101 學年第 2 學期 校課程委員會會議

傳閱附件

目　錄

大一英語(1)(第一級)　　2　必　　，上

大一英文提供四技學生在奠定學生英文之基本閱讀與寫作能力，並於期末舉行全校會考，以鑑定其修習之成果。大一英文(1)課程著重在字彙的加強，文章結構的分析、閱讀策略的運用、及文法的瞭解與應用。學生們經由這些方面的學習研究，徹底瞭解以及實際的演練，即可學到豐富的英文知識，以達到改進並提升英文程度的目的。

Freshman English (1)（Level 1）　　2　R　　, F

The course aims to develop students' basic reading and writing skills in English. A unified final exam is offered to evaluate students' progress. The curricula of Freshman English (1) (Level 1) places emphasis on the reinforcement of vocabulary, the analysis and understanding of sentence structures, the application of reading strategies, and the understanding of English grammar. Through study, reflection on language and application of course material, students can learn the fundamentals of the English language and so improve their skills in this language.

大一英語(2)(第一級)　　2　必　　，下

大一英文提供四技學生在奠定學生英文之基本閱讀與寫作能力，並於期末舉行全校會考，以鑑定其修習之成果。本課程在協助學生培養閱讀技巧，加強其文法知識；閱讀教材中包含最常見的全球通俗字眼，更有日常生活與職場用字，藉由閱讀讓學生熟悉某些文章類型與內容。

Freshman English (2)（Level 1）　　2　R　　, S

This course aims to develop students' basic reading and writing skills in English. A unified English final exam is offered to evaluate students' progress. Freshman English (2)（Level 1）is designed to aid students in improving their skill in reading and developing their knowledge of grammar in use. It also exposes students to acquisition-rich texts containing high-frequency vocabulary, including shared international vocabulary, particularly daily-life language and job-related vocabulary.

大一英語(1)(第二級)　　2　必　　，上

大一英文提供四技學生在奠定學生英文之基本閱讀與寫作能力，並於期末舉行全校會考，以鑑定其修習之成果。大一英文(1)(第二級)課程目標為幫助學生擴充英文字彙量、增進文法知識，並學習英文閱讀技巧，以增進英文能力並提升學習興趣。

Freshman English(1)（Level 2）　　2　R　　, S

This course aims to develop students' basic reading and writing skills in English. A unified English final exam is offered to evaluate students' progress. Freshman English (1)（Level 2）

aims to broaden students' English vocabulary, improve their sense of grammar, and acquire various English reading skills. It is hoped that through this course students can improve their English proficiency and gain greater motivation in learning English.

大一英語(2)(第二級)　　2　必　　，下

大一英文提供和加強學生英文基本閱讀與寫作的能力。大一英文(1) (第二級)課程目標除了幫助學生擴充英文字彙量、增進文法知識，並學習英文閱讀技巧以外，透過課堂句法結構寫作練習，強化課堂所學知識，提升學習成效。

Freshman English(2)（Level 2）　2　R　　, S

This course aims to develop students' basic reading and writing skills in English. A unified English final exam is offered to evaluate students' progress. Freshman English (2)（Level 2）aims to broaden students' English vocabulary, improve English grammar, and acquire various English reading skills. Classroom activities include sentence pattern writing to improve students' knowledge of sentence structure, creating greater awareness of how the English language functions at sentence level.

大一英語(1)(第三級)　　2　必　　，上

大一英文提供四技學生在奠定學生英文之基本閱讀與寫作能力，並於期末舉行全校會考，以鑑定其修習之成果。本課程目的在於引導學生學習基礎英語閱讀技巧,並幫助學生建立字彙學習策略。透過課堂活動及線上英語自學練習，期望有效提升英文讀寫能力、培養學生學習英文的興趣。為提高學生學習興趣，課堂閱讀題材內容與生活及社會議題相關,以期望學生能藉由廣泛閱讀來激發精進英文能力的方向與動力。

Freshman English(1)（Level 3）　2　R　　, F

The course aims to develop students' basic reading and writing skills in English. A unified final exam is offered to evaluate students' progress. The aim of Freshman English(1)（Level 3） is to equip students with basic reading skills and vocabulary-building strategies. Through integrating in-class reading activities and online English exercises, students will practice vocabulary, apply different reading strategies, and better understand the use of English grammar. Topics will be introduced in a motivating way and the language linked to the everyday needs and interests of the students. Students will be expected to read extensively so as to increase the motivation of learning English.

