習目標為學生具備樹種鑑定之能力，於實習課程內以實務配合幻燈片，加上野外採集鑑定，訓練學生學以致用而有實際經驗。

202028 Plant Taxonomy Exp. **1S** **Y.T. Jou, F**

The objective of this practice course is to provide the students with the ability to identify the various plants in the field. The contents include as follows: collecting plants in the field, identification and examination of herbarium specimens and slides, using the herbarium and introducing its importance in the study of taxonomy, and surveying the composition of plants in small areas

202029 動物解剖學 **2 選** **許岩得、上**

課程概述：本課程為基本動物解剖學，著重於動物體內各系統的解剖與結構的認識。包括心臟循環系統、呼吸系統、內分泌系統、神經肌肉系統、消化系統、泌尿生殖系統，期使學生能夠將解剖學與生理學知識相結合並運用於生命科學、動物科學及實驗動物科學相關領域，往後修習生物醫學相關課程的基礎。

202029 Animal Anatomy **2S** **Y. D. Hsuuw, F**

Lecture provides the anatomy concepts and understandings that focus on the animal anatomy and the observation of systemic structures. Courses contain the heart and circulation, respiration, endocrine system, nerve-muscular system, digestion, the urinary and reproductive system. Following the lectures, student might apply the knowledge on the life science, animal science or laboratory animal, or as a fundamental for the biomedical course and research.

202030 動物解剖學實驗 **1 選** **許岩得、上**

本課程以哺乳動物實際解剖練習為主，著重於動物體內各系統的解剖與結構的觀察。包括心臟循環系統、呼吸系統、內分泌系統、神經肌肉系統、消化系統、泌尿生殖系統，期使學生能夠將解剖學與生理學知識相結合並運用於生命科學、動物科學及實驗動物科學相關領域，做為往後修習生物醫學相關課程的基礎。

202030 Animal Anatomy Exp. **1S** **Y. D. Hsuuw, F**

Lecture provides the anatomy practice on mammalian animals that focus on the animal dissection and the observation of systemic structures. Courses contain the Skull, axial and appendicular skeletons, the cardiovascular, respiratory, endocrine systems, the digestive, urinary and reproductive systems. Following the lectures, student might apply the knowledge on the life science, animal science or laboratory animal, or as a fundamental for the biomedical courses and studies.

202031 免疫學 **2 選** **張格東、下**

本課程涵蓋人體免疫學中有關及時性與適應性免疫反應，補體系統，B 與 T 淋巴球的發育與活化，以及免疫反應在人體的運作機制，包括過敏反應。

202031 Immunology **2S** **K.T. Chang, S**

An up-to-date study of the human immune system. It features enhanced coverage of aspects of innate and adaptive immunity, complement system, B- and T-cell development, and the nature of the immune response in the human body.

202032 科學方法 **3 選** **徐志宏、下**

科學方法是科學家從蒐集整資料並盡力去建構一個能精確(指的是可信的、前後一致的,且非任意的)表述之結果的整個流程。個人認知與文化信仰都會影響每個人對於自然現象的洞察力與解釋方式。在發展理論或作出結論的時候,如能透過標準的程序與準則,盡量減少這些影響,將會使理論或結論更為精確。科學方法大至有 4 個步驟: 1) 現象的觀察; 2) 構想假設來解釋現象; 3) 用假設來預測其他存在的現象,或預估數量; 4) 執行實驗利用結果來來驗證假設

202032 Scientific Method **3S** **D. J. H. Shyu, S**

The scientific method is the process by which scientists, collectively and over time, endeavor to construct an accurate (that is, reliable, consistent and non-arbitrary) representation of the world. Recognizing that personal and cultural beliefs influence both our perceptions and our interpretations of natural phenomena, we aim through the use of standard procedures and criteria to minimize those influences when developing a theory. The scientific method has four steps: 1) Observation and description of a phenomenon or group of phenomena; 2) Formulation of an hypothesis to explain the phenomena; 3) Use of the hypothesis to predict the existence of other phenomena, or to predict quantitatively the results of new observations; 4) Performance of experimental tests of the predictions by several independent experimenters and properly performed experiments.

202033 生物顯微鏡學 **2 選** **周映孜、下**

顯微鏡學為生物學研究的一重要工具。本課程將供學生對各式的顯微鏡具一基本認識,可裨益於未來之生物學學習與研究工作。本課程旨在介紹應用於生物學研究的各式顯微鏡之原理與應用,包括光學顯微鏡、暗視野、位相差、干擾及螢光顯微鏡,電子顯微鏡,雷射共軛焦顯微鏡等。

202033 Introduction to Biological **2S** **Y.T. Jou, S**
Microscopy

Microscopy is an important tool for biological research works. This course provides basic knowledge of an important array of microscopes for students and it is useful for learning life sciences and other researches in the future. Basic principles and applications of microscopy for life sciences are introduced, such as light microscopy, dark field microscopy, phase contrast microscopy, interference microscopy, fluorescence microscopy, electron microscopy and laser confocal microscopy.

202034 動物分類學 **2 選** **蔡添順、下**

本課程主要涵蓋的課題包括分類學的起源,分類學的潮流,分類定義,物種的觀念,分類學的步驟”採集—鑑定—描述—發表”,參考書目的製作與應用,和動物命名學。

202034 Animal Taxonomy **2S** **T. S. Tsai, S**

An up-to-date study of animal taxonomy. It features mainly on “Rise of Taxonomy”, “Newer Trends in Taxonomy”, “Zoological Classification”, “Concepts of Species”, “Taxonomic Collection-Identification-Description and Publication”, “Reference Works in Taxonomy” and “Zoological

Nomenclature”.

202035 腫瘤生物學 **2 選** **顏嘉宏、下**

課程的設計主要是介紹腫瘤細胞發生的概論，包括基因跟腫瘤關係、腫瘤起源、基因表達與調控、致癌基因與腫瘤抑制基因的表現、訊息傳遞途徑、基因的突變等。

202035 Cancer Biology **2S** **C. H. Yen, S**

The course will introduce the general concepts of oncogenesis, such as the mutation, oncogenes and tumor suppressor genes, cell cycle regulation, apoptosis, and cancer therapy.

202036 病毒學 **2 選** **張格東、上**

本課程將著重在醫用病毒學。課程內容將包括電子顯微鏡的原理及應用，病毒的分類，結構與複製機制，血清學鑑定方法，肝炎病毒，流感病毒 (H1N1) 及 SARS 的認識與探討。

202036 Virology **2S** **K.T. Chang, F**

An up-to-date study of medical virology. It features on the taxonomy, the structure and the replication of virus in general; the principle and application of electron microscope and the serological techniques for differential diagnosis of viruses, by which mainly on the field of hepatitis viruses, influenza viruses (ex. H1N1) and the viruses that causes respiratory distress (ex. SARS).

202037 無脊椎動物學 **2 選** **蔡明利、上**

本課程旨在介紹無脊椎動物之生物多樣性和分類、形態、行為、生態與生理等基本生物學，並強調無脊椎動物與其它動植物之相互關係及其在生態系之角色與功能。

202037 Invertebrate Zoology **2S** **M. L. Tsai, F**

The course includes the biodiversity and classification, morphology, behavior, ecology, and physiology of invertebrates. It emphasizes the relationships between invertebrates and other animals and plants, and their functions and roles in ecosystems.

202038 無脊椎動物學實驗 **1 選** **蔡明利、上**

本實驗係配合無脊椎動物學教學的補充課程。無脊椎動物學是一個高度多樣的領域，無脊椎動物提供了豐富多樣且值得研究的生物。據保守的估計，所有動物中至少有 96% 的種類是屬於無脊椎動物。本實驗讓學生透過在實驗室觀察活體與標本探索無脊椎動物本身，並藉由野外觀察或實驗瞭解這些動物為何能適應其棲地。

202038 Invertebrate Zoology Exp. **1S** **M. L. Tsai, F**

lecture. Invertebrate Zoology is an enormously diverse field, providing a rich array of astonishing organisms worthy of study. About 96% of all animal species lack backbones, but this assessment may be too conservative.

202039 動物組織學 **2 選** **許岩得&張格東、上**

一個互動性的教學，重點著放於人體組織在顯微解剖學和細胞生理學的認識與了解。其中包括皮膚，神經系統、肌肉與骨骼系統、呼吸系統、泌尿系統、消化系

統、內分泌系統及免疫系統。

202039 Animal Histology

2S Y.D. Hsuuw & K.T. Chang, F

An interactive study of Human Histology. It features microscopic anatomy and physiology of the cells in human tissues.

202040 動物行為學

2 選

蔡添順、上

動物行為學是一門探討動物行為的機制和表現的科學。此課程強調行為發生的遠因及近因、功能，以及動物如何利用行為以適應其生態及社會環境。課程主題包括覓食、捕食者－獵物交互作用、棲地選擇和空間使用、溝通、敵對、性擇、交配系統、親代育幼、以及社會行為等。此課程亦將會介紹觀察和量化行為的方法，以利學生獨自完成研究計畫。

202040 Animal Behavior

2S

T. S. Tsai, F

Animal Behavior is the study of mechanism and performance of animal behavior. The course emphasizes the ultimate and proximate factors, and function of behaviors, and how it allows animals to adapt to the demands of their ecological and social environments. Topics will includes the role and mechanism of behaviors in foraging, predator-prey interactions, habitat selection and spacing, communication, aggregation, sexual selection, mating system, and parental care, and group living. The course also introduces methods for the observation and quantification of behavior in order to accomplish an independent study project.

202041 動物生理學

3 選

顏嘉宏、上

課程的設計主要是著重於動物各生理系統結構、特性及其在體內上所扮演的功能。包括化學訊息、賀爾蒙控制、心臟循環系統、呼吸系統、恆定機能、代謝作用系統、神經系統、消化系統、生殖系統、泌尿系統及免役統，以使學生能夠運用於生命科學與動物科學相關領域，作為往後修習生物醫學相關課程的基礎。

202041 Animal Physiology

3S

C. H. Yen, F

Design of lecture is focus on the systemic structures of animal physiology, speciality and their functions in body, which including the chemical signaling, regulation of hormones, heart and circulation, respiration, homeostasis, metabolism, nerve system, digestion, reproduction, urinary system and immunity. Following the lectures, student might apply the knowledge on the life science and animal science, or as a fundamental for the biomedical course and research.

202042 動物生理學實驗

1 選

顏嘉宏、上

本課程為基本生理學實驗，著重於動物體內各系統的生理結構的觀察、功能檢測及其在體內所扮演的角色。包括血液心臟循環系統、神經肌肉系統、消化系統、內分泌恆定機能、泌尿生殖系統，期使學生能夠將生理學實驗與生理學知識相結合並運用於生命科學與動物科學相關領域，作為往後修習生物醫學相關課程的基礎。

202042 Animal Physiology Exp.

1S

C. H. Yen, F

Basic laboratory of physiology is focus on the observation of systemic structures, examination of functions and their role in animal body. All experiments including blood, the heart and circulation, the nerve-muscular system, digestion, the endocrine and homeostasis, and the reproductive and urinary system. Following the laboratory, student might associate the experiments with the knowledge of physiology, and apply on the life science and animal science, or as a fundamental for the biomedical course and research.

202043 植物生理學 **3 選** **徐志宏、上**

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、礦物營養及養分之輸送、光合作用、呼吸作用、氮素代謝作用，脂質及其他二次代謝物之代謝，以及植物生長與分化。

202043 Plant Physiology **3S** **D. J. H. Shyu, F**

The purpose of this course is to acquaint students with knowledge of basic principles and the application of plant physiology in the agricultural system. The contents include: Introduction of concepts of plant physiology, the process of absorption and transpiration in plants photosynthesis and respiration, nitrogen intermediary metabolism, mineral nutrition and its translocation, growth regulators and their applications, and physiology of seed germination.

202044 植物生理學實驗 **1 選** **徐志宏、上**

本實驗課程在使學生能以實驗印證理論，增進學生對理論之瞭解。實驗內容包括擴散作用、滲透作用、原生質分離之觀察、水勢、滲透勢、蒸散作用及根壓之測定，礦物營養診斷、輸導作用、呼吸作用、呼吸酵素之一般檢驗，植物蛋白質之抽取及分析、光補償點之測定及利用薄層色層分析法分離光合色素、葉綠素吸收光譜與定量之測定、植物生長調節劑生理功能之觀察等。

202044 Plant Physiology Exp. **1S** **D. J. H. Shyu, F**

The laboratory work is to acquaint students with both practical operation and theoretical aspects of the lecture subjects. The contents include the observation of diffusion, osmosis and plasmolysis, measurement of water potential and transpiration, plant nutrition and symptoms of mineral deficiency, measurement of root pressure, translocation of organic solutes in phloem, quantity of respiratory enzymes, extraction and quantitative determination of plant protein, separation of photosynthetic pigments by TLC, chlorophyll absorption spectrum and quantitative determination, and physiological functions of growth regulators.

202045 消化道微生物 **3 選** **陳又嘉、上**

本課程內容主要介紹動物消化道生理環境、消化道微生物與宿主和微生物間營養關係，其中，包含瘤胃微生物、腸道益生菌(例如乳酸菌)、白蟻腸道菌等都將在課程中介紹，而這些腸道微生物的應用潛力也將在課堂中進行討論。

202045 Gastrointestinal Microbiology **3S** **Y. C. Chen, F**

The contents of this course focus on the description of digestive trace environment, gastrointestinal microorganisms and the interaction of microorganisms and hosts. In this course, rumen microorganisms, probiotics (eg. lactic acid bacteria) and termite gut microbes will be introduced. The applications of gastrointestinal microorganisms will also be discussed.

