

## 生物科技系 碩士班 中英文摘要

### Department of Biological Science and Technology

#### 一、必修科目 Required Courses

#### **30039 專題討論 2 必 輪授、上下**

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

#### **30039 Seminar 2R Rotation, F S**

This course is designed to advise students to search for update papers from Biotech related journals, to make a presentation in class, and to discuss with teachers and classmates.

#### **30090 生物技術與產業實務 3 必 輪授、上**

本課程旨在加強學生對生物技術的瞭解，其範圍涵蓋遺傳工程技術、細胞融合技術和蛋白質工程技術等三大領域的理論和臨床上應用。

#### **30090 Biotechnology and Bioindustry 3R Rotation, F**

The course will emphasize three major areas, including genetic engineering, hybridoma techniques and protein engineering. This class is going to train students to understand the concepts and applications of biotechnology.

#### **40480 活性天然物特論 3 必 輪授、上**

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。

#### **40480 Special Topics in Bioactive Natural Products 3R Rotation, F**

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)

#### **30032 高等分子生物學 3 必 輪授、上**

本課程主要介紹核酸(DNA、RNA)和蛋白質的構造與功能，及基因工程與重組 DNA。內容包括載體的介紹、重組 DNA 的構築、基因表現和重組蛋白質的純化及其應用。

#### **30032 Advanced Molecular Biology 3R Rotation, F**

The course introduces the nucleic acids (DNA、RNA), structure and function of proteins, genetic engineering and recombinant DNA technology. The course contents include: vectors of introduction, construction of recombinant DNA, gene expression, and purification and application of recombinant proteins.

**30091 人體生理學特論** **3 必** **輪授、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。

**30091 Advanced human physiology** **3R** **Rotation, 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.

**30057 碩士論文** **6 必** **各教師**

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

**30057 Thesis** **6R** **All Teachers**

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

## 二、選修科目 Elective Courses

**20813 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。

**20813 Plant Functional Genomics and Applications** **2 E** **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.

**20814 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。

**20814 Plant Functional Genomics and Applications Lab.**

**1 E**

**D. J. H. Shyu, F**

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.

**20691 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。

**20691 Genomics**

**2 E**

**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.

**20190 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。

**20190 Bioinformatics**

**2 E**

**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.

**40560 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。

**40560 Gastrointestinal Microbiology** **3 E** **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.

**41032 應用微生物特論** **2 選** **陳又嘉、上**

本課程為提供學生學習應用微生物學中的進階技術與學理，課程中將介紹特殊環境微生物、真菌交配模式、微生物重組酵素表達、微生物代謝物產生與分析、發酵理論等內容。

**41032 Special Topics on Applied Microbiology** **2 E** **Y. C. Chen, F**

The course is designed to offer students advanced techniques and theories of applied microbiology. The course includes extremely environmental microorganisms, fungal mating types, recombinant enzymes production, the analysis and production of microorganism metabolites and fermentation theories.

**40657 高等微生物生理與遺傳** **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。

**40657 Advanced in Microbial Physiology and Genetics** **3 E** **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.

**21843 外溫四足動物學** **2 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。

**21843 Herpetology** **2 E** **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.

**40026 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。

**40026 Natural Products Chemistry** **3 E** **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.**

**20659 動物基因轉殖** **2 選** **胡紹揚、上**

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。

**20659 Animal Transgenics** **2 E** **S. Y. Hu , F**

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.

**動物基因轉殖實習** **1 選** **胡紹揚、上**

本課程內容以魚類為主體，介紹水生觀賞魚種之基因改造育種技術，透過讓學生實務操作顯微注射等轉殖技術，培育新品系之水生觀賞品種，使學生具備觀賞水族動物繁養與育種之技術。

**Animal Transgenics Practice** **1S** **S. Y. Hu , F**

The course use fish as subject to introduce genetically modified breeding technology. The objective of this course is to make students practically manipulate microinjection and culture a new breed, and make students with culture and breeding skill of

ornamental marine animals.