大一英語(2)(第三級)　　2　必　　，上

大一英文提供四技學生在奠定學生英文之基本閱讀與寫作能力，並於期末舉行全校會考，以鑑定其修習之成果。本課程目的在持續提供學生英語閱讀技巧之練習,並增加英語

字彙。透過課堂活動及線上英語自學練習，學生可實際運用所學之閱讀技巧。此外，課堂上也將教授學生如何練習寫句子及段落短文來訓練學生用英語表達自我看法。

Freshman English(1)（Level 3） 2 R , S

The course aims to develop students' basic reading and writing skills in English. A unified final exam is offered to evaluate students' progress. The aim of f Freshman English(1)（Level 3） is to offer students practice in basic reading skills and help students increase vocabulary. Through integrating in-class reading/writing activities and online English exercises, students will practice vocabulary and apply different reading strategies. Moreover, students will be instructed how to write sentences and short paragraphs to express their opinions in English at the end the course.

大一英語(1)(第四級) 2 必 ，上

大一英文提供四技學生在奠定學生英文之基本閱讀與寫作能力，並於期末舉行全校會考，以鑑定其修習之成果。大一英文課程教導四技學生運用基本的閱讀技巧，提升英文閱讀能力，並透過文章分析來提升學生的文法句型結構以及英文字彙能力。學生透過精讀各種領域的文章，以拓展知識範疇。並藉由英文報章雜誌的閱讀，讓學生不只加強英文能力，還能夠吸收各種國際相關議題資訊。

Freshman English(1)（Level 4） 2 R , F

The course aims to develop students' basic reading and writing skills in English. A unified final exam is offered to evaluate students' progress. Freshman English (1) (Level 4) is a course designed to help students apply basic reading skills to enhance reading comprehension ability and help students to increase their knowledge of English Grammar and vocabulary by reading various topics contained in authentic English language articles. Furthermore, by reading news articles and magazines, students will be able to know more about the world we live in.

大一英語(2)(第四級) 2 必 ，上

大一英文提供四技學生在奠定學生英文之基本閱讀與寫作能力，並於期末舉行全校會考，以鑑定其修習之成果。本課程延續大一英文(1)(第四級)課程，教導四技學生運用基本的閱讀技巧，提升英文閱讀能力，並透過文章分析來提升學生的文法句型結構以及英文字彙能力。學生透過精讀各種領域的文章，以拓展知識範疇。並藉由英文報章雜誌的閱讀，讓學生不只加強英文能力，還能夠吸收各種國際相關議題資訊。本課程將運用上學期所學的閱讀和寫作技巧來加強學生的英文寫作能力。

Freshman English(2)（Level 4） 2 R , F

The course aims to develop students' basic reading and writing skills in English. A unified final exam is offered to evaluate students' progress. Freshman English (2) (Level 4) is a

course designed to further help students to apply basic reading skills to enhance reading comprehension ability and to help students to increase their knowledge and understanding of English Grammar and vocabulary through reading about various topics contained in news articles. Furthermore, by reading news articles and magazines, students will be able to know more about the world we live in. In addition, students will be able to write short articles after being provided guidelines on how to make an outline and how to structure a short article.

外語實務訓練(1)　　0　選　　，上

本課程為於三年級尚未通過外語門檻同學開設之替代課程。學生於三年級開學前參加二次(進修推廣部一次)具公信力之語言測驗機構舉辦之外語能力測驗仍無法通過門檻者。本課程在培養學生基礎聽力文法以及閱讀能力，以銜接正式多益以及培養同學正確自我學習英文能力和態度。此外將加強建構基礎單字，期許同學看懂和聽懂基本日常常用的對話及文章。

Remedial Skills for English Learning (1)　　0　　E　　F

This course is an alternative for seniors who fail to pass the foreign language proficiency tests. Before enrollment in this course, seniors are required to take language proficiency tests conducted by authorized language centers twice (once for students from the Continuing and Extension Education Division).

This course aims to cultivate students' fundamental skills in listening, grammar and reading. Students are expected to develop an autonomous approach to learning in foreign languages and in the preparation for the TOEIC. In addition, basic vocabulary is introduced in the class in the hope of equipping students with abilities to understand basic daily conversations and reading materials.

外語實務訓練(2)　　0　選　　，下

欲修習本課程前須先通過外與實務訓練(1)。本課程銜接外與實務訓練(1),以增加同學進階英語能力。聽力部分增加長對話和簡短獨白，閱讀部分將進階至商用書信和廣告等。英語字彙將複習上學期部分同時新增常見多益單字，期待學生上完本課程後能確實提升英文實力，為之後充實自我英文實力奠定基礎。

Remedial Skills for English Learning (2)　　0　　S　　E

Course takers are required to pass the Practicum for foreign languages (1) to continue on to this course. This course aims to further enhance students' language abilities. With regard to listening, longer conversations along with short talks are introduced. The reading section of the course focuses on understanding business letters and advertisements. In addition to the review of vocabulary learned in the previous semester, common TOEIC vocabulary is also

integrated into the course. It is expected that students will improve in language proficiency and gain a solid foundation for future language learning.