202046 外溫四足動物學 **3 選** **蔡添順、上**

脊椎動物可分為具有外溫及內溫生理的二十大類群，亦可分為主要適應水域生活的魚類與陸域生活的四足類。具有外溫生理的四足動物是地球上適應多樣性最高的動物類群之一。這些動物包含在一般所謂的兩生爬行動物類群中，但是不包含廣義爬行動物中的鳥類。本課程講授的內容將包括外溫四足動物的形態、生理、生殖、攝食、行為、生態、生物地理與系統分類及多樣性。課程最後將引導學生閱讀相關文獻以將所得知識融會貫通並予以應用。

202046 Herpetology **3S** **T. S. Tsai, F**
Vertebrates can be classified as ectotherms and endotherms, as well as fish and tetrapods. Ectothermic tetrapods exhibit an amazing diversity of adaptations to varied habitats. The herpetology features morphology, physiology, reproduction, feeding, behavior, ecology, biogeography, classification, and diversity of amphibians and reptiles (not including birds). Students will learn and experience the knowledge in the lecture by paper reading processes.

202047 演化生物學 **3 選** **蔡明利、下**
演化生物學著重在溯祖理論的觀念、演化相關的理論教授和環境之天擇作用的影響。各承中包含了生物適應性、巨演化、共演化、族群遺傳、生物的親緣關係、種化現象與滅絕作用等

202047 Evolutionary Biology **3S** **M. L. Tsai, S**
Evolutionary biology will encompass the coalescence theory, the study of the theories of evolution and natural selection. Course material will include adaptation, macroevolution, coevolution, population genetics, and the phylogeny of life, speciation and extinction.

202048 植物逆境生理學 **2 選** **周映孜、下**
植物逆境生理學在全球暖化與環境的過度開發議題中越顯重要，課程目的在讓學生明白環境因子對植物造成的傷害，與植物適應環境的原理，課程中將會利用教科書、期刊論文等資料說明，包含數種常見的環境逆境，如：(1)植物的耐高溫機制、細胞組織的熱休克；(2) 低溫寒害與凍害；(3)鹽分逆境；(4)乾旱缺水逆境；(5)機械傷害逆境等。

202048 Plant stress Physiology **2S** **Y. T. Jou, S**
Plant stress physiology is a global issues related to the environment. To gain knowledge about environmental stresses on whole plant, several sections will be introduced: (1) heat shock/thermo-tolerance, (2) chilling injury and freezing, (3) salt stress, (4) drought stress, (5) wound stress. The research approaches being used to study environmental stresses by examining recent publications from scientific journals.

202049 酵素學 **3 選** **顏嘉宏、下**
本課程主要分為三大部分：第一部份是敘述有關酵素學的基本概念，如：分類、構造、功能及活性調控，第二部份是強調有關酵素研究之技術，包括酵素活性分析、純化及特性之研究，最後是介紹酵素於各種不同工業之應用。

202049 Enzymology **3S** **C. H. Yen, S**
Three sections are included in this course. The first part is to introduce the basic concepts of enzymology, such as: classification, structure, function and regulation. The second part contains assay of enzyme activity, purification, and characterization. Finally, the application of enzymes in different industries will be introduced.

202050 海洋生物學導論 **3 選** **蔡明利、下**
海洋生物學導論主要介紹生活在海洋的生物及其棲息地特性與海洋生態環境的關係。海洋約佔地球表面積之三分之二。海洋表面通常看似平靜，但卻充滿生命。從海洋表面直至海床底部都能提供各式各樣生物生存環境。課程內容包括海水的成

份與特性(海洋化學)、海洋地質及海洋中包括無脊椎動物、魚類、哺乳類海洋植物以及它們的棲所。瞭解各式各樣的海洋生物如何以不同的策略生存在海洋。

202050 Introduction to Marine Biology 3S M. L. Tsai, S

Marine biology major study the creatures that live in the oceans and their ecological relationships. It also look at the habitats and ecological environments in which these organisms live. Oceans cover two-thirds of the earth's surface. And while their surfaces often look smooth, the oceans are teeming with life. Oceans provide animal habitat all the way down to the ocean floor. Since oceans are, on average, over 2.5 miles deep, this means that they contain 99.5 percent of our planet's livable habitat. Within that vast space, the oceans are filled with a huge range of microscopic organisms, animals, and plant life. In this class we will learn how this life thrives in the oceans. We will study such subjects as the chemical makeup of water, the ocean's geology, marine invertebrates, fish, plants, and biological habitats.

202051 真菌學 2 選 王均琍、下

本課程乃以真菌類緣為主幹，分別描述下列真菌—(1) 黏菌綱 (2) 根瘤菌綱(3) 結合菌綱 (4) 卵菌綱 (5) 子囊菌綱 (6) 擔子菌綱 (7) 不完全菌綱的形態、生理、生殖、遺傳、分類、生態及其在農業、醫學及工業上的應用及影響。

202051 Mycology 2S G. L. Wang, S

The course is to introduce the morphology, physiology, propagation, genetics, ecology, classification and the importance of each group of the fungi, which include : (1) Myxomycetes (2) Plasmodiophoromycetes (3) Zygomycetes (4) Oomycetes (5) Ascomycetes (6) Basidiomycetes and (7) Duteromycetes.

202052 植物生長與發育 2 選 徐志宏、下

本課程主要延續植物生理學之課程，介紹與植物生長及發育相關的機制與原理，以奠立學習植物科學之分子發育基礎。課程內容包括生長與發育基本概念、植物激素如生長素、細胞分裂素、脫落酸、乙烯、油菜固醇對植物生長及發育的影響、環境反應如光型態發生、趨性、週期節律、溫度影響以及次級代謝產物與路徑等。

202052 Plant Growth and Development 2S D. J. H. Shyu, S

This course is not only the advanced course but the molecular development basis of plant physiology. It is designed to introduce the mechanisms and principles of plant growth and development. The content includes the basic concepts of plant growth and development, the effects of plant hormone such as auxin, cytokinin, abscisic acid, brassinosteroids on plant growth and development, environmental responses such as photomorphogenesis, tropisms, circadian rhythms, temperature effects, and secondary metabolism and pathways.

202053 植物細胞與組織培養 2 選 周映孜、下

本課程主要介紹植物細胞與組織培養的常用操作技術及其應用方向，建立無菌培養的觀念及技術，以培育產業發展應用的人才。課程內容包括細胞全能性與型態發生、微體繁殖原理、遺傳與變異、基本植物組織培養技術、常用植物組織及器官培養方法、細胞培養方法、原生質體培養方法、原生質體融合、雜種細胞篩選與鑑定、雜交技術之應用、人工種子原理、技術與應用、超低溫保存原理、方法與檢測以及植物基因轉殖技術與應用等。

202053 Plant Cell and Tissue Culture 2S Y. T. Jou, S

This course is designed to introduce useful techniques and applications of plant cell and tissue culture.

The sterile concepts and industrial application techniques are intended to be established in this course. The content includes totipotency and morphogenesis, the principles of micropropagation, genetics and variations, basic techniques of plant tissue culture, common techniques of plant tissue and organ culture, cell culture, protoplast culture and fusion, hybrid cell selection and identification, applications of hybrid cells, principles, techniques, and applications of artificial seeds, principles and techniques of cryopreservation, and techniques and applications of transgenic plants.

202054 植物細胞與組織培養實驗 **1 選** **周映孜、下**

本課程主要為配合植物細胞與組織培養的實驗課程，實際操作常用之技術，同時建立無菌培養的觀念，以達到培育產業發展應用的人才的目的。課程內容包括無菌技術、培養基配製、癒合組織誘導、繼代培養、莖頂及根端培養、胚珠、胚芽、子房培養、花藥及花粉培養、細胞培養及原生質體培養、體細胞雜合及基因轉殖法等。

202054 Experiment in Plant Cell and Tissue Culture **1S** **Y. T. Jou , S**

This experiment course is designed to practice commonly used techniques and to establish the sterile concepts of plant cell and tissue culture for incubation of talents in this field. The content includes aseptic techniques, medium preparation, callus induction, subculture, stem tip and root tip culture, ovule, embryo, and ovary culture, anther and pollen culture, cell culture, protoplast culture, somatic cell hybrid, and transgenic techniques.

202055 野生動物生態及經營管理 **2 選** **陳添喜、下**

本課程旨在廣泛地介紹野生動物專業、野生動物自然資源，以及野生動物生態、經營管理及保育的原則。學生將學習野生動物的習性及生態理論，以及如何將這些學理應用於野生動物的保育、經營管理和控制上。主題也將涵蓋全世界及台灣的野生動物種類及相關保育議題。學生將學習一般野生動物管理者使用的傳統及現代的工具和技術，並在野外或在實驗室內利用電腦模擬操作。此課程設計乃希望發展學生獨立及批判性思考，以及解決問題的技能，以期提升整合資訊的能力。

202055 Wildlife Ecology and Management **2S** **T. S. Chen , S**

This course provides students with a broad introduction to the wildlife profession, wildlife as a natural resource, and the principles of wildlife ecology, management and conservation. Students will learn basic ecological principles and how those principles are applied in the conservation, management and control of wildlife. Topics will also include wildlife and related conservation issues locally and globally. Students will also learn and use classical and modern tools and techniques used by wildlife managers in the field and on the computer for monitoring. The course is designed to develop independent and critical thinking, and problem solving skills, and to enhance the students' ability to synthesize information from a diversity of sources.

202056 發酵化學 **2 選** **胡紹揚、下**

本課程內容強調醱酵技術的生物程序，以醱酵產品的製程範例來說明微生物於醱酵化學反應中所扮演的功能以及參與的生化反應，藉由簡單的醱酵槽操作機會，培養學生在微生物醱酵的研究興趣。

202056 Fermentation Chemistry **2S** **S. Y. Hu , S**

The course emphasized the biological process of fermentation. Using fermentative products as examples to explain the biochemical reactions and the role of microbes in the fermentation. The importance of this lecture is to inspire interest of fermentation research in students.

202057 族群生態學 **2 選** **廖培鈞、下**

生物族群如何藉由遺傳上的改變演化得能適應環境？族群如何成長？族群生態學在瞭解族群與環境間的交互作用。本課程提供一個族群基礎理論的概念。利用各種不同的數學或經驗模式來描述族群如何被雕塑與透過生態及演化轉變的過程。

202057 Population Ecology **2S** **P. C. Liao, S**

How do plant and animal populations change genetically to evolve and adapt to their local environments? How do populations grow? Population ecology is the study of how populations interact with their environment. This course provides an overview of fundamental population theory and how it has developed. Using a variety of model organisms and empirical approaches, to describe how populations are shaped and transformed by both ecological and evolutionary processes.

202058 族群遺傳學 **3 選** **廖培鈞、下**

使學生了解族群遺傳學之基礎包含哈第溫伯格定律、突變、遷移和基因漂變等。進而讓學生了解由於天則作用造成之生物演化之基礎。計算等位基因的頻度以了解相關的遺傳問題及。並清楚的讓學生了解哈第溫伯格定律及當偏離哈第溫伯格定律後所產生的現象。

202058 Population Genetics **3S** **P. C. Liao, S**

To understand the basic theory of population genetics including Hardy-Weinberg equation, mutation, migration and gene drift. To understand the basic biological evolution by natural selection. To calculate allele frequencies as they relate to inheritance. To understand the Hardy-Weinberg Law and how evolution takes place when this law is not in place.

202059 應用微生物學 **2 選** **陳又嘉、下**

本課程主要介紹食用真菌與其他可應用於農工業的微生物。授課內容主要包括靈芝、巴西蘑菇、香菇、雲芝、蟬花、蟲草、茯苓等菌類，其形態分類、有效成分分析，並介紹其調節身體機能的可能機制；此外，酒類釀造、乳製品發酵、有機酸與甜味劑之生產，其相關微生物與生理特性，及工業中微生物可開發生產的酵素及其作用機制，也將在課程中介紹。

202059 Applied Microbiology **2S** **Y. C. Chen, S**

The course discusses edible fungi and the application of those useful microorganisms in agriculture and industry. The morphology and identification of mushrooms interested are introduced. The possible mechanisms of human physiology regulated by bioactive compounds of fungi are also discussed. Besides, the microorganisms related to organic acids, sweeteners, and enzyme production, brew and milk fermentation are also discussed in this course.

202060 分子病毒學 **3 選** **施玟玲、下**

內容介紹重要觀念之介紹與掌握，非常適合初學者與已修過一般病毒學、但重要觀念掌握不清楚之學生。瞭解如何來研究病毒，包括主要之研究方法與技術，能夠使修課之學生，對於如何開始研究病毒有一完整之概念。使修課之學生能夠掌握

病毒之一般共同特性與瞭解病毒基因表現之多樣性並強調重要病毒(如禽流感病毒)之如何致病與其為何難以預防之理由。

202060 Molecular Virology **3S** **W. L. Shih , S**

The contents of this course including (1) The structure and classification of virus (2) The replication and gene expression of viral genetic materials (3)How interaction and disease progression in virus-infected cells (4) The traditional and new methods in preventing and treating virus infection (5) The analysis and research techniques of virology.