**40760 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。

**40760 Protein Engineering** **3 E** **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.

**40249 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。

**40249 Organic Analysis** **3 E** **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.

**40761 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。

**40761 Proteomics** **2 E** **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.

**21854 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。

**21854 Proteomics experimental course** **1 E** **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.

**22355 幹細胞生物學**

**3 選**

**張格東、上**

本課程將介紹成體幹細胞如血液幹細胞、間葉幹細胞、神經幹細胞、肝臟幹細胞等之細胞生理學與生化特性，並針對臨床醫學與生物製藥的未來發展性進行探討。

**22355 Stem cell biology**

**3 E**

**K.T. Chang, F**

An up-to date discussion of somatic stem cell biology, mainly focusing on the physiology and biochemistry of hematopoietic stem cells, mesenchymal stem cells, neuron stem cells and hepatic oval cells etc, for clinical and pharmaceutical application.

**40743 細胞凋亡**

**3 選**

**施玟玲、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。

**40743 Apoptosis**

**3 E**

**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

**40684 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。

**40684 Animal Cell Culture**

**2 E**

**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.

**40022 分子診斷技術學**

**2 選**

**施玟玲、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。

**40022 Molecular-Based Diagnostic Technique**

**2 E**

**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.

**30096 光合作用特論****2 選****周映孜、上**

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。

**30096 Special Topics in Photosynthesis****2 E****Y.T. Jou, F**

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.

**40853 植物逆境生理學****2 選****周映孜、上**

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。

**40853 Stress Physiology of Plants****2 E****Y. T. Jou, F**

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.

**40837 植物生物化學****2 選****徐志宏、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。

**40837 Plant Biochemistry****2 E****D. J. H. Shyu, 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.



**40834 植物分子生物學** **2 選** **周映孜、徐志宏、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。

**40834 Plant Molecular Biology** **2 E** **J. H. Shyu , Y.T. Jou ,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.

**30093 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。

**30093 Environmental Genomics** **2 E** **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.

**21849 動物適應與仿生科技** **2 選** **蔡添順、下**

本課程是一門探討動物結構與生理機制以了解其生態適應問題的跨領域實驗科學。生理的部份將包括呼吸、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，以了解動物構造與生理多樣性、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？），以使學生了解動物形態與生理適應的基礎知識與其應用。

**21849 Morphological and physiological adaptations of animals** **2 E** **T. S. Tsai , S**

This course is a cross-disciplinary science that seeks to describe the morphological varieties and physiological mechanisms of animals underlying ecological observations. 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 morphology and physiology 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 adaptation on morphology and physiology, with 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?”.

**40027 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。

**40027 Natural Products Chemistry Lab. 2 E 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).

**40255 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。

**40255 Organic Spectroscopy 3 E 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).

**20690 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。

**20690 Gene Recombination and Expression 2 E Y. C. Chen & H. L. Cheng, S**

This course emphasize the technologies of recombinant DNA, and introduce the prokaryotic and eukaryotic expression systems.

**21850 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。

**21850 The Biology of Animal Aging**      **2 E**      **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.

**40643 高等細胞生物學**      **2 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。

**40643 Advanced Cell Biology**      **2 E**      **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.

**22629 品保與品管**      **2 選**      **陳又嘉、徐睿良**

品保與品管可確保產品的品質在各種產業上扮演舉足輕重的角色。本課程的目的為使同學具備品保與品管之概念、瞭解其產業應用之各種實務，並學習如何將品保與品管落實於生物科技產業。課程內容涵蓋品質的概念、各種品質制度、品管與品保之關係、全面品質保證系統、各式品管方法及生技產業之各式優良實務。

**22629 Quality assurance and quality control**      **2S**      **J. L. Hsu, Y. C. Chen,S**

Quality assurance (QA) and quality control (QC) have been used to guarantee the quality of products and play a key role in various industries. The aim of this course is to provide students an overview of QA & QC, as well as some good practices. Contents include concept of quality, various quality systems, relationships between QA and QC, total quality assurance management, QC methods and good practices in quality assurance.