基礎英文(聽力)　　0　選　　，上、下

基礎英文(聽力)提供基礎英文聽力練習，奠定學生基礎英文對談之理解能力。本課程以日常生活為主題，練習日常對話、指示、要求、描述、建議等不同型態之口說英文。

Courses in Fundamental English Skills (Listening)　0　E　F, S

Listening for Novice Learners in English (Listening) is intended for students who have studied English previously but need further practice in understanding simple conversational language. In this course, students are required to practice listening for a variety of purposes and hear examples of different types of spoken English including casual conversations, instructions, directions, requests, descriptions, apologies, and suggestions.

基礎英文(文法)　　0　選　　，上、下

本課程旨在幫助學生建立正確的英文文法概念。透過生活化的例句和練習題，將基本的句型結構和時態等融入日常生活語言，藉以提升學生的閱讀能力。

Courses in Fundamental English Skills (Grammar)　0　E　F, S

This course is designed to help students establish basic concepts of English grammar and further improve their reading comprehension. Students are introduced to the form, meaning, and usage of basic structures in English and provides ample opportunities for practice through authentic and varied exercises.

基礎英文(字彙)　　0　選　　，上、下

本課程設計是幫助學生熟悉英語文的基本概念，並且幫助學生，學習字彙發音與拼寫。課程閱讀教材包含常見的日常生活字彙，或與職場相關字彙，讓學生透過閱讀，增加其字彙量。

Courses in Fundamental English Skills (Vocabulary)　0　E　F, S

This course is designed to familiarize students with basic concepts of English and aid learners in improving pronunciation and spelling. Learner will also enlarge their vocabulary through reading texts consisting of high frequency everyday or job-related vocabulary.

英文菁英班　　2　選　　，上、下

英文菁英班供英文程度為進階的學生選讀以持續增強英語能力;課程內容之設計主要針對加強高階英語的聽說讀寫訓練，一方面發展以英語進行理解溝通的思考方式，並同時培養自我英語學習的能力。一方面亦鼓勵這些學生能參與托福(TOEFL)或亞斯(ILETS)等國際英語檢定考試，取得英語能力證明以增加未來的競爭力。

English for Advanced Learners 2 E F, S

The course is designed to aid students to use English in situations that require effective communicative skills in English. The course aims to help students increase language proficiency, enhance core language skills, and foster autonomous learning in English. The purpose is to empower students to use the language in functional settings and to improve competence and performance in English communication and international English qualification examinations.

戶外休閒運動 2 選 吳崇旗，上、下

本課程目的主要是結合本校廣闊校園、特色場地與附近自然資源，透過一系列戶外休閒運動（包括：定向越野、高低空繩索、無痕山林與登山健行等）的參與，提供學生走出戶外接近大自然、突破自我與人際互動的機會，進而擺脫「宅男宅女」形象，發展積極健康的生活型態。

Outdoor Recreational Sport 2 E F, S

The purpose of this course is to take advantage of the large campus, special facilities and nearby natural resource to provide opportunities for students to learn by challenging oneself and interacting with others by the series of outdoor recreational sport (including, orienteering, ropes courses, LNT and hiking) and then to develop active healthy lifestyle.

運動知識與賞析 2 選 林秀卿、郭癸賓(合授)，上、下

課程最主要希望透過課堂講授灌輸學生具備正確運動知識，更希望透過觀摩與實際體驗培養終身運動參與的知識與技能，讓修課學生擺脫一般大學生「宅男宅女」形象，養成具備通往健康新生活的認知、情意與技能。

Knowledge and Appreciation for Sport 2 E F, S

The purpose of this course is to develop correct and healthy concepts and attitude toward sport through knowledge and practice (viewing and participating) to lead students to the ideal of healthy and lifestyle.

全民國防教育軍事訓練－防衛動員 0 必 ，上、下

「全民國防」是我國國防的基本理念,「全民防衛動員」則是全民國防的具體實踐。「911事件」發生後，世界各國多傾力在「國土安全」的維護上，一時之間，新興的「國土安

全」課題有逐漸凌駕「國家安全」的趨勢。因而顯示現代國家所必須面對的安全威脅議題，不再侷限於來自外部的「軍事威脅」，還必須含括來自內部的「人為威脅」及自然災害的「環境威脅」因素。

因此，現代戰爭與現代國防，已經不再是單純的軍事課題，建立全面性的綜合安全觀念，已是政府與民間都必須共同承擔的共識與理念，也是臺灣邁入 21 世紀所必須具有的準備。為因應中國大陸的軍事威脅及非傳統領域的安全威脅，達到預防戰爭、國土防衛、反恐制變的國防戰略構想，防衛動員是以「全民防衛動員機制」為主體，「納動員於施政，寓戰備於經建」，透過政軍協同合作，有效整合國內災害防救、傳染病防治、輻射災害應變及反恐怖行動等緊急應變系統，建立綿密、完備的全民防衛體系，產生足夠的動員能量，建構國土安全網，達到國土防衛、平戰一體的目標，使全民國防能夠紮根落實。

Military Training of the National 0 R F, S
Defense Education-Defense Mobilization

"National defense" is the basic concept of national defense, "Defense Mobilization is the concrete practice of the national defense. "911 incident" occurred after the world and more effort to the maintenance of the "Homeland Security" the sudden emerging gradually overriding trend of "national security", "homeland security" issues. The modern state must face threats to security issues, and thus is no longer confined to the military threat from the outside, but also from internal human threats and natural disasters "environmental threat" factors must be included.