202061 生物晶片 **2 選** **徐睿良、下**

本課程主要介紹生物晶片的原理及其應用範疇，主要目的為讓學生具備生物晶片製備及應用的基本概念，幫助生技領域學生對快速、微量、靈敏、及高通量樣品分析有更深一層的認識。課程內容包括生物晶片的發展、形式、製備、表面化學、偵測方式及在生醫領域之應用。

202061Biochips **2S** **J. L. Hsu , S**

Principles of biochips will be comprehensively introduced in this course. Subjects will be mainly focused on the historical development of biochips, the types of biochips, their fabrications and surface chemistry, detection, and their applications to the field of biotechnology. The goal of this course is to introduce the concepts, the fabrications, and the applications of biochips to students.

202062 奈米生物科技 **2 選** **徐睿良、下**

本課程主要介紹奈米技術在生物科技的應用，內容包括奈米生物科技的簡介、奈米生物模版、奈米生物感測器、奈米醫藥、奈米生化分析載具及奈米生物電子元件等。

202062Nanobiotechnology **2S** **J. L. Hsu , S**

The objective of this course is to introduce the applications of nanotechnology in biotechnology. The contents include the introduction of nanobiotechnology, nano size biotemplating, nanobiosensors, nanopharmaceuticals, nano platforms for biochemical analysis and nanobioelectronics etc.

202063 訊息傳遞 **2 選** **施玟玲、下**

本課程將介紹細胞外之分子與細胞膜上之接受體之交互作用，使細胞膜之接受體活化，將胞外之訊號擴大後傳遞到胞內，以及細胞如何整合外來訊息導致最後的生物反應。

202063Signal Transduction **2S** **W. L. Shih , S**

This course will introduce the interaction of an extracellular ligand with a transmembrane receptor and then activation of receptor. Subsequently, a signal being amplified and transduced across the membrane. And, how cell integrate the extracellular signals result in the final cellular response.

202064 疫苗與診斷試劑之開發 **2 選** **施玟玲、下**

本課程在使學生深入了解疫苗與診斷試劑的開發工作及原理，並且能有效的活用這些知識與技術於各個不同的專業研究與製程。課程內容包括傳統疫苗與診斷試劑及以現代分子生物學與免疫學的理論所研發之疫苗及診斷試劑。

202064 Development of Vaccines and Diagnostic Reagents **2S** **W. L. Shih , S**

This course will be focused on analytical technologies and related instruments commonly used in biological field. The contents include spectroscopic methods and instruments, enzymatic assays, biosensors, various separation methods (either chromatography or electrophoresis) and instruments, sample preparations, and mass spectrometric analysis. The goal of this course is to provide students with clear concept for bioanalytical chemistry and instrumental analysis that allows them having more practical analytical skills in biological research.

202069 疾病模式生物學

2 選

胡紹揚、下

模式生物(model organism)是人類對抗疾病的先驅，欲了解致病的機轉與新開發藥物的功能，則會預先以動物進行疾病生成機制的研究與藥效試驗，本課程教學以斑馬魚為主要實驗動物，讓學生瞭解簡單生物與人類生物學之間具有緊密的相關性，將人類疾病模式建立在實驗動物上，以利從事基礎研究、疾病之診斷技術、治療應用以及療效追蹤，激發學生將模式生物的研究結果作為了解人類細胞生理和病理學的指引。

202069 Disease Model Biology

2S

S. Y. Hu, S

Model organism is extensively studied to explore potential causes and treatments for human diseases. The course use zebrafish as model organism to elucidate the causes of human diseases including cancer diseases, cardiovascular diseases, liver diseases, muscle atrophy and immuno-diseases. The objective of this course is to make students understand the relevance between model organism and human, and culture students to expand the research of model animal.

202070 醫用胚胎學

3 選

張格東、下

本課程的設計主要是幫助學生了解生命的開始，包括一般胚胎學 -- 生殖細胞的形成、受精過程、胚胎著床、胚胎發育、胚幹細胞的分化；與系統胚胎學的器官形成、先天的遺傳缺陷、細胞治療與再生醫學的應用。

202070 Medical Embryology

3 S

K. T. Chang, S

Lecture will help the students to understand the origin of life, including gametogenesis, fertilization, implantation, embryo development, and differentiation of embryonic stem cells in terms of general embryology; as well as systemic embryology on the topic of organogenesis and congenital birth defects.

202071 動物適應與仿生科技

3 選

蔡添順、下

本課程是一門探討動物適應機制與應用的跨領域實驗科學。適應的部份將包括呼吸、循環、能量代謝、排泄、運動、感覺...等層面，及其與環境中物理、化學及生物因子之交互作用。藉由生理、生物化學、生物物理與分子生物的整合探討，以了解動物多樣化的適應機制、功能與演化。其中的知識是仿生學與科技設計的基礎。課堂中將以有趣問題來引起學生注意與動機(例如老鼠可在液體裏呼吸嗎？高海拔飛翔的鳥類如何克服缺氧及失溫？草履蟲為何沒有肌肉？響尾蛇飛彈設計的創意來源？)。

202071 Animal adaptations and bionics

3S

T. S. Tsai, S

This course is a cross-disciplinary science that seeks to describe the mechanisms and applications of animal adaptations. It addresses ecological questions about the controls over the respiration, circulation, metabolism, excretion, movement, sensation, and others, as these processes are affected by interactions between animals with their physical, chemical, and biotic environment. At a level of integration (physiology, biochemistry, biophysics, molecular biology), the diversified adaptations can help us

understand the functional significance of specific animal traits and their evolutionary heritage. Its knowledge is the basis of design and technology of bionics. Students will learn the basics and applications of animal adaptations, giving interesting questions for attention and motivation, such as “May mice breathe in the liquid?”, “How do birds soaring at high altitude overcome hypoxia or hypothermia?”, “Why does the paramecium have no muscles?”, or “What is the sidewinder’s design inspired from?”.

202072 保育生物學 **2 選** **黃美秀、上**

課程中涵蓋下列個主題：1. 生物多樣性：測量方法，管理生物多樣性 2. 滅絕：歷史與近代之族群消失速率與滅絕速率 3. 人類族群成長速率：成長速率與環境承載能力 4. 種化：生物多樣性之成因 5. 遺傳在保育上之功能：自交、異交與常使用之分子工具。

202072 Conservation Biology **2S** **M. S. Huang, F**

We will cover the following major subjects: 1. Biodiversity – methods of measurement, broad patterns, and processes that maintain diversity. 2. Extinction – recent and historical rates and causes of extinction and population decline. 3. Human population growth - the 'arms race' between growth rates and carrying capacity. 4. Speciation – the process generating diversity. 5. Genetic issues in conservation – inbreeding, hybridization, and the use of molecular genetic tools.

202073 實驗動物操作技術 **2 選** **顏嘉宏、上**

課程主要是介紹飼養管理實驗動物，以小白鼠、大白鼠及兔子為主，包括動物配種、懷孕檢查、繁殖、採血、灌食、注射及基礎實驗動物外科技術操作等相關知識。

202073 Manipulation of Laboratory Animals **2S** **C. H. Yen, F**

Lecture provides student to learn the feeding and management on laboratory animal, such as mouse, rat and rabbit. Courses containing the mating of laboratory animal, examination of pregnancy, breeding, blood sampling, injection, and the fundamental operation of animal surgeries.

202074 實驗動物操作技術實習 **1 選** **顏嘉宏、上**

課程主要是讓學生實際操作實驗動物(以小鼠及大鼠為主)的飼養管理及動物配種、懷孕檢查、繁殖、採血、灌食、注射及基礎實驗動物外科技術操作等。此外也會以衛生署公告的健康食品功能性評估辦法為例，教導學生如何誘導小鼠(或大鼠)成為特定的疾病模式以輔助進行相關健康食品的功能性評估。

202074 Laboratory animals manipulation training course **1S** **C. H. Yen, F**

The course will train the students to be an technician doing the laboratory animals (rat and mice) housing & management, breeding, tissue collection, gavage, injection, and general surgical technics. Additionally, the students will create specific disease animal model to evaluate the beneficial effects of interested substance on physiological functions in this course.

202075 內分泌學 **2 選** **許岩得&胡紹揚、上**

本課程主要講授內分泌腺(組織)所分泌的激素種類、調節作用機轉、下視丘和腦下腺間之相互調控，激素的生理機能以及內分泌相關疾病，本課程將有助於學生對激素整體了解，以培養更深入研究內分泌之能力。

202075 Endocrinology **2S** **Y. D. Hsuw & S. Y. Hu, F**

This course is designed for study the classes of hormones, the mechanisms of hormone action, the control of hypothalamic-hypophyseal hormone and the physiological roles of the endocrine glands (tissues) in domestic animal. After complete this course, students can understand the hormone functions and can learn advance topic easily.

202076 基因體學 **2 選** **徐志宏、上**

本課程主要為分子生物學之進階課程，目的在利用分子生物學之技術以達到探究生物體基因體序列及其功能的目的，亦為基因體科學研究之基礎課程。課程內容包括分子生物技術、圖譜分析、定序策略及方法、基因表現分析、序列分析方法、高通量遺傳學、蛋白質體學、結構基因體學、基因體結構、微生物基因體學、比較基因體學、人類基因體、訊息傳遞、醫藥應用、藥物基因體學、疾病診斷、農業應用及道德與規範等。

202076 Genomics **2S** **D. J. H. Shyu, F**

This course is the advanced course of molecular biology. It is designed to introduce the genome sequences and their functions of certain organisms, so it is also the basic course of genomic science research. The content includes techniques of molecular biology, mapping techniques, sequencing strategy and methods, gene expression analysis, sequence analysis methods, high-throughput genetics, proteomics, structural genomics, genome structure, microbial genomics, comparative genomics, human genome, signal transduction, pharmaceutical applications, pharmacogenomics, disease diagnosis, agriculture applications, and ethical issues and regulations.

202077 生物多樣性調查技術 **2 選** **蔡添順、上**

本課程之目標在介紹生物多樣性的物種多樣性調查技術和研究方法，課程內容包括動物相調查、植物取樣與測量、動物捕捉與標記、動物年齡和性別判別、族群調查與分析、動物食性分析等。

202077 Techniques of Biodiversity survey **2S** **T. S. Tsai, F**

The goal of this course is to introduce the techniques of studying species diversity for biodiversity. The course contents include fauna survey, vegetation sampling and measurement, animal trapping and marking, aging and sexing, population study and analysis, and food habit analysis.

202078 生物資訊學導論 **2 選** **徐志宏&陳又嘉、上**

生物資訊學課程將介紹生物資料庫及網站之建立、生物資訊的搜尋與生物資訊的分析。課程內容主要包括生物巨分子，例如蛋白質及核酸。重要議題包括文獻資料庫、序列資料庫、序列分析工具、實驗方法資源、基因拼圖資料庫、資料庫搜尋、核酸比對、微陣列晶片及蛋白質體學之分析等。

202078 Introduction of Bioinformatics **2S** **D.J.H. Shyu & Y.C.Chen, F**

This course will introduce databases, searching and analysis of bioinformation. It focuses and discusses application of computer and internet resources to analyze biological macromolecules, such as protein and DNA. Important topics include literature database, sequence database, sequence analysis tools, protocol resource, genome mapping database, database search, nucleotide alignments, microarray chips, and proteomics.

此課程為引導學生了解在分子層次之基因、蛋白質和基因組的演化領域，重點在於分子演化改變的方向與作用力。課程中使學生了解大量序列資料之目的，僅為了解在分子層次上的遺傳與演化動態現象，進而瞭解基因、基因家族和基因組的分子遺傳與演化之探討方式與方法。

202083 Molecular Evolution **3S** **P. C. Liao, F**

This lecture explores the evolution of genes, proteins, and genomes at the genetic and molecular level. The focus is on the processes that drive molecular evolutionary change. The interpretation of the new wealth of sequences can only be achieved through understanding the dynamics of genetic and evolutionary change at the molecular level. Molecular evolution focuses on understanding how genes and genomes evolve.

202084 分子演化學實習 **1 選** **廖培鈞、上**

本課程配合分子演化學的課程進度，利用分析軟體的介紹與實作，使學生能對分子遺傳資料的處理及分析有更實際的了解及應用。本課程介紹的軟體包括：CLUSTAL, MEGA, DnaSP, Arlequin, PAUP, TOPALi, MrBayes, IBDWS, BEAST, MIGRATE, IM, PAML, DIVERGE, LOSITAN, STRUCTURE, BARRIER 等。

202084Molecular Evolution Practicum 1 S **P. C. Liao, F**

Students will learn and practice software that applied to the analyses of molecular data. Multiple procedures for analyses of molecular evolution will be introduced by the introduction of software programs, including CLUSTAL, MEGA, DnaSP, Arlequin, PAUP, TOPALi, MrBayes, IBDWS, BEAST, MIGRATE, IM, PAML, DIVERGE, LOSITAN, STRUCTURE, BARRIER, SAMOVA, and so on.

202085 化學生態學 **2 選** **廖培鈞、上**

訊息傳導在物種內的溝通或物種與物種間的交互作用扮演著非常重要的角色。受到攻擊或受傷的植物產生的揮發性有機物質是否提供植物本身或不同株植物間(無論是同種或不同種)的訊息傳遞，將會是本課程探討的問題。本課程將介紹生物如何藉由地面上及地表下的化學物質傳遞達到適應環境的機制。我們將從基因到生態系的角度，逐步探討植物與植物間的溝通、植物與昆蟲或植物與植食性動物的拮抗作用，及複雜的植物-害蟲-寄生蜂的三角關係。

202085Chemical Ecology **2S** **P. C. Liao, F**

Signaling transduction is an important role for intraspecific communication and interspecific interaction. Whether the volatile organic compounds (VOCs) produced from attacked or damaged plants can serve in signaling processes within the same individual plant or between intra- or inter-specific plants will be focused on. In this course, adaptation of organisms will be introduced via exploring mechanisms of above- and below-ground chemical communications between organisms. We will focus on topics of plant-plant communication, plant-insect or plant-herbivore antagonism, and tritrophic complexities, from genes to ecosystem.

