生命科學系 96-2 新增課程中英文摘要

一、大學部

動物胚胎幹細胞建立與應用　　2選　　許岩得

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。

Application and establishment of embryonic stem cells　　2 S　　T. D. Hsuuw

The course will present the establishment of embryonic stem cells from preimplantation embryos, and its new insights of applications in biotechnology, pharmaceutics 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

動物胚胎幹細胞建立與應用實習　　2選　　許岩得

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。

Practice of the application and establishment of embryonic stem cells　　2 S　　T. D. Hsuuw

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.

植物生長與發育　　2選　　徐志宏

本課程為植物生理學之進階課程，課程內容主要著重於讓學生了解植物各個器官的生長、分化與發育過程及其調節機制，包括植物激素、光敏素與光型態發生、光週期現象與生物韻律及環境逆境等對植物生理的影響，以對植物生理與生化功能有更為深入的認識，並可奠定日後選修其他植物科學進階課程的基礎。

Plant Growth and Development 2 S **J.H.Shyu**

The course is designed as the advanced course of plant physiology for undergraduate students. The subjects discussed will help students to understand the growth, differentiation, and development of various organs in plants. They include the effects of plant hormones, phytochromes and photomorphosis, photoperiodism and biological rhythms, and environmental stresses to the plant physiology. For a better understanding of plant physiological and biochemical functions, study of the course will establish a solid foundation for future study of other advanced courses of plant science.

植物生長與發育實驗 1選 **徐志宏**

本課程主要探討植物細胞與組織培養之基本原理、方法與應用以供植物研究與生產之用，配合實作課程，內容包括培養條件與培養基配製方法、器官發生與胚發生的原理，原生質體、細胞、組織及器官培養的操作方法，試管內繁殖之應用、無病毒植株培育、植物反應器之二次代謝物生產等，並運用這些技術於植株培育及生理生化研究之上。

Experiments in Plant Growth and Development 1 S **J.H.Shyu**

The course covers the principles, methods, and applications of cell and tissue culture strategies for plant research and production. Topics include culture environment and media preparation methods, organogenesis and embryogenesis, manipulation methods of protoplast, cell, tissue, and organ culture, applications of in vitro propagation, regeneration of virus-free plants, plants as bioreactors for secondary metabolites production, and use of these techniques for plant propagation and physiological and biochemical research.

植物功能性基因體學之應用 2選 **徐志宏**

教育部「生物及醫學科技人才培育先導型計畫」暑期課程

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。

Plant Functional Genomics and Applications 2 S **J.H.Shyu**

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.

植物功能性基因體學之應用實驗 2選 **徐志宏**

教育部「生物及醫學科技人才培育先導型計畫」暑期課程

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。

Experiments in Plant Functional Genomics and Applications 2 S **J.H.Shyu**

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.

自由基生物學 2選 **顏嘉宏**

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。

Free Radical Biology 2 S **C.H.Yen**

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 thee 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.

校外實習 1 選 **輪授**

為促進本系學生有實際參與生命科學相關產業的機會，本系擬開設校外實習課程。目前已經在進行接洽的實習單位有動物中心(林口長庚醫院)、遠東藍藻工業股份有限公司、國立科學工藝博物館及特有生物研究保育中心(南投縣集集鎮)等。

Practical Training 1 S **Rotation**

For understanding the detail of life sciences-related industries, we will offer the Practical Training Course to undergraduates (third-degree) in Department of Life Sciences to have an opportunity to join the cooperative organization such as Animal Center in Chang-Gung Memorial Hospital (Linkuo), Far East Microalgae Ind. Co., Ltd., National Science and Technology Museum and Endemic Species Research Institute.