Therefore, modern warfare and modern defense is no longer a purely military issues, the establishment of a comprehensive concept of security, the Government and the private sector must be shared consensus and philosophy, also Taiwan into the 21st century must have ready . In response to the Chinese mainland's military threat to the security threats and non-traditional areas, to prevent war, homeland defense, anti-terrorism system becomes defense strategic concept, defense mobilization in total defense mobilization mechanism as the main body, "satisfied mobilization in policy, and combine combat readiness in the CEPD, through political and military collaboration, effective integration of domestic disaster prevention and relief, prevention and treatment of infectious diseases, radiation emergency response system for disaster response and counter-terrorism operations, the establishment of a tight-knit, complete total defense system to produce enough to mobilize energy, construct a net of Homeland Security, Homeland Defense peacetime one goal, to be able to take root in the implementation of the national defense.

全民國防教育軍事訓練－國防科技 0 必 ，上、下

冷戰結束後，由於大規模戰爭爆發的機率降低，各國都大幅削減國防預算，也因此放慢了軍事科技的發展腳步。近年來，地面武器的發展主要著重在因應區域衝突與反恐戰

爭，尤其是基於美軍及其盟軍在伊拉克、阿富汗的執勤需要，研發重點僅是對現有地面武器及裝備進行局部性能的強化。在這種情況下，主要的地面武器多半延續冷戰末期的發展，雖然也曾推出少數全新概念的新世代地面武器研發計畫，但這些計畫紛紛遭到縮減、延後、甚至落得難產的命運。

除此之外，歐美先進國家也大幅縮減海軍發展規模，以美國海軍為例，全新世代的 DD（X）驅逐艦、CG（X）巡洋艦，均被縮小規模，或改為建造成本及技術風險較低的軍艦。海軍裝備的發展進入低盪時期，此為一個全球性的現象，使得歐美造船廠與海軍武器裝備製造商因此重整以適應新的經營環境。在各國缺乏足夠經費的狀況下，未來戰鬥系統計畫多被迫取消，現今以規模較小、成本及技術難度較低的武器研發計畫來取代，科技的創新程度已受到大幅壓縮。

Military Training of the National Defense Education-Defense Technology **0 R F, S**

Reduces the chance of a large-scale war broke out after the end of the Cold War, the countries are to slash the defense budget, thus slowing down the development of military technology footsteps. In recent years, the development of ground-based weapons mainly focus on R & D focus, in particular, is based on the operational requirements of the U.S. military and its allies in Iraq, Afghanistan, the strengthening of the local performance of existing ground-based weapons and equipment in response to regional conflicts and the war on terror. In this case, most of the major ground weapons continuation of the development of the end of the Cold War, has also introduced a few brand-new concept of a new generation of ground-based weapons R & D projects, but these programs have been reduced, delayed, or even end up with the fate of dystocia .

In addition, the advanced countries of Europe and the United States also substantially reduced the scale of development of the Navy, U.S. Navy, for example, a new generation DD (X) destroyer, CG (X) cruiser, are downsizing, or changed the construction cost and technical risk than low warships. Naval equipment development has entered a period of low swing, this is a global phenomenon, the European and American shipyard and naval weapons and equipment manufacturers therefore restructuring to adapt to the new business environment. Countries lack adequate funding situation, the Future Combat Systems Program and more forced to cancel today to replace a smaller, lower cost and technical difficulty weapons development program, and the degree of innovation of science and technology has been significantly compressed.

全民國防教育軍事訓練－全民國防　0　必　，上、下

「全民國防」，旨在說明全民國防之內涵與功能、全民國防教育的緣起及其重要性，並列舉世界各國推動全民國防教育的相關措施與特色。相較於中國大陸將國防觀念落實於

民眾生活的務實作法，我國應規劃更為多元、適切的全民國防教育內容，以符合防衛作戰的特點與趨勢。

臺海安全環境轉變，我國須相應進行戰略調整。面對

中共綜合國力提升與不斷擴增的軍事武力，國軍仍須維持堅強的國防力量，惟國家財政有限， 國防預算編列需考量整體資源分配，我國不可能與中共進行軍備競賽。未來將從有限預算做靈活運用以發揮最大效益之方向思考。發揮「以小搏大」的效果，並使共軍在估算戰爭所需付出代價後，不敢輕啟戰端。

Military Training of the National Defense Education-Civil defense **0 R F, S**

"National Defense", intended to illustrate the meaning and function of national defense, the origins of the National Defense Education and its importance, and cited measures and characteristics of the world to promote the national defense education. Comparison with mainland China defense concept to implement pragmatic approach in people's lives, and our country should be planning more diverse, and appropriate content of the National Defense Education to meet defense and combat features and trends.