202086 天然物化學 **3 選** **張誌益、上**

植物製造並蓄積不同的化學物質，譬如生物鹼、類胡蘿蔔與類黃酮，人們已長久使用這些化合物作為醫藥與營養素用途，本課程將經由生合成推導介紹這些植物的二次代謝產物，內容將由 shikimic acid pathway, polyketide pathway 及 mevalonic

acid pathway 等生合成途徑觀察多樣性的天然物。

202086 Natural Product Chemistry 3S C. I. Chang, F

Plants produce and accumulate a wide variety of chemicals, such as alkaloids, carotenoids, and flavonoids. Human beings have benefited from these compounds for many years in both medical and nutritional context. This course will introduce those secondary metabolism of plant through biosynthetic approach. The immense variety of natural products could be surveyed by biosynthetic schemes such as shikimic acid pathway, polyketide pathway and mevalonic acid pathway etc.

202087 蛋白質工程學 3選 鄭雪玲、上

本課程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。

202087 Protein Engineering 3S H. L. Cheng, F

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

202088 有機分析 3選 徐睿良、上

本課程將介紹分析有機分子常用的分離方法、分析技術及分析儀器，包括：各式分離方法與分析技術的原理、分析儀器及圖譜解析。讓同學對於分析有機分子，不管是原理還是實際操作上，有更進一步的瞭解，並使同學在這些分析方法的應用上更有效率。

202088 Organic Analysis 3S J. L. Hsu, F

This course will be focused on the introduction of separation methods, analytical technologies and related instruments commonly used in organic molecule analysis. The contents include principles, instrumentations and data analysis of the separation methods and analytical technologies.

202089 蛋白質體學 2選 徐睿良、上

本課程將對蛋白質體學進行通盤性的介紹，從蛋白質體學的入門介紹、蛋白質體學所需的方法與工具、到蛋白質體學的應用範疇，包括大規模的蛋白質身份鑑定、結構蛋白質體學、蛋白質轉譯後修飾鑑定、蛋白表現量分析及蛋白—蛋白作用網絡分析等。

202089 Proteomics 2S J. L. Hsu, F

In this course, principles of proteomics will be comprehensively introduced from the basic definition, tools for proteomics and their further applications. Subjects will be focused on protein mining, structural proteomics, post-translation modifications, protein expression profiling and protein-protein interaction mapping.

202090 蛋白質體學實習 1選 陳又嘉&徐睿良、上

本課程將介紹蛋白質體學常用的一些實驗方法，從樣品的前處理、蛋白質的分離純化、酵素水解、質譜分析、資料庫輔助的蛋白質鑑定、大規模蛋白表現差異分析至蛋白質轉譯後修飾鑑定等。藉由連貫式實驗的設計，不只使同學熟悉這些基本實驗技術的操作，同時也使同學瞭解蛋白質體研究主要的分析流程及其在生物科技領域的應用。

202090 Proteomics experimental 1S Y. C. Chen & J. L. Hsu, F

202095植物功能性基因體學之應用 2選

徐志宏、上

植物功能基因體學的課程主要是應用植物分子生物學及植物生物技術的方法，系統性的探討參與植物生長、發育、適應環境與代謝過程中所有相關基因群的表現、調控及其功能，藉由包括 mRNA、蛋白質及代謝產物量的偵測、突變篩選及生物資訊資料庫的整合等策略，以了解整個植物轉錄體、蛋白質體及代謝體等隨著基因表現活性而產生的變化，並可對各種植物基因體的序列進行比較及分析，對作物在質及量上的品種改良、中草藥代謝產物、林木生理及環境保護的研究亦深具重要性。

202095Plant Functional Genomics and Applications 2S

D. J. H. Shyu , F

This course is an application of approaches of plant molecular biology and plant biotechnology to systematically investigate the expression, regulation, and function of related gene clusters involved in plant growth, development, environmental adaptation, and metabolism. Strategies used to examine the changes of transcriptome, proteome, and metabolome in response to gene expression patterns include the detection of mRNA, protein and metabolite production, mutant selection, and integration of bioinformatic databases. Analysis of plant comparative genomics also provides important information for researches in plant improvement and breeding, medicinal plant and secondary metabolites, woody plant physiology and environment protection.

202096植物功能性基因體學之應用實驗 1選

徐志宏、上

利用植物功能基因體學課程中所學習到的原理、技術與方法，實際應用於目標植物基因體的研究上；實驗課程內容包括基因庫的構築、功能基因的篩選、生物資訊探勘及基因表現分析等，用以探討參與植物特定生長發育時期的過程中所有相關基因群的表現、調控及其功能。使用的實驗方法包括 RNA 的製備、cDNA 基因庫的構築、蛋白質水解酵素基因的篩選、基因表現差異的分析與基因鑑定等。

202096Experiments in Plant 1S

D. J. H. Shyu , F

Functional Genomics and Applications

This course is designed to utilize the principles, techniques, and approaches learned from lecture for applying on plant genomics studies. The contents include the construction of gene library, the selection of functional genes, the mining of bioinformatics, and the analysis of gene expression. For the investigation of expression, regulation, and function of related gene clusters involved in certain growth and development stages, methods such as RNA preparation, cDNA library construction, proteolytic enzyme genes screening, differential gene expression and analysis, and gene identification will be applied.

202097 入侵生物學

2 選

蔡明利、下

當生物侵入特定生態系時，會干擾此生態功能。也可能引發一連串的幅射演化過程，例如，有些特定陸上動物群即是海洋動物入侵陸地棲地的結果。本課目探討包括：一種成功的入侵物種具有什麼樣的特性？那些物種能成為成功入侵者？什麼樣特性的生態系容易被入侵或不容易被侵入？本課目中會舉出一些實際的案例，如水生物成功侵入陸地環境生理生態上的適應等來探討這些問題。

202097Biological Invasion 2S

M. L. Tsai , S

Biological invasion may have disrupted a certain ecosystem function. However, it may also open

the gate for latter radiative evolution, for example, the successful land colonization of a certain sea animal group. What are the factors that determine whether a species will be an invader or not? What are the site properties that determine whether an ecological system will be relatively prone to, or resistant, invasion? This course is focus on the animals that have been successful invaders with an emphasis on the modeling the invasion process. The latter included the terrestrial invasion of aquatic animals with an ecophysiological approach to the origins of land animals.

202098 自由基生物學

2選

顏嘉宏、下

自由基指的帶有未配對電子的原子、離子或分子，而在使用氧作為代謝的生物體中，都會有自由基的產生。自由基在生物體內的角色很多元化。在植物方面，植物與病原菌的交互作用中，不管是造成植物罹病或引起植物的防禦反應，都有自由基有關。此外植物在逆境中成長或植物的衰老也與植物體內的自由基有關，而且在植物體內有一套抗氧化的系統，可以抵抗自由基所帶來的傷害。在動物方面，巨噬細胞內產生的自由基有助於加強動物體的防禦能力。然而在血管細胞產生的自由基則可以當做血管收縮或血管舒張的訊號傳遞物質。此外，動物體內產生過多的自由基與疾病及老化有很大關聯性，而且動物體內有抗氧化系統可以減弱自由基所帶來的傷害。由於自由基的研究已持續多年，理論基礎已趨穩定，而且已深入一般日常生活中，因此，我們擬開設此課程介紹學生基礎的自由基生物學概念及其應用。

202098 Free Radical Biology

2S

C. H. Yen, S

A free radical is defined as any atom, ion or molecule with unpaired electron, and it is unavoidably produced in an organism that has the ability to utilize oxygen as an energy source. Free radicals play important multiple roles in an organism. In plants, free radicals are involved in growth, disease, immunity, apoptosis or environmental stress. In vertebrates, free radicals act as second messengers mediated inflammation, cardiovascular function, immune responsiveness, aging and so on. However, there is an antioxidant system in an organism to regulate the free radicals-induced effects. Since the study of free radical biology have been explored for a long time and the fundamental knowledge or theory is well established, we will introduce the concepts and application of free radicals in plants and vertebrates to undergraduates (fourth-degree) in Department of Life Sciences.

20299 智慧財產權

2選

徐志宏、下

本課程主要介紹智慧財產權的基本常識、重要性、規定、申請及使用等相關技巧，始能在參與產業發展的過程中尊重及善用智慧財產權。課程內容包括智慧財產權之基本知識及法規、創新與保護的重要性、專利價值與策略、專利查詢、技術調查與管理、專利組織、專利申請、專利審查機制及實施與案例討論等。

20299 Intellectual property

2S

D. J. H. Shyu, S

This course is designed to introduce the basic knowledge and importance of intellectual property. The techniques of using patents and apply for a patent are also intended to be trained in this course to respect and take advantage of intellectual property. The content includes the basis and laws of intellectual property, the importance of innovation and protection, patent value and strategy, patent search, technology investigation and management, patent office and organization, patent application, patent pending and case discussion.

202100 性演化與性擇

3選

蔡明利、下

為何會有性？如果生殖必需有兩個不同性別個體才能完成嗎？有些物種則不

必然。性是由演化來的起源於無性生殖物種。“...當一個特定個體的生殖利益，大於其他相同性別的個體時...”---達爾文。這是性擇---天擇的一個特殊案例。性擇使生物能吸引配偶並能成功的繁殖下一代，性擇也使許多生物會有極端的演出。例如雄孔雀華麗的尾巴、象鼻海豹為固守後宮的領域鬥爭、果蠅的求偶之舞等均是性擇的結果。更極端的如雄紅被蜘蛛把自己當禮物成為雌蜘蛛的食物。本課目探討性的演化及自然界中有趣的性擇現象。

202100 Sexual Selection and Evolution of Sex

3S

M. L. Tsai , S

Why is there sex? We assume that reproduction requires two individuals. But in many organisms that is not true. Life originated without sex so sexual reproduction is something that had to evolve. "...the advantage which certain individuals have over others of the same sex and species solely in respect of reproduction"----- Darwin . Sexual selection is a “special case” of natural selection. Sexual selection acts on an organism's ability to obtain or successfully copulate with a mate. Selection makes many organisms go to extreme lengths for sex: peacocks maintain elaborate tails, elephant seals fight over territories, fruit flies perform dances, and some species deliver persuasive gifts. Going to even more extreme lengths, the male redback spider literally flings itself into the jaws of death in order to mate successfully. In this course we discuss the origin of sex and some interesting examples of sexual selection.

2-11、農學院生物科技系(碩士班) 必選修科目表

生物科技系碩士班 (Graduate Institute of Biotechnology)

(一)教育目標

培育符合區域及國家需求之高階農業生物科技人才，協助建立熱帶農業生物科技產業。

(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	
高等分子生物學 Advances in Molecular Biology	3	3				
生物技術與產業實務 Biotechnology and Bioindustry	3		3			
碩士論文 Thesis	6			3	3	
合 計	16	4	4	4	4	

(三)選修科目

中 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
生物資訊學 Bioinformatics	2	2				
基因調控 Gene Regulation	2	2				
動物細胞培養 Animal Cell Culture	2	2				大碩合班
植物基因轉殖 Genetic Transformation of Plants	2	2				

中 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
高等微生物生理與遺傳學 Advanced in Microbial Physiology and Genetics	3	3				
蛋白質工程學 Protein Engineering	3	3				大碩合班
天然物化學 Natural Product Chemistry	3	3				大碩合班
消化道微生物 Gastrointestinal Microbiology	3	3				大碩合班
有機分析 Organic Analysis	3	3				大碩合班
蛋白質體學 Proteomics	2	2				大碩合班
蛋白質體學實習 Proteomics Experimental Course	1	1				大碩合班
分子演化學 Molecular Evolution	3	3				大碩合班
分子演化學實習 Molecular Evolution Practicum	1	1				大碩合班
親緣地理學 Phylogeography	3	3				大碩合班
化學生態學 Chemical Ecology	2	2				大碩合班
人體生理學特論 Advanced Human Physiology	2	2				
植物功能性基因體學之應用 Plant Functional Genomics and Applications	2	2				大碩合班
植物功能性基因體學之應用實驗 Experiments in Plant Functional Genomics and Applications	1	1				大碩合班
動物幹細胞建立與應用 Application and Establishment of Embryonic Stem Cells	2	2				大碩合班
動物幹細胞建立與應用實習 Application and Establishment of Embryonic Stem Cells Practice	1	1				大碩合班
分子診斷技術學 Molecular-Based Diagnostic Technique	2	2				大碩合班
外溫四足動物學 Herpetology	3	3				大碩合班
生物技術與污染防治 Environmental Biotechnology	2	2				大碩合班
細胞凋亡 Apoptosis	3	3				大碩合班