**202083 質譜分析及實習**      **3 選**      **徐睿良、下**

本課程將介紹各式質譜儀，包括離子源、質量分析器及偵測器之原理，並與介紹各式分離工具之搭配及其在生技領域之應用。主要目的為提供學生有關質譜分析工具所需的原理、實際應用時須具備之背景知識、資料解析能力、及可應用的方向。同時藉由實際操作，使同學學習實務技能，將質譜分析應用於生

物科技之學術與產業領域。

### **202083 Mass Spectrometry & Laboratory Practice 3 E**

**J. L. Hsu, S**

The principles and applications of mass spectrometry will be introduced including separation front ends, inlet interfaces, ion sources, analyzers and detectors. In addition, their applications in most of scientific field, in particular biomedical application will be emphasized. The goal of this course is to enable students possessing background in mass spectrometric analysis, training in data interpretation, and sense for application. Moreover, this course also provides laboratory practice enabling students more familiar with the practice and techniques in academic and industrial applications.

### **21848 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。

### **21848 Medical Embryology**

**3 E**

**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.

### **實驗動物照護與管理**

**2 選**

**許岩得、下**

提供學生有關實驗動物相關法規及試驗設計、對動物照顧與管理的實務操作。課程內容包括動物保護法等有關實驗動物相關規定、3R 精神、麻醉與安樂死、環境豐富化、動物行為觀察等。

### **Lab. Animal Care and management**

**2 E**

**Y. D. Hsuuw , S**

Lecture provide the concept of laboratory animal regulations, the design of animal study and the practice of animal care and management. Programs including the animal study regulations in the animal protection Act, the concept of 3R (replacement, reduction and refinement), anesthesia and euthanasia, environmental enrichment and animal behavior.

### **20664動物幹細胞建立與應用**

**2選**

**許岩得、上**

「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。

### **20664Application and Establishment of Embryonic Stem Cells**

**2 E**

**Y. D. Hsuuw , F**

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.

**20665 動物幹細胞建立與應用實習 1選 許岩得、上**

「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。

**20665 Application and Establishment of Embryonic Stem Cells Practice 1 E Y. D. Hsuuw , F**

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.

**40019 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。

**40019 Molecular Virology 3 E 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.

**20584 校外實習 3選 輪授**

本課程的目的為使學校課程內容與企業需求間更加緊密結合，透過校外實習之過程，讓學生熟悉研發、生產、品管及行銷等企業運作流程並瞭解企業制度與產業趨勢。進一步地，協助學生從實習經驗中充實專業技能、培養獨立思考、協調溝通的能力及敬業態度。

**20584 Practice of Industrial Training 3 E Rotation**

This course aims to establish close correlation between course contents in this department and industrial needs. Through the industry internship, students will be more familiar with business trends and key industrial components such as research and development, manufacturing, quality assurance, marketing, and so on. In addition, this course also aims to help students not only enrich job skills, but develop independent thinking, coordinating and communication ability, and professional attitude.

**21914 專題討論(1) 1選 輪授、上**

本課程擬指導學生由最新生物技術相關期刊中，挑選最新而重要的論文提出

報告，並由全體教師、學生共同研討，讓學生學習到如何尋找資料、論文寫作、實驗設計與結果討論等實驗研究工作相關的技術。

**21914 Seminar I**

**1 E**

**Rotation, F**

This course is designed to advise students to search for update papers from Biotech related journals, to make a presentation in class, and to discuss with teachers and classmates.

**21749 專題討論(2)**

**1 選**

**輪授、下**

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

**21749 Seminar II**

**1 E**

**Rotation, S**

This course is designed to advise students to search for update papers from Biotech related journals, to make a presentation in class, and to discuss with teachers and classmates.

**40717 專題研究(1)**

**2 選**

**輪授、上**

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、討論及實驗或設計，並將研究結果撰寫報告。

**40717Independent study (1) 2S**

**assigned , F**

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

**40718 專題研究(2)**

**2 選**

**輪授、下**

本課程由教師根據研究主題，輔導學生進行特定文獻收集、討論及方法設計，並將研究結果撰寫報告。

**40718Independent study (2) 2S**

**assigned , S**

Student will be requested to study advisory reference , discuss with faculty members, and design methods. Each student is required to submit a final report of research results.