The security environment in the Taiwan Strait into our strategic adjustments accordingly. The face of military force to enhance CPC's comprehensive national strength constantly amplified, Guojun need to maintain a strong defense force, except for the limited state financial, defense budgeting need to consider the overall allocation of resources, the country can not be an arms race with the Chinese communists. Future do flexibility in the use of the direction of thinking in order to play the maximum benefit from the limited budget. Play a "small risk" effect, and required to pay the price in the estimation of the war, the communist army after a war, dare delicately.

全民國防教育軍事訓練－國際情勢 0 必 ，上、下

「國際情勢」係由「全球化」發展切入，探討在經歷 2008 年「全球化」的金融風暴打擊後，各國藉由區域組織的建立，提振國家經濟並促成共同防衛的機制，此過程呈現出競爭與合作關係並存的複雜現象。而 2010 年末至 2011 年初爆發於北非突尼西亞的「茉莉花革命」，以及埃及強權遭推翻事件，讓世人驚覺社群網站 facebook 之訊息分享與串聯行動，竟可產生讓政權垮臺、讓全球的專制政權如臨大敵的強大威力。「全球化」確實已為世局帶來了不確定與無法預測之發展。

美國知名專欄作家、普立茲新聞獎得主湯馬斯·傅利曼（Thomas L. Friedman）， 在其《世界又熱又平又擠》書中分析：在「全球化」形成的無疆界、變遷快速的國際環境中，全球化牽一髮而動全身的連動效應，造成的影響往往超乎我們的想像與理解，而且沒有一個是個別團體、國家，甚至個別區域所能單獨因應解決的。

至於兩岸從軍事對峙至當前的和緩氛圍，自應珍惜和平來之不易。未來應如何圓滿化解大陸持續擴展軍力對我構成的軍事威脅，繼續推進和平發展，確保臺海地區長遠安定與繁榮，尤需兩岸共同關注並以智慧妥為因應。

Military Training of the National Defense Education-International Situations **0 R F, S**

"International situation" by "globalization" cut explore after experiencing the "globalization" of financial turmoil in 2008, the countries through the establishment of regional organizations, to boost the country's economy and contributed to a common defense mechanism, this process presentscomplex phenomenon of coexistence of the relationship between competition and cooperation. Broke out in late 2010 to early 2011 in the "Jasmine Revolution" in Tunisia, North Africa, and Egypt might have been to overthrow the event, the world suddenly became aware of the social networking sites facebook messages to share with a series of actions, can actually produce for regime collapse, so that the world authoritarian regime guard the power. "Globalization" really brings uncertainty and unpredictability of development for the world situation.

American well-known columnist and Pulitzer Prize winner Thomas Friedman (Thomas L. Friedman), "Hot Flat and Crowded," the book in its analysis: the formation of the "globalization" without Borders the rapidly changing international environment, globalization indeed affect the whole body linked effect, the impact is often beyond our imagination and understanding, and there is no one individual groups, countries, and even individual regions can separate response solution. As for cross-strait military confrontation to a relaxed atmosphere, the self should cherish peace hard-won. How satisfactorily resolve the the continent continued expansion of the military threat posed by the military power to me, to continue to promote the peaceful development, to ensure the long-term stability and prosperity of the Taiwan Strait area, particularly the cross-strait common concern and wisdom to properly cope with.

全民國防教育軍事訓練－國防政策 0 必 ，上、下

「國防政策」闡明因應國防安全的多元挑戰，當前我國國防政策的基本目標為「預防戰爭、國土防衛、應變制變、防範衝突與維持區域穩定」；軍事戰略則以「防衛固守，有效嚇阻」。

國軍現階段全面推動國防轉型，是順應新軍事科技與作戰型態改變的必要途徑，並追求國防經濟效益極大化，國防資源的投入須能兼顧國家整體經濟發展，國防發展亦應帶動民生經濟。每個國家對於本國的國家利益和國家安全，均視為國之大事，為維護國家的利益和安全，均會審慎擬定「國防政策」。隨著自然災變等非傳統安全事務影響國家安

全範疇的擴大，國軍亦須強化「災害預防、國土防衛」思維，以具體落實救災機制與整體編裝作業，展現軍民一體、同舟共濟的精神。

Military Training of the National Defense Education-National Defense Policies **0 R F, S**