中 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
訊息傳遞 Signal Transduction	2		2			大碩合班
健康食品功能評估方法導論 Introduction of Assessment of Healthy Food Evaluation	2		2			
植物生物化學 Plant Biochemistry	2		2			
植物分子生物學 Plant Molecular Biology	2		2			
有機光譜學 Organic Spectroscopy	3		3			
高等細胞生物學 Advanced Cell Biology	3		3			
基因重組及表現 Genetic Recombination and Expression System	2		2			大碩合班
天然物化學實驗 Experiments in Natural Product Chemistry	2		2			大碩合班
活性天然物特論 Special Topics in Bioactive Natural Products	3		3			
應用微生物學 Applied Microbiology	2		2			大碩合班
質譜分析 Mass Spectrometry	2		2			
生物晶片 Biochips	2		2			大碩合班
分子病毒學 Molecular Virology	3		3			大碩合班
疫苗與診斷試劑之開發 Development of Vaccines and Diagnostics	2		2			大碩合班
奈米生物科技 Nanobiotechnology	2		2			大碩合班
植物細胞培養 Plant Cell Culture	2		2			
環境基因體學 Environmental Genomics	2		2			
醫用胚胎學 Medical Embryology	3		3			大碩合班
生物顯微操作技術 Biological Microtechnique	2		2			
線性迴歸與模式建立 Linear Regression and Model Building	2		2			

100.04.20 教務會議傳閱附件 2、(提案二) 新增、更名課程規劃
2-11、農學院生物科技系(碩士班) 必選修科目表

中 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
動物基因轉殖 Transgenic Biotechnology	2		2			大碩合班
光合作用特論 Special Topics in Photosynthesis	2		2			
動物適應與仿生科技 Animal Adaptations and Bionics	3		3			大碩合班
疾病模式生物學 Disease Model Biology	2		2			大碩合班
生化分析 Bioanalytical Chemistry	2		2			大碩合班
動物老化生物學 Mechanisms of Animal Senescence	2		2			大碩合班
合 計	111	53	58	0	0	

二、選修科目 Elective Courses

186005 生物資訊學

2 選

陳又嘉、上

本課程討論以電腦及網路資源來分析生物巨分子，例如蛋白質及核酸。重要議題包括文獻資料庫、序列資料庫、序列分析工具、實驗方法資源、基因拼圖資料庫、資料庫搜尋、核酸比對、微陣列晶片及蛋白質體學之分析等。

186005 Bioinformatics

2S

Y. C. Chen, F

The course discusses application of computer and internet resources to analyze biological macromolecules, such as protein and DNA. Important topics include literature database, sequence database, sequence analysis tools, protocol resource, genome mapping database, database search, nucleotide alignments, microarray chips, and proteomics.

186006 基因調控

2 選

施玟玲&鄭雪玲、上

本課程將著重於反式作用因子如何與順式作用的 DNA 序列交互作用，以便調控細胞內之基因表達。

186006 Gene Regulation

2S

W. L. Shih & H. L. Cheng, F

The course will emphasize the interaction of both trans-acting and cis-acting DNA in order to regulate gene expression in cells.

186007 動物細胞培養

2 選

施玟玲、上

本課程的目的是讓學生了解動物細胞培養的原理、操作和應用，內容包括初代細胞培養、繼代細胞培養、細胞株培養，各種細胞株之特性及細胞分析技術。

186007 Animal Cell Culture

2S

W. L. Shih, F

The objective of this course is to introduce the principles, manipulation and practical applications of animal cell culture. Course contents include primary cell culture, passage cell culture, cell line culture, the specific characteristics of cells and the techniques of cell analysis.

186008 植物基因轉殖

2 選

蔡奇助、上

本課程的設計旨在討論植物遺傳工程及應用基因轉殖以瞭解發育調控、環境及生物逆境對轉殖植物生長之影響。內容包括方法學、轉殖植物之應用及文獻閱讀等。

186008 Genetic Transformation of

2S

C. C. Tsai, F

Plants

The course discusses recent progress of plant genetic engineering and application of transgenic plants to developmental control, environmental and biotic stresses on the growth of plants. It will cover methodology, application of transgenic plants and literature review.

186009 高等微生物生理與遺傳學

3 選

陳又嘉、上

課程內容講述微生物營養物質及環境因子對微生物其生理與遺傳之影響、微生物細胞之物質代謝(好氣、嫌氣)、代謝系之連系(分解系、素材合成系、構成的合成系)以、代謝抑制與發酵生產(酒精、有機酸、胺基酸、酵素、核酸關聯物質、生理活性物質)及微生物的遺傳模式與影響因子。

186009 Advances in Microbial Physiology and Genetics

3S

Y. C. Chen, F

The scope of this course is to illustrate the effects of nutrients and environmental factors on microbial

physiology and genetics, including substance metabolism (aerobic and anaerobic) of microbial cells, connection of metabolic systems (catalytic system, stuff biosynthetic system, constitutive biosynthetic system.) In addition, the course also cover metabolic control, ferments production (alcohols, organic acids, amino acids, enzymes, nucleic acid, related compounds and active substances) and the models and factors about microbial genetics.

186010 蛋白質工程學

3 選

鄭雪玲、上

本課程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。

186010 Protein Engineering

3S

H. L. Cheng, F

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

186011 天然物化學

3 選

張誌益、上

植物製造並蓄積不同的化學物質，譬如生物鹼、類胡蘿蔔與類黃酮，人們已長久使用這些化合物作為醫藥與營養素用途，本課程將經由生合成推導介紹這些植物的二次代謝產物，內容將由 shikimic acid pathway, polyketide pathway 及 mevalonic acid pathway 等生合成途徑觀察多樣性的天然物。

186011 Natural Product Chemistry

3S

C. I. Chang, F

Plants produce and accumulate a wide variety of chemicals, such as alkaloids, carotenoids, and flavonoids. Human beings have benefited from these compounds for many years in both medical and nutritional context. This course will introduce those secondary metabolism of plant through biosynthetic approach. The immense variety of natural products could be surveyed by biosynthetic schemes such as shikimic acid pathway, polyketide pathway and mevalonic acid pathway etc.

186012 消化道微生物

3 選

陳又嘉、上

本課程內容主要介紹動物消化道生理環境、消化道微生物與宿主和微生物間營養關係，其中，包含瘤胃微生物、腸道益生菌(例如乳酸菌)、白蟻腸道菌等都將在課程中介紹，而這些腸道微生物的應用潛力也將在課堂中進行討論。

186012 Gastrointestinal Microbiology

3S

Y. C. Chen, F

The contents of this course focus on the description of digestive trace environment, gastrointestinal microorganisms and the interaction of microorganisms and hosts. In this course, rumen microorganisms, probiotics (eg. lactic acid bacteria) and termite gut microbes will be introduced. The applications of gastrointestinal microorganisms will also be discussed.

186013 有機分析

3 選

徐睿良、上

本課程將介紹分析有機分子常用的分離方法、分析技術及分析儀器，包括：各式分離方法與分析技術的原理、分析儀器及圖譜解析。讓同學對於分析有機分子，不管是原理還是實際操作上，有更進一步的瞭解，並使同學在這些分析方法的應用上更有效率。

186013 Organic Analysis

3S

J. L. Hsu, F

This course will be focused on the introduction of separation methods, analytical technologies and related instruments commonly used in organic molecule analysis. The contents include principles, instrumentations and data analysis of the separation methods and analytical technologies.

- 186014 蛋白質體學** **2 選** **徐睿良、上**
本課程將對蛋白質體學進行通盤性的介紹，從蛋白質體學的入門介紹、蛋白質體學所需的方法與工具、到蛋白質體學的應用範疇，包括大規模的蛋白質身份鑑定、結構蛋白質體學、蛋白質轉譯後修飾鑑定、蛋白表現量分析及蛋白—蛋白作用網絡分析等。
- 186014 Proteomics** **2S** **J. L. Hsu , F**
In this course, principles of proteomics will be comprehensively introduced from the basic definition, tools for proteomics and their further applications. Subjects will be focused on protein mining, structural proteomics, post-translation modifications, protein expression profiling and protein-protein interaction mapping.
- 186015 蛋白質體學實習** **1 選** **陳又嘉&徐睿良、上**
本課程將介紹蛋白質體學常用的一些實驗方法，從樣品的前處理、蛋白質的分離純化、酵素水解、質譜分析、資料庫輔助的蛋白質鑑定、大規模蛋白表現差異分析至蛋白質轉譯後修飾鑑定等。藉由連貫式實驗的設計，不只使同學熟悉這些基本實驗技術的操作，同時也使同學瞭解蛋白質體研究主要的分析流程及其在生物科技領域的應用。
- 186015 Proteomics experimental** **1 S** **Y. C. Chen & J. L. Hsu, F**
In this course, the main experimental methods involved in current proteomics including sample preparations, protein separations, enzymatic digestions, mass spectrometric analysis, database-assisted protein identifications, large-scale protein expression profiling and characterization of protein post-translational modifications will be widely introduced. Through the integrated experimental design, students will be not only familiar with experimental techniques but will be clear about the main analytical pipeline for proteome research and its applications in biotechnology.
- 186016 分子演化學** **3 選** **廖培鈞、上**
此特論課程為引導學生了解在分子層次之基因、蛋白質和基因組的遺傳與演化領域，重點在於分子演化改變的方向與作用力。課程中使學生了解大量序列資料之目的，僅為了解在分子層次上的遺傳與演化動態現象，進而瞭解基因、基因家族和基因組的分子遺傳與演化之探討方式與方法。
- 186016 Molecular Evolution** **3S** **P. C. Liao, F**
This special topic explores the evolution of genes, proteins, and genomes at the genetic and molecular level. The focus is on the processes that drive molecular evolutionary change. The interpretation of the new wealth of sequences can only be achieved through understanding the dynamics of genetic and evolutionary change at the molecular level. Molecular genetics and evolution focuses on understanding how genes and genomes evolve.
- 186017 分子演化學實習** **1 選** **廖培鈞、上**
本課程配合分子演化學的課程進度，利用分析軟體的介紹與實作，使學生能對分子遺傳資料的處理及分析有更實際的了解及應用。本課程介紹的軟體包括：CLUSTAL, MEGA, DnaSP, Arlequin, PAUP, TOPALi, MrBayes, IBDWS, BEAST, MIGRATE, IM, PAML, DIVERGE, LOSITAN, STRUCTURE, BARRIER 等。

186017 Molecular Evolution Practicum 1S P. C. Liao , F

Students will learn and practice software that applied to the analyses of molecular data. Multiple procedures for analyses of molecular evolution will be introduced by the introduction of software programs, including CLUSTAL, MEGA, DnaSP, Arlequin, PAUP, TOPALi, MrBayes, IBDWS, BEAST, MIGRATE, IM, PAML, DIVERGE, LOSITAN, STRUCTURE, BARRIER, SAMOVA, and so on.

186018 親緣地理學 3 選 廖培鈞、上

本課程整合生態學、演化學、族群生物學、分子演化學等領域，探討物種在空間及時間上的族群變化、種化等演化過程。這門課程的授課方式將以講授及開放式討論為主，並會介紹一些常用的分析方法及分析軟體，以實際的操作來了解親緣地理學的觀念及應用。

186018 Phylogeography 3S P. C. Liao , F

Phylogeography is a science integrating the ecology, evolution, population genetics, and molecular evolution. We will discuss the evolutionary processes of species in space and time, such as demographic changes and/or speciation in this course. This is an open-discussed course and need to read a lot of papers. Certain analytic approaches and softwares will be introduced in this course.

186019 化學生態學 2 選 廖培鈞、上

本課程介紹植物、昆蟲與微生物之間的化學溝通方式。課程主要著重在植物如何適應環境、植物彼此之間如何溝通、植物如何抵禦外侮等。

186019 Chemical Ecology 2S P. C. Liao , F

Communication (by chemicals) between plants, insects, and microorganisms were introduced in this course. Main topics focus on how plants adapt, how plants communicate to each other, and plant defense mechanisms.

186020 人體生理特論 2 選 顏嘉宏、上

利用授課及書報討論的方式，針對人體生理學中的心血管循環系統、腸胃道消化系統及泌尿系統深入探討。

186020 Advanced human physiology 2S C. H. Yen, F

We will discuss the cardiovascular system, digestive system, urinary system in this course. Students taken this course will also do the presentation about these systems.

186021 植物功能性基因體學之應用 2選 徐志宏、上

植物功能基因體學的課程主要是應用植物分子生物學及植物生物技術的方法，系統性的探討參與植物生長、發育、適應環境與代謝過程中所有相關基因群的表現、調控及其功能，藉由包括 mRNA、蛋白質及代謝產物量的偵測、突變篩選及生物資訊資料庫的整合等策略，以了解整個植物轉錄體、蛋白質體及代謝體等隨著基因表現活性而產生的變化，並可對各種植物基因體的序列進行比較及分析，對作物在質及量上的品種改良、中草藥代謝產物、林木生理及環境保護的研究亦深具重要性。

186021 Plant Functional Genomics and Applications 2 S D. J. H. Shyu , F

This course is an application of approaches of plant molecular biology and plant biotechnology to systematically investigate the expression, regulation, and function of related gene clusters involved in

plant growth, development, environmental adaptation, and metabolism. Strategies used to examine the changes of transcriptome, proteome, and metabolome in response to gene expression patterns include the detection of mRNA, protein and metabolite production, mutant selection, and integration of bioinformatic databases. Analysis of plant comparative genomics also provides important information for researches in plant improvement and breeding, medicinal plant and secondary metabolites, woody plant physiology and environment protection.