"Defense policy" to clarify the multiple challenges in response to the national defense and security, the basic goal of China's national defense policy as "preventive war, homeland defense, strain the system change, conflict prevention and the maintenance of regional stability"; military strategy by the "resolute defense and effective deterrence. "

Stage of the national army fully promote the national defense transformation, it is necessary to conform to the new military technology and combat style change and maximizing economies of the pursuit of national defense, national defense resources invested to be able to take into account the overall national economic development, defense, livelihood and economic development should be driven . Each country for its own national interests and national security, are regarded as the affairs of state, and national defense policy to safeguard national interests and security will be carefully prepared. With the natural catastrophe and other non-traditional security affairs affecting the expansion of the areas of national security, the national army are also required to strengthen disaster prevention, homeland defense "thinking, the spirit of the concrete implementation of disaster response mechanisms and the overall compilation loaded job to show military and civilian one, the same boat.

一、農學院

(一) 農學院院定選修課程

永續農業　　3　選

本課程介紹永續農業的理論依據，包含永續農業之定義與發展、永續農業法規、作物栽培、土壤肥料、病蟲害綜合管理、水土保持、食品加工、綠色行銷、生態保育等，並引領學生了解所有主要相關的科學領域，從作物生產到農業技術、農場管理、食品加工和食品行銷。

Sustainable Agriculture　　3　E

This course will introduce the basic theories of sustainable agriculture, including the definition and development of sustainable agriculture, sustainable agriculture regulations, crop cultivation, soil and fertilization, integrated pest management, soil and water conservation, food processing, green marketing, ecological conservation. The course will lead students to understand sustainable agriculture in fields of science, from crop production to agricultural technology, farm management, food processing, and food marketing.

永續農業國內外專業實習　　3　選

本課程提供學生在校外之實習，以了解永續農業之經營現況，透過實地操作，使學生熟悉作物栽培之基本技能，包括作物種類及栽培方法、土壤肥料管理、生長管理、病蟲害及雜草防治、食品加工及農場管理實務等，使學生具備作物栽培之基本能力，以建立未來從事永續農業之能力。

Practice of Sustainable Agriculture　3　E

The course is designed for the off-campus operational training to let students to realize the real operations of sustainable agriculture. From the training, students will learn the basic farming techniques through field training, including the selection of crops and cultivation methods, soil and fertilization management, production management, pests and weed control, food processing, farm management, agricultural marketing, ecological conservation, and etc. This course will strenghthen students' ability in sustainable agriculture.

(二)　工作犬訓練學校

犬隻服從訓練實習　　2　選

服從訓練為維持人犬間良好關係理想方式之一，更是行為矯正最基本的方法，主要從狗對人及狗對其他動物的社會化入門，相處時建立適當位階、增加彼此溝通之默契，針對坐下、趴下、過來、坐下等待、趴下等待、定點休息和跟著走等項目進行訓練，讓狗能依主人口令做出正確的動作；課程中會從最基本的繫牽繩訓練到高階的無牽繩伴行進行說明，並會針對各種訓練用的頸圈分別介紹。這門課程對喜歡狗或是有養狗的同學將是非常實用，對各項工作犬專業訓練也是重要基礎。

Introduction of dog obedience training　2　E

Obedience training is an ideal way to build up good relationship between men and dogs. By doing this properly, it's not only helping to set up correct hierarchy and communication bridge, but also providing important foundation of any training programs. This training covers basic commands such as "sit", "down", "come", "sit and wait", "down and wait" and "heel", and requires dogs to fully understand and follow these commands. The course will gradually develop from leash-on training to leash-less sessions, and will also introduce different training equipments. This is very practical class for those students who love or own dogs themselves, and is very important basic of working dog trainings.

犬隻敏捷訓練與實習　　2　選

家庭飼養的伴侶犬，常受限於住宅環境而沒有充足的運動，很多主人只有帶狗散步或排便，忙碌的時候更可能長時間關在屋內或籠內，造成愛犬精神與心理的不安或焦慮。敏捷訓練是最佳人犬互動的運動，可以單項進行或組合多項同時演練，在一步一步訓練的過程中培養了良好的默契，也可以達到足夠的運動量。敏捷訓練的項目包括跳高、跳遠、擺盪前進、跳輪胎、蹺蹺板、獨木橋、高台、A 字板、隧道和 S 隧道等項目。歐美國家的狗主人更是發揮廢物利用的精神，用許多舊的木材或塑膠水管動手製作器具，本課程將與同學一起動手製作器具並與愛犬同樂。

Agility training　　2　E

Frequently, household dogs do not have sufficient exercise which is restricted by living environment. Majority of the owners only take their dogs for a walk or excretion. When owners are busy, the dogs may be locked in the cage or stay in the house for a long period of time. That could cause dogs to be nervous and anxious. Agility is the best exercise for cooperation between human and dogs. It can be process by a single event or multiple combinations simultaneously. Under the step-by-step training, they not only could have a good rapport, but also have enough exercise. The events of agility include jump heights, long jumps, winged jumps, tire jump, seesaw, long bridge, panel jumps, tunnels, and so on. In Europe and United States, the owners create their handmade equipments by recycling, such as old wood panel, plastic piles and so on. This course will focus on agility training with dogs and handmade equipments with students.