186022 植物功能性基因體學之應用實驗 1選 徐志宏、上

利用植物功能基因體學課程中所學習到的原理、技術與方法，實際應用於目標植物基因體的研究上；實驗課程內容包括基因庫的構築、功能基因的篩選、生物資訊探勘及基因表現分析等，用以探討參與植物特定生長發育時期的過程中所有相關基因群的表現、調控及其功能。使用的實驗方法包括 RNA 的製備、cDNA 基因庫的構築、蛋白質水解酵素基因的篩選、基因表現差異的分析與基因鑑定等。

**186022 Experiments in Plant 1S D. J. H. Shyu, F
Functional Genomics and Applications**

This course is designed to utilize the principles, techniques, and approaches learned from lecture for applying on plant genomics studies. The contents include the construction of gene library, the selection of functional genes, the mining of bioinformatics, and the analysis of gene expression. For the investigation of expression, regulation, and function of related gene clusters involved in certain growth and development stages, methods such as RNA preparation, cDNA library construction, proteolytic enzyme genes screening, differential gene expression and analysis, and gene identification will be applied.

186023 動物幹細胞建立與應用 2選 許岩得、上

於「動物胚胎幹細胞建立與應用」課程中教授與胚胎幹細胞建立與應用之學理與目前在生物科技、藥物及再生醫學之應用，包括介紹胚胎學、胚胎幹細胞之建立與最新胚胎幹細胞相關科技應用等內容。

**186023 Application and establishment of 2S Y. D. Hsuuw, F
embryonic stem cells**

The course will present the establishment of embryonic stem cells from preimplantation embryos, and its new insights of applications in biotechnology, pharmaceuticals and regenerative medicine. Lectures include the embryology, embryo culture, establishment of embryonic stem cells, and the current cell biology and biotechnology in embryonic cell differentiations.

186024 動物幹細胞建立與應用實習 1選 許岩得、上

而在「動物胚胎幹細胞建立與應用實習」課程中，以實際操作方式讓學生學習實驗動物飼養、超級排卵、麻醉藥之配製及注射、體外取胚技術、體外胚胎培養、胚胎內細胞發育能力檢測及胚胎幹細胞之分離與培養觀察等各項技術。

**186024 Application and establishment of 1S Y. D. Hsuuw, F
embryonic stem cells practice**

The practice course will present the fundamental of animal breeding, manipulation of superovulation, Recovery of preimplantation embryos from pregnancy, embryo culture in vitro, morphological observation on embryo development, isolation of the inner cell mass from blastocysts, establishment of embryonic stem cells, embryonic stem cell culture and stem cell differentiation.

- 186025 動物老化生物學** 2選 鄭雪玲、上
本課程旨在介紹並討論動物老化的定義、特徵、研究方法與分子機制，以及延緩老化或健康老化的可能方法與機制。由個體，器官與組織，到細胞的老化皆涵蓋在本課程中。
- 186025 The biology of animal aging** 2S H. L. Cheng, F
The content of this class is to introduce and discuss the definition, characteristics, research methods and molecular mechanisms of animal aging, as well as the potential methods and mechanisms of anti-aging or healthy aging. It covers the investigation of senescence at the levels of organisms, tissues/organs, and the cell.
- 186026 分子診斷技術學** 2選 施玫玲、上
本課程將介紹分子生物技術檢測及鑑別微生物、遺傳疾病及複雜疾病。
- 186026 Molecular-based Diagnostic Technique** 2S W. L. Shih, F
The course introduces the applications of molecular-based techniques to detect and differentiate microbial, as well as the diagnosis of genetic and complex disease.
- 186027 外溫四足動物學** 3選 蔡添順、上
脊椎動物可分為具有外溫及內溫生理的二大類群，亦可分為主要適應水域生活的魚類與陸域生活的四足類。具有外溫生理的四足動物是地球上適應多樣性最高的動物類群之一。這些動物包含在一般所謂的兩生爬行動物類群中，但是不包含廣義爬行動物中的鳥類。本課程講授的內容將包括外溫四足動物的形態、生理、生殖、攝食、行為、生態、生物地理與系統分類及多樣性。課程最後將引導學生閱讀相關文獻以將所得知識融會貫通並予以應用。
- 186027 Herpetology** 3S T. S. Tsai, F
Vertebrates can be classified as ectotherms and endotherms, as well as fish and tetrapods. Ectothermic tetrapods exhibit an amazing diversity of adaptations to varied habitats. The herpetology features morphology, physiology, reproduction, feeding, behavior, ecology, biogeography, classification, and diversity of amphibians and reptiles (not including birds). Students will learn and experience the knowledge in the lecture by paper reading processes.
- 186028 生物技術與污染防治** 2選 徐睿良、上
本課程主要介紹生物技術在環境污染防治之應用。內容包括微生物簡介、環境監控、污水處理、乾淨科技之應用、生物復育、替代能源及農業生物科技等。
- 186028 Environmental biotechnology** 2S J. L. Hsu, F
The objective of this course is to introduce the applications of biotechnology in environmental protection and remediation. The course includes the basics of microbiology, environmental monitoring, sewage treatment, clean technology, bioremediation, energy and biofuel and agrobiotechnology.
- 186029 細胞凋亡** 3選 施玫玲、上
介紹細胞凋亡機制與生物體的關係並加強學生與最新發表論文的認識與剖析，講解疾病的發生與細胞凋亡訊息傳遞路徑的相關性，以及當今利用調控凋亡訊息傳遞路徑於疾病治療之策略。並講解各種細胞凋亡的分析方法與原理，包括流式細胞分析的

原理及應用。利用對於細胞凋亡機制的探討，幫助學生融合現階段已知的分子生物學生或細胞生物學技術及觀念，並培養其在生命科學基礎方面的思考能力。

186029 Apoptosis **3S** **W. L. Shih , F**

The course will introduce the molecular mechanisms of apoptosis, the apoptosis related disease and how to cure this disease base upon the control of apoptosis, the principle and rationale of apoptosis analysis techniques

186030 訊息傳遞 **2選** **施玫玲、下**

本課程將介紹細胞外之分子與細胞膜上之接受體之交互作用，使細胞膜之接受體活化，將胞外之訊號擴大後傳遞到胞內，以及細胞如何整合外來訊息導致最後的生物反應。

186030 Signal Transduction **2S** **W. L. Shih , S**

This course will introduce the interaction of an extracellular ligand with a transmembrane receptor and then activation of receptor. Subsequently, a signal being amplified and transduced across the membrane. And, how cell integrate the extracellular signals result in the final cellular response.

186031 植物生物化學 **2選** **江友中、下**

本課程的目的在使學生對植物特有的生化反應有基本的了解。個別的主題包括光合作用、呼吸作用、氮同化作用、脂質代謝、細胞壁形成、植物荷爾蒙和次及代謝物的生合成。

186031 Plant Biochemistry **2S** **Y. C. Chiang , S**

The purpose of this course is to provide students with a fundamental understanding of biochemistry unique to plants. Individual topics include photosynthesis, respiration, nitrogen assimilation, lipid metabolism, cell wall formation, and biosynthesis of plant hormones and secondary metabolites.

186032 植物分子生物學 **2選** **蔡奇助、下**

本進階課程討論植物基因構造與功能、基因組構造、生長及發育過程中之訊號傳導、基因發現、基因體學、及蛋白質體學等。

186032 Plant Molecular Biology **2S** **C.C. Tsai , S**

This is an advanced course discussing plant gene structure and function, genome organization, signal transduction during growth and development, gene discovery, genomics and proteomics.

186033 有機光譜學 **3選** **張誌益、下**

本課程的目的在介紹決定有機化合物結構的方法，使學生具備決定結構研究所需工具，課程中我們將探討核磁共振光譜、質譜、紅外線光譜與紫外/可見光光譜等技術。

186033 Organic Spectroscopy **3S** **C. I. Chang , S**

This course is designed to provide an introduction to the structural elucidation of organic compounds. In the class we will discuss nuclear magnetic resonance spectroscopy (NMR), mass spectroscopy (MS), infrared spectroscopy (IR) and ultraviolet/visible spectroscopy (UV-vis).

186034 高等細胞生物學 **3選** **鄭雪玲、下**

本課程主要探討目前細胞生物學領域中幾個主要研究課題，包括細胞凋亡、蛋白

激酶及其訊息傳遞路徑、癌症分子細胞學、幹細胞研究等，並配合相關期刊論文之研讀。

186034 Advanced Cell Biology **3S** **H. L. Cheng, S**

The course will discuss several topics in the field of cell biology, including apoptosis, protein kinases and the related signaling pathways, molecular and cellular biology of cancers, stem cells, etc. Related scientific papers will be discussed in the class.

186035 基因重組及表現 **2選** **陳又嘉&鄭雪玲、下**

本課程將著重於 DNA 重組技術的介紹並介紹常用之原核基因及真核基因表達系統。

186035 Genetic recombination and Expression System **2S** **Y. C. Chen & H. L. Cheng, S**

This course emphasize the technologies of recombinant DNA, and introduce the prokaryotic and eukaryotic expression systems.

186036 天然物化學實驗 **2選** **張誌益、下**

本課程之目的將訓練研究生熟悉天然物分離、純化與結構鑑定相關之實驗設計、操作方法與技術，內容將包含樣品之前處理、萃取、濃縮、分配萃取、管柱層析、再結晶、高效能液相層析、核磁共振光譜、質譜、紅外線光譜與紫外/可見光光譜等主題。

186036 Experiments in Natural Product Chemistry **2S** **C. I. Chang, S**

The purpose of this course is designed to train graduate students to understand the experimental designs, general methodologies and techniques in related to the isolation, purification and structure elucidation of natural products. Subjects included preparation of materials, extraction, concentration, partition, column chromatography, recrystallization, high performance liquid chromatography, nuclear magnetic resonance spectrometer (NMR), infrared spectrometer (IR), and ultraviolet/visible spectrophotometer (UV-vis).

186037 活性天然物特論 **3選** **張誌益、下**

本課程將介紹生物鹼、類黃酮、萜類等重要活性天然物之生合成、純化技術、構造決定與生物活性資訊，內容亦配合期刊論文等資料，對這些天然資源在保健食品與新藥開發之應用進行討論。

186037 Special Topics in Bioactive Natural Products **3S** **C. I. Chang, S**

The course will introduce the biosynthesis, purification, structural determination and biological activities of some important bioactive natural products, including alkaloids, flavonoids and terpenoids. The topics also discuss the applications of healthy food in human diet and new drugs derived from natural resource using recent scientific literature.(journals, reviews, books, etc)

186038 應用微生物學 **2選** **陳又嘉、下**

本課程主要介紹食用真菌與其他可應用於農工業的微生物。授課內容主要包括靈芝、巴西蘑菇、香菇、雲芝、蟬花、蟲草、茯苓等菌類，其形態分類、有效成分分析，

186042 疫苗與診斷試劑之開發 **2選** **施玫玲、下**
本課程在使學生深入了解疫苗與診斷試劑的開發工作及原理，並且能有效的活用這些知識與技術於各個不同的專業研究與製程。課程內容包括傳統疫苗與診斷試劑及以現代分子生物學與免疫學的理论所研發之疫苗及診斷試劑。

186042 Development of Vaccines and Diagnostics **2S** **W. L. Shih, S**

The objective of this course is to understand the developing and principle of vaccines and diagnostic reagents, and how they can be utilized in different subjects of research and manufacture. The course includes the traditional vaccines and diagnostic reagents and the modern vaccines and diagnostic reagents which base on the knowledge of molecular biology and immunology.

186043 奈米生物科技 **2選** **徐睿良、下**

本課程主要介紹奈米技術在生物科技的應用，內容包括奈米生物科技的簡介、奈米生物模版、奈米生物感測器、奈米醫藥、奈米生化分析載具及奈米生物電子元件等。

186043 Nanobiotechnology **2S** **J. L. Hsu, S**

The objective of this course is to introduce the applications of nanotechnology in biotechnology. The contents include the introduction of nanobiotechnology, nano size biotemplating, nanobiosensors, nanopharmaceuticals, nano platforms for biochemical analysis and nanobioelectronics etc.

186044 健康食品功能評估方法導論 **2選** **顏嘉宏、下**

本課程依據行政院衛生署食品藥物管理局食品衛生組公告的「健康食品安全及功效評估辦法」，為學生說明健康食品功效評估辦法中的相關動物實驗應如何進行及所應注意的事項。同時也會在課程中讓同學進行「案例報告(Case report)」，針對某些通過衛生署認證的健康食品進行專案報告。

186044 Introduction of assessment of healthy food evaluation **2 S** **C. H. Yen, S**

We will discuss the animal studies mentioned in the assessment of healthy food evaluation in this course. Additionally, students will present the specific product certificated by the Government to know the process of application.

186045 植物細胞培養 **2選** **徐志宏、下**

本課程為提供學生有關植物微體繁殖及植物生物技術的新知與最新進展，內容將包括一些重要主題，如營養生理、分化的分子基礎、基因轉殖、二次代謝產物生產、影響培植體生長與發育之因子等。

186045 Plant Cell Culture **2S** **D. J. H. Shyu, S**

The course is designed to offer students with modern trends of plant cell and tissue culture knowledge related to micropropagation and plant biotechnology. Specific topics will be covered, such as nutritional physiology, molecular basis of differentiation, genetic transformation, secondary metabolite production, factors affecting growth and differentiation of plants and cells.

186046 環境基因體學 **2選** **徐志宏、下**

本課程主要探討生物體因應不同環境變化在基因表現層次上所造成的反應，利用基因體技術的分析了解特定環境或環境因子對基因表現程度的影響，進而瞭

解在特定環境中基因體多樣性及多形性存在的意義，並對決定人類健康、環境與生態系統以及自然族群的影響因子及其永續發展建立系統性的觀念及輪廓。

186046 Environmental Genomics 2S D. J. H. Shyu, S

The course of environmental genomics aims to explore the responses of gene expression of organisms to the changes in various environments. The uses of genome technology will facilitate the understanding of effects of certain environment or environmental factors on gene expression as well as the meanings of presence of genome diversity and polymorphisms within a particular environment. The systematic conceptual framework and sustainable development of determining factors for the human health, environment and ecosystems, and natural populations will be discussed.

186047 醫用胚胎學 3選 張格東、下

課程的設計主要是幫助學生了解生命的開始，包括一般胚胎學 -- 生殖細胞的形成、受精過程、胚胎著床、胚胎發育、胚幹細胞的分化；與系統胚胎學的器官形成、先天的遺傳缺陷。胚胎形成的機制包含、細胞生長、細胞凋亡、細胞分化、細胞治療與再生醫學的應用。

186047 Medical Embryology 3S K.T. Chang, S

Lecture will help the students to understand the origin of life, including gametogenesis, fertilization, implantation, embryo development, and differentiation of embryonic stem cells in terms of general embryology; as well as systemic embryology on the topic of organogenesis and congenital birth defects.

186048 生物顯微操作技術 2選 許岩得、下

本課程旨在介紹並教導研究組織結構之多項生物顯微技術，為一理論和實際操作的課程。學生可瞭解各項技術的基本原理與方法、流程，並由實際實驗學習該項技術。本課程擬介紹的技術有徒手切片法、埋膠切片法、透明法、包埋法、解離法等。學生於學期末需繳交生物製片或圖片檔與報告。

186048 Biological microtechnique 2 S Y.D. Hsuuw, S

This course introduces microtechniques for anatomical and structural study, combined with basic principles and practical experiments. Students can learn basic principle, method and procedure, practical operation and experiments as well. Several techniques are introduced, free hand section, resin section, clearing method, whole mount and maceration. Term report for sections or micro-images is asked.

186049 線性迴歸與模式建立 2 選 蔡明利、下

迴歸分析是最廣泛使用的統計工具之一。迴歸分析是藉由分析變數間的關係，利用一個或多個變數來預測另一變數。本課程旨在讓學生瞭解分析方法並學習如何用來分析資料，以從既有資料中獲得更多資訊。

186049 Linear regression and model building 2 S M. L. Tsai, S

Regression analysis is one of the most widely used of all statistical tools that utilizes the relation between two or more quantitative variables so that one variable can be predicted from the other, or others. To get more information from a given data, this class attempts to reinforce the students' understanding of the methodology and use the concepts learned to analyze data.

186050 動物基因轉殖 2選 胡紹揚、下

水生動物為人類重要蛋白質來源之一，也是研究人類疾病的新興實驗動物之一。本課程內容以魚類為主體，介紹目前基因轉殖的技術與應用範疇，培養學生對水生動物應用發展的興趣。

186050 Transgenic Biotechnology

2S

S. Y. Hu , S

Marine animals are important protein sources for human, and also an emerging animal model for studying human diseases. The objective of this course is to make students understand applied aspect of transgenic biotechnology in marine animals and culture students to expand the development of marine biotechnology.

186051 光合作用特論

2選

周映孜、下

從生物物理學、生物化學、分子生物學、生態生理學等不同觀點討論光合作用。光合作用是植物學最廣泛被討論的題目，無論是作物生長、產量提升、環境適應、基因表現、蛋白結構等，關於光合作用的研究遍及植物生態生理到分子生化，原核到真核，本課程將透過光合作用色素系統說明植物如何去除光合作用中的過氧化自由基、光的捕獲將如何將光能轉變成化學能，利用生化代謝路徑說明二氧化碳轉變成糖類的步驟、光合作用酵素或相關蛋白的結構、植物如何改變型態結構生理特性以利光合作用進行適應環境。

186051 Special Topics in Photosynthesis

2S

Y.T. Jou, S

Learning Photosynthesis from biological physics, biochemistry,

Molecular biology and physiology plant ecology. Living organisms interact with the others and environment, photosynthesis is about the biochemistry and metabolism. Sunlight provides the energy that operates the light and carbon reactions. Lots of photosynthesis studies were used molecular evidence and ecology physiology, such as pigment systems to understand the functions of superoxide, molecular and biochemistry studies the structure of the photosynthetic apparatus.

186052 動物適應與仿生科技

3選

蔡添順、下

本課程是一門探討動物適應機制與應用的跨領域實驗科學。適應的部份將包括呼吸、循環、能量代謝、排泄、運動、感覺...等層面，及其與環境中物理、化學及生物因子之交互作用。藉由生理、生物化學、生物物理與分子生物的整合探討，以了解動物多樣化的適應機制、功能與演化。其中的知識是仿生學與科技設計的基礎。課堂中將以有趣問題來引起學生注意與動機(例如老鼠可在液體裏呼吸嗎?高海拔飛翔的鳥類如何克服缺氧及失溫?草履蟲為何沒有肌肉?響尾蛇飛彈設計的創意來源?)。

186052 Animal adaptations and bionics

3 S

T. S. Tsai , S

This course is a cross-disciplinary science that seeks to describe the mechanisms and applications of animal adaptations. It addresses ecological questions about the controls over the respiration, circulation, metabolism, excretion, movement, sensation, and others, as these processes are affected by interactions between animals with their physical, chemical, and biotic environment. At a level of integration (physiology, biochemistry, biophysics, molecular biology), the diversified adaptations can help us understand the functional significance of specific animal traits and their evolutionary heritage. Its knowledge is the basis of design and technology of bionics. Students will learn the basics and applications of animal adaptations, giving interesting questions for attention and motivation, such as "May mice breathe in the liquid?", "How do birds soaring at high altitude overcome hypoxia or hypothermia?", "Why does the paramecium have no muscles?", or "What is the sidewinder's design inspired from?".

186053 疾病模式生物學

2選

胡紹揚、下

模式生物(model organism)是人類對抗疾病的先驅，欲了解致病的機轉與新開發藥物的功能，則會預先以動物進行疾病生成機制的研究與藥效試驗，本課程教學以斑馬魚為主要實驗動物，讓學生瞭解簡單生物與人類生物學之間具有緊密的相關性，將人類疾病模式建立在實驗動物上，以利從事基礎研究、疾病之診斷技術、治療應用以及療效追蹤，激發學生將模式生物的研究結果作為了解人類細胞生理和病理學的指引。

186053 Disease Model Biology

2S

S. Y. Hu , S

Model organism is extensively studied to explore potential causes and treatments for human diseases. The course use zebrafish as model organism to elucidate the causes of human diseases including cancer diseases, cardiovascular diseases, liver diseases, muscle atrophy and immuno-diseases. The objective of this course is to make students understand the relevance between model organism and human, and culture students to expand the research of model animal.

186054 生化分析

2選

徐睿良、下

本課程廣泛介紹生技領域常用的生化分析技術，包括：各式光譜分析及儀器介紹、生化反應分析方法、生物感測器、及各式分離方法及儀器等定性及定量分析技術與儀器。讓同學對一些生化分析技術及儀器，不管是原理還是實際操作上，有更進一步的瞭解，並使同學在這些分析方法的應用上更有效率。

186054 Bioanalytical Chemistry

2S

J. L. Hsu , S

This course will be focused on analytical technologies and related instruments commonly used in biological field. The contents include spectroscopic methods and instruments, enzymatic assays, biosensors, various separation methods (either chromatography or electrophoresis) and instruments, sample preparations, and mass spectrometric analysis. The goal of this course is to provide students with clear concept for bioanalytical chemistry and instrumental analysis that allows them having more practical analytical skills in biological research.

2-13、人文學院應用外語系(碩士班) 必選修科目表

應用外語系碩士班

(一) 教育目標

旨在培養傑出的英語教學菁英及高級農業科技和商務英語人才之培育。

(二) 專業必修科目

中 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
研究方法 Research Methods	3	3				
英文論文寫作 English Thesis Writing	3	3				
碩士論文 Thesis	6		2	2	2	
專題討論 Discussion of Special Topics	2		1	1		授課時數 2 小時
合 計	14	6	3	3	2	

(三)專業選修科目

中 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
英語教學理論與實務 Theories and Practice of English Teaching	3	3				
第二外語語言習得 Second Language Acquisition	3	3				
教育統計 Statistics in Education	3	3				
課程設計 Curriculum Design	3	3				
高級商用英文與實務 Advanced Business English and Practice	3	3				
科學期刊選讀 Scientific Reading	3	3				
教育心理學 Educational psychology	3	3				
商務理論與實務 Commerce Theory and Practice	3	3				
聲韻學 Phonology	3	3				
社會語言學 Sociolinguistics	3	3				
教材教法專題 Seminar on Materials Design and Teaching Practice	3		3			
多媒體英語教學研究 Research on Multimedia-Assisted English Teaching	3		3			
質性研究 Qualitative Research Method	3		3			
高級筆譯 Advanced Translation	3		3			
高級口譯 Advanced Interpretation	3		3			
人力資源管理 Human Resource Management	3		3			
農業科技英文 Agricultural Science and Technology English	3		3			
構詞學 Morphology	3		3			
心理語言學 Psycholinguistics	3		3			
語言學習診斷與補救 Language Diagnosis and Remedial Instruction	3		3			

中 英 文 科 目 名 稱	學 分 數	第一學年		第二學年		備 註
		上	下	上	下	
高級談判英文 Advanced English Negotiation	3			3		
隨行翻譯 Escort Interpretation	3			3		
農企業策略管理專題 Seminar on Agribusiness Strategies and Management	3			3		
語用學 Pragmatics	3			3		
英語測驗與評量專題 Seminar on English Language Testing and Assessment	3			3		
英語教育訓練與需求評估 English Educational Training and Needs Evaluation	3			3		
合 計	78	30	30	18	0	

應用外語系碩士班(Department of Modern Languages)

一、必修科目 Required Courses

606001 研究方法 **3 必**

本課程教學目標為(1)使學生能夠熟悉研究方法的格式和架構；(2)使學生熟悉和運用研究設計；(3)使學生能夠分析、撰寫和呈現資料；(4)使學生能夠對研究結果進行整理、歸納和推論；和(5)撰寫中英文研究摘要。

606001 Research Methods **3 R**

The purposes of this course aim to teach students (1) to be familiar with the format and structure of research method, (2) to understand and be able to conduct a research design, (3) to be able to analyze, interpret, and present the outcome of data, (4) to be able to conclude and generalize data, and (5) to be able to write the research abstract in Chinese and English and complete a research.

606002 英文論文寫作 **3 必**

本課程教學目標為(1)使學生能夠熟悉英文論文的寫作格式；(2)使學生熟悉各學門之英文論文寫作文體和風格；(3)使學生能夠用英文來分析和撰寫統計資料和質性資料；(4)使學生熟悉並會撰寫中英文論文摘要。學生在課程結束時將能夠用英文撰寫學術論文。

606002 English Thesis Writing **3 R**

The purpose of this course aims to teach students how to write academic thesis writing in English. Students will be able to write thesis in English through a series of course activities, including introduction to format and styles of different academic areas, analysis, interpretation, and presentation of qualitative and quantitative data, and abstract writing in English.

606003 碩士論文 **6 必**

本科目之教學目標是要讓學生選擇專業相關領域他們認為最有興趣或最有價值的主題做完整的研究，最後寫出他們的碩士論文。本課程的內容及技巧包括英文寫作技巧、寫作格式介紹(APA 及 MLA 格式)和研究方法(含統計軟體的使用)。第一學年第二學期的碩士論文課重點在熟悉專業相關領域的問題與議題並選擇研究主題；第二學年第一學期的碩士論文課重點在英文研究論文寫作技巧與研究方法的傳授；第二學年第二學期的碩士論文課重點在實際寫作並完成英文碩士論文。

606003 Thesis **6 R**

The objective of the course aims at enabling students to choose a topic, which they are most interested in or they value it most, to do a thorough research related the departmental specialized fields and eventually to write the thesis. The contents and skills of this course consist of English writing skills, style introduction (APA and MLA), and research methods including the use of statistic software. The emphasis of the thesis class in the second semester of the first academic year is on being familiar with issues and problems related to the professional areas and choosing a topic to do the research; the focus of the thesis class in the first semester of the second academic year is on delivering the English thesis writing skills and research methods; the highlight of the thesis class in the second semester of the second academic year is on actually writing and finishing an English thesis.

606004 專題討論

1 必

本科目之教學目標是要使學生能夠研讀、研究、討論、最終寫作商業、農業或英語教學相關話題，達到熟悉這些專業主題為目的。學生必須擇一主題研讀或研究它，在課堂上發表及分享這些資訊，引導討論，最後寫成報告。

606004 Discussion of Special Topics 1 R

The objective of this course aims at enabling students to study, research, discuss and eventually write to be familiar with the professional topics related to commerce, agriculture, or English teaching. Students have to choose a topic, study and/or research on it, present and share the information in class, lead a discussion and eventually write a report.