犬舍設計與經營管理　　2　選

目前狗旅館是很熱門的行業，也紛紛設計建造新穎豪華的犬舍，然而在設計建造時需要注意的事項是非常重要的，舉凡位置及坐落方向的選擇、電力及供水的來源、汙水的處理、陽光照射或特殊天候的預防、接待室、員工休息室、準備室、淋浴間和儲藏室等都需要在設計時列入考慮。經營管理時清掃、散放、餵食、洗澡和修爪剪毛等例行工作，或是每月要投予的心絲蟲和跳蚤預防藥，還有每年要進行的預防注射或內寄生蟲驅除等健康維護都是應妥善安排的事項。本課程將從建築硬體到經營的策略都會讓學生得到應有的資訊。

Design and Management of Kennel 2 E

Recently, dog hotel is very popular business, it tends to design and build kennel modern and luxurious. However, the details are very important that should be noticed when designed. For example, the choice of location and bearing, the source of power and water supply, sewage disposal, illumination of sunlight, prevention from exceptional weather, and room designed (office, crate area, preparation room, shower room, storage, and so on.). Healthy care should be well managed. Routing work should be done by specific date, such as daily clean, feeding, and walking; others are showering, grooming, and trimming. Monthly medical care should be given as preventative medicine for ecto-parasite and heart warm disease. Annually medical care should be given as vaccination and anti-endoparasite medicine as well. This course will talk about sufficient information that includes two categories: design of kennel and strategy of kennel management.

犬隻傳染病與公共衛生 2 選

犬隻傳染病病源計有病毒、細菌、黴菌、原蟲、內寄生蟲和外寄生蟲等。畜主或伴侶犬經營者應熟習這些傳染病，在公共衛生的考慮下，做好健康維護和傳染病預防，同時也兼顧人類的健康，不受愛犬少數共通傳染病病源的影響。

Canine infectious disease and Public Health 2 E

Pathogens of canine infectious disease include virus, bacterium, fungus, protozoa, parasite, and so on. Canine infectious disease can cause acute to chronic clinical course that may be mild, severe, even death threat. Owners and managers should be familiar with these infectious diseases in order to prevent them and maintain dogs have good health. This course will focus on canine infectious diseases and public health that influence human and dogs.

工作犬產業行銷學 2 選

現代社會的商業經營非常需要有專業行銷的概念，在伴侶犬的服務行銷方面也要有良好的行銷學基礎，故開設此課程，針對行銷概論、消費行為、行銷研究、行銷策略、產品策略、推廣策略、通路策略、價格策略、行銷管理、和行銷的未來進行分析說明。也會讓學生以伴侶犬為主題撰寫行銷報告。並在課程中提出報告讓同學分享多元化的構想。

Working Dogs Industry Marketing Management 2 E

Commercial management needs professional marketing concepts. The aspect of service companion dog should have good marketing background as well. This course will focus on analysis of introduction to marketing science, consumption behavior, marketing research, marketing strategy, product strategy, promoting strategy, channel

strategy, price strategy, marketing management, and the future of marketing. Students will learn to present their variable concepts of marketing which focus on the subject of companion dogs by writing and presentation.

工作犬簡介　　2　選　　祁偉廉

自從狗能協助牧羊人放牧羊群，狗不只可作為多才多藝的牧羊犬，也可協助人類警衛和打獵。如今，狗的工作更為豐富引人入勝，在多元化的工作項目中，扮演著協助者的角色。工作犬可以協助身心障礙者，包括導盲、導聾和肢輔等項目；在犬嗅覺運用方面有搜救、緝毒、防爆和野生動物保育等；另外在陪伴人類的身心靈方面，也有針對陪老人、陪病人和陪兒童等。本課程將說明狗和人密切合作的發展，共同努力發展最佳的能力。隨著時代的進步，工作犬在良好的操作下，學會彼此的欣賞和尊重。

Introduction of Working Dogs　　2　E　　Chi-Wei Lien

Since the dog help hunting, dogs have start working for human. Later on, shepherds dog guarded their flocks against wolves. Dogs have evolved and worked as accomplished herders, guards, and hunters. Today, dog jobs are far more plentiful, fascinating, and diverse. Dogs could work for guide, hearing, service, therapy, rescue, entertainment, sniff-out narcotic, explosive, wildlife and so on. They even can provide affection and comfort to people in spirit. The relationship between people and dogs has developed a strongest rapport because of working hard together and cooperation more closely. This course will focus on development of intimate and cooperative relationship between human and dogs, and bringing into the work together to the best of their abilities. As time progresses, handlers and their working dogs have learned to appreciate and respect each other within good cooperation.