二、選修科目 Elective Courses

606005 英語教學的理論與實務 3 選

本課程目的是要讓學生能夠熟悉教英語作為第二語言的各種理論。課程內容包括史金納、皮亞傑、維高斯基、克拉遜、布倫納等人的理論及文法-翻譯法、自然法、直接法、聽覺語言教學法、潛移默化教學法、默式教學法、完全肢體回應教學法、溝通式教學法、內容為主及工作為主(任務導向)等等教學法的理論基礎與教學練習。

606005 Theories and Practice of English Teaching 3 S

This course aims at enabling students to be familiar with all kinds of theories in teaching English as a second language. The content includes the theories of Skinner's, Piaget's, Vygotsky's, Krashen's, Bruner's, etc. and the theoretical bases and teaching practice of various teaching approaches, such as the Grammar-Translation, the Natural Way, the Direct Methods, the Audiolingual Method, the Suggestopedia/desuggestopedia, the Silent Way, the Total Physical Response (TPR), the Communicative Teaching, the content-base, the task-base (mission-oriented), and so forth.

606006 第二外語語言習得 3 選

本課程目的在介紹學生各種第二外語習得的相關理論，例如史金納、皮亞傑、維高斯基、克拉遜、布倫納等人的理論，作為發展第二語言課程設計、採行以及評鑑的理論基礎。學生將閱讀大量的文憲及研究報告來獲得如何加速學生第二語言習得的想法。主題涵蓋學習者的差異性、語言相互(成長)發展、課程設計、及各種教學方式與方法的議題與問題等等。

606006 Second Language Acquisition 3 S

This course aims at introducing students various theories related to second language acquisition, such as the theories of Skinner's, Piaget's, Vygotsky's, Krashen's, Bruner's, etc., to develop a rational basis for the design, development, implementation and evaluation of L2 programs. Students will read ample literature and research papers to gain the idea regarding how to facilitate students' second language acquisition. Topics covered include learner variables, interlanguage development, curriculum design, issues and problems of various teaching approaches and methods, etc.

606007 教育統計 3 選

本科目之教學重點為瞭解推論統計的基本原理概念，包括抽樣、量尺、敘述性統計、次數分配、推論統計、假設考驗。選擇適切統計方法解決問題，並適切解釋分析結果。且能運用統計軟體進行資料分析。

606007 Statistics in Education 3 S

This course is designed to teach basic concepts of statistics: sampling and measurement; descriptive statistics; probability distributions and statistical inference, including tests of significance. The use of computer technology for managing data, running analyses, and testing research hypotheses will be included.

60608 課程設計 3 選

本科目之教學重點為 (1) 使學生瞭解課程設計的原則以及班級經營的目的

(2) 訓練學生運用課程設計的方法以及班級經營的策略，達到良好的教學效果與目標 (3) 培養學生彈性化、適性化的班級經營態度 (4) 提升學生蒐集相關文獻的方法與研究能力。

60608 Curriculum Design 3 S

The course aims to develop students' ability to plan curriculum and conduct instruction. What students will learn covers the assessment strategies, communication skills for teaching, and key features of classroom management. Throughout the course, students will have ample opportunities to design curriculum appropriate for the needs of different learners. Towards the end of the course, students would also be equipped with the ability to collect and analyze research papers of this area.

60609 高級商用英文與實務 3 選

這是一門以全英語授課的課程。這門進階課程將為學生提供業務溝通書寫演練的機會。重點於在面對國際商業環境遇到需要完成的各種任務時所需的電子郵件、信件和報告的編寫。課程涵蓋訊息架構和一般英語商務對談，並將盡可能使用實際的教材和情況。

60609 Advanced Business English and Practice 3 S

This is a course taught entirely in English. This advanced course will provide students with opportunities to practice written business communication. Emphasis is placed on writing email messages, letters, and reports to accomplish various tasks encountered in the international business environment. Message structure and common English language business discourse are covered. Authentic materials and situations will be used as often as possible.

60610 科學期刊選讀 3 選

本課程將藉由一系列農、科技、管理和人文等相關之科學期刊選讀來培養研究生熟悉相關產業之現況、應用和發展。除培養學生批判思考和解決問題的能力外，並能熟悉各產業之研究、發展與應用。

60610 Scientific Reading 3 S

The course focuses on providing graduate students a series of selected scientific journal articles in the fields of agriculture, management, and social sciences. Students will learn about the contemporary advanced research, applications, and development as well as the ability of problem-solving and critical thinking.

60611 教材教法專題 3 選

本科目之教學重點為 (1) 使學生瞭解教材教法的基本原理與策略

(2) 訓練學生運用教材教法的基本原理設計課程並編製教材 (3) 藉由實際教學觀摩實習，激發學生從事教學的興趣 (4) 培養學生蒐集相關文獻的方法與研究能力。

60611 Seminar on Materials Design and Teaching Practice 3 S

606015 Advanced Interpretation 3 S

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

606016 商務理論與實務 3 選

本課程綜合論述(概觀)基本經濟理論、國際貿易理論、及國際商務的理論方法。多國企業的組織策略和地點考量及地方政治因素將被涵蓋。學生將也能檢視多國企業的管理實務。

606016 Commerce Theory and Practice 3 S

This course provides an overview of basic economic theory, theories of international trade, and the theoretical approaches to international business. Organizational strategies of multinational enterprises as well as location considerations and geo-political factors will be covered. Students will also examine the management practices of multinational enterprises.

606017 教育心理學 3 選

本課程主要目的在解釋認知行為，語言，個人，社會和道德發展的個人以及個人和群體間的差異。本課也介紹社會認知和行為主義觀點的學習，內在和外動機，以及正式和非正式的評估

606017 Educational psychology 3 S

The course explains the cognitive, linguistic, personal, social, and moral development of individuals as well as individual and group differences. This lesson also describes behaviorist and social cognitive views of learning, intrinsic and extrinsic motivation, and informal and formal assessments.

606018 聲韻學 3 選

本課程介紹聲韻學的理論及探討人類語言中基本的音韻特性。學生經由檢視不同語言中的語音變化學習如何分析語料，並利用理論解釋聲韻變化的現象。

606018 Phonology 3 S

This course introduces phonological theories and investigates general phonological properties across human languages. In this course, we will examine data from various languages, and students are expected to learn to analyze the data and use theories to capture the patterns.

606019 社會語言學 3 選

社會語言學研究語言與社會間的關係。本課程將介紹語言在各層面所表現的差異，以及這些差異與個體及文化間的關連和影響。討論議題包含語言因區域和社會階層所造成的差異、語言與族群、語言與性別、語言與情境、以及語言的接觸等。

606019 Sociolinguistics 3 S

This course is an introduction to sociolinguistics, the study of the relationship between language and society. We will look at variation at all levels of language and how such variation interrelates with identity and culture. Topics to be covered in this course include regional and social variation in language, language and ethnicity, language and gender, language and social context, and language in contact.

606020 人力資源管理專題 3 選

本課程目的在提供研究生對於人力資源管理的了解且介紹如何有效運用組織的人力資源和發展。本課程內容包括：人力資源管理系統的介紹、人力的招募與運用、人員的訓練與教育、管理者發展與生涯規劃、績效評估與績效評核、薪資與激勵、員工的福利與獎金、勞資關係以及國際化人力資源管理。

606020 Seminar on Human Resource Management 3 S

This course aims to provide graduate students a better understanding of theories and practices of human resource management. The course will cover: introduction to human resource management system, manpower recruitment and use of the training and education, management development and career planning, performance evaluation and performance appraisal, compensation and incentives, employee benefits and bonuses, labor relations and International human resource management.

606021 農業科技英文 3 選

這是一門以全英語授課的課程。本課程將藉由透過閱讀有趣的當代文獻而給予學生農業各領域中的基本常識。學生將有極多練習聽、說、讀、寫之技巧的機會。特別強調在詞彙的學習及在農業各個領域中使用的術語。學生將被預期能夠培養出農業各領域之理解及鑑賞能力並能夠用英語交流彼此的知識。

606021 Agricultural Science and Technology English 3 S

This is a course taught entirely in English. This course will provide students with a general knowledge of various areas of agriculture through reading interesting current literature. Students will have ample opportunities to practice listening, writing, reading and speaking skills. Special emphasis is placed on learning the vocabulary and jargon used in various areas of agriculture. Students will be expected to develop an understanding and appreciation for all areas of agriculture and be able to communicate their knowledge in English.

606022 構詞學 3 選

本課程介紹聲韻學的理論及探討人類語言中基本的音韻特性。學生經由檢視不同語言中的語音變化學習如何分析語料，並利用理論解釋聲韻變化的現象。

606029 Morphology 3 S

This course introduces phonological theories and investigates general phonological properties across human languages. In this course, we will examine data from various languages, and students are expected to learn to analyze the data and use theories to capture the patterns.

606023 心理語言學 3 選

本課程介紹語言和腦部處理機制的關係。課程內容涵蓋人類語言的本質和原始，

人類如何瞭解、使用、和習得語言，以及語言對其他認知能力的影響。學生除聽講外，必須參與課間討論和實做的活動，以確實瞭解心理語言學的觀念及方法。

606023 Psycholinguistics 3 S

This course is designed to develop understanding of the relationship between language and the processes of the brain and mind. More specifically, questions regarding the nature and origin of human language will be examined, and the ways how humans comprehend, produce and acquire language, as well as how language may (or may not) influence other aspects of cognition will also be discussed. In addition to attending to the lectures, students are also expected to participate in discussions, and several “hands-on” activities to demonstrate their understanding of the concepts and methods applied in the study of psycholinguistics.

606024 語言學習診斷與補救 3 選

本科目之教學重點為(1)使學生瞭解學習困難之產生與補救教學的策略。(2)訓練學生運用診斷與補救教學策略編製各種補救教材。(3)提升學生主動從事學習困難診斷的興趣。以及(4)培養學生蒐集相關文獻的方法與研究能力。

606024 Language Diagnosis and Remedial Instruction 3 S

The course aims to develop the ability to provide diagnosis and remedial aids to learners whose academic performance is consistently below average. What students will learn covers the analysis of learners' learning ecology, the process of assessment, instruction planning, evaluation of learners' performance, and modification of the instructional plan based on learner performance. Towards the end of the course, students should be able to design instruction appropriate for the unique needs of each learner.

606025 高級談判英文 3 選

本科目之教學重點為(1)讓學生對英文閱讀有廣泛接觸(2)使學生熟悉各種閱讀技巧(3)使學生有用英文表達之能力。大一主要培養閱讀技巧在於了解文章主旨大意，課前預習及課後複習，並針對以上之要求提供不同文章作練習。

606025 Advanced English Negotiation 3 S

The purpose of this course aims to train students become excellent professional business negotiators through a series of professional training, including introduction to theory and techniques, strategic analysis, power analysis, negotiation process analysis, simulations, and role plays. Students are expected to master professional negotiation skills and perform outstanding negotiation ability in all situations.

606026 隨行翻譯 3 選

本科目之教學重點為(1)使學生瞭解隨行翻譯之種類與要素；(2)訓練學生隨行翻譯之技巧；(3)培養學生從事隨行翻譯工作之專業態度；(4)引導學生涉略不同領域之專業背景知識，並針不同題材及案例進行口譯練習。

606026 Escort Interpretation 3 S

This course aims at (1) helping students understand the types and elements of escort interpretation; (2) training students to become familiar with the skills of escort interpretation; (3) developing students'

professional attitudes toward jobs related to escort interpretation; and (4) guiding students to get more professional knowledge about different fields. Topics and cases regarding different fields will be selected as practice materials.

606027 農企業策略管理專題 3 選

在此課程中，學生將從農企業的觀點習得商業管理的各種面向。農企業的生產與市場管理的獨特性質將被強調。學生將學習如何利用與應用管理技術與工具。學生將練習他們的分析與作決定技巧。

606027 Seminar on Agribusiness Strategies and Management 3 S

In this course, students will learn about the various aspects of business management from an agribusiness perspective. The unique nature of agribusiness production and marketing management will be emphasized. Students will learn how to use and apply management techniques and tools. Students will practice their analytical and decision-making skills.

606028 語用學 3 選

語用學研究語境對語意的影響，本課程即為探討語言在實際情境中使用的意義、規則和條件。討論議題包括指涉、預設、衍推及語言行為理論。上課方式除講課外，學生亦必須參與討論和實做練習。

606028 Pragmatics 3 S

Pragmatics is a subfield of Linguistics which studies how context contributes to meaning, and this course is therefore designed to examine how language is used in context. Issues will be discussed include reference, presuppositions, implicatures, and speech acts. In addition to attending to the lectures, students are also expected to participate in discussions, and several “hands-on” activities to demonstrate their understanding of the concepts and methods applied in the study of pragmatics.

606029 英語測驗與評量專題 3 選

本課程的主要目標是要讓學生了解英語測驗的基本概念及四種語言技能的測驗方法。課程包含英語課堂成就與能力測驗及標準化測驗之測驗內容、施測與評分。

606029 Seminar on English Language Testing and Assessment 3 S

This course is designed to offer a comprehensive understanding of essential principles and types of tests for the assessment of the four language skills. It also examines the construction, administration, scoring, and grading of teacher-prepared classroom tests of language proficiency and achievement, as well as standardized tests.

606030 英語教育訓練與需求評估 3 選

本課程主要目的在於培育英語教師及訓練其在課堂中對於學習者與老師個別需求的分析能力。此課程讓學生瞭解各種教學理論及練習各種技巧以其幫助他們成為成功的語言教育人員。

606030 English Educational Training and Needs Evaluation 3 S

The objectives of the course are to develop skills and techniques of English language teaching and to practice analyzing learner's and teacher's needs in the classroom. It prepares course participants to become successful language teachers by examining the principles of effective teaching and practicing a range of skills.