校外實習　　3　選

選擇優良的伴侶犬或工作犬單位，讓學生前往實習，進行職場體驗，也讓企業有機會求得優秀的人才。

Practice of Industrial Training　　3　E

Students can be out of school and have on-the-job training related with dog training units. It is an opportunity for students to get work experience and the company can have chance to get experienced interns as full-time regular employers.

(三) 生物科技系

保健食品概論　　2　選　　黃卓治、下

講授保健食品相關知識，說明其定義、發展歷史及國際現況，比較各國保健食品相關申請認證文件內容及規定，介紹保健食品範圍，專有名詞法規，健康食品申請流程與內容，說明功能性原料之化學組成及生理功能，介紹食品安全性評估技術及其應用，內容包括食品毒理學，並由食品營養學觀點，說明保健食品之理論基礎與其在加工上之應用。

Introduction to functional food　　2　E　　T. C. Huang,　S

Definition and range of functional food will be discussed. The initiation, development and future trend of functional food industry will be introduced .The terms, systems of

health food certification and related regulation of health food of various countries will be included and compared. The principle or active components and their functionalities on human body will be interpreted. Toxicology concerns about major compounds in functional products will be included. Nutritional point of views will be applied to explain the role and bioactivities of functional foods.

(四) 生物資源研究所

森林資源經濟分析　　3　選　　羅凱安、上

課程旨在訓練學生瞭解森林資源經濟問題，並能作經濟決策分析及效益評估等，主要內容包括：森林資源經濟系分析；森林資源最適化分配問題；森林資源經營之經濟效評估；林業生生產之投入產出分析；森林資源政策之經濟分析；專案研究。

Economics Analysis of Forest Resources　　3　E　　Kai-An, Lo　F

The objective of this course is to provide students with an ability to understand problems
of forest resources economics, to analyze forest resources economic policies and to implement cost-benefit assessments. The major contents include: The analyses of forest
resources economic system; the best allocations of forest resources; the analyses of forestry
production; the economic analyses of forest resources policies; special research projects on
forestry economics.

生態旅遊研究　　3　選　　羅凱安、上

台灣的位置與地形特殊，有許多實貴的生態與人文資源，如何保育與合理利用是相當重要的研究課題。生態旅遊是一種當前環境保育、發展觀光與社區發展三個重要方向發展下的產物，其不僅為國內外的發展趨勢，也是各種生態文化產業提供新的發展契機。本課程主要涵蓋五部份，即生態與旅遊之導論、生態旅遊之資源與調查、遊憩觀光之衝擊與評估、生態旅遊規劃與管理、以及生態旅遊案例與省思，培養學生具有研究與操作生態旅遊之能力。

Ecotourism Research　　3　E　　Kai-An, Lo　F

Taiwan has important location and unique landscape. There are many treasure embedded in ecological and cultural resources. How to preserve and conserve those resources are quite important research topics. Ecotourism is a new concept to deal with environmental conservation, tourism, and community development. It is not only domestic and foreign trend; also provide turning points for various ecological and

cultural industries development. Of this curriculum mainly covers five parts, namely introduction, the ecotourism resources and the investigation, recreational impact and the monitoring, the eco-tourism planning and management, as well as the case studies and reconsiderations. It can enhance the students' research and operation ability on ecotourism.

休閒研究方法論　　3　選　　陳美惠、上

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。

Research Methods in Leisure Studies　　3　E　　Mei-Hui, Chen、F

This course shall provide training in the basic knowledge and skills necessary for the development and conduct of graduate student research. These knowledge and skill shall include, but not limited to,（1）problem development （2）study design （3）methods of data collection and analysis, and（4）the reporting of research findings and conclusions. In addition, this course shall emphasize, through example practice and the application of statistical software to analyze data.

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。

Advanced Microbial Physiology and Genetic　　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.

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。

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.

基因表達系統 2 選 陳又嘉、鄭雪玲、下

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。

Genetic Expression System 2 E Y. C. Chen, H. L. Cheng S

This course emphasize the expression of prokaryotic and eukaryotic genes, and introduce the common use of host expression system.

應用微生物特論 2 選 陳又嘉、下

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。

Special topics in Applied Microbiology 2 E Y. C. Chen S

The course is designed to offer students advenced 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.

應用微生物學 3 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。

Applied Microbiology 3 E 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.

動物幹細胞建立與應用　　2　選　　許岩得、下

於「動物幹細胞建立與應用」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 Stem Cells　　2　E　　T. D. Hsuuw　S

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.

動物幹細胞建立與應用實習　　2　選　　許岩得、下

而在「動物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 Stem Cells　2 E　T.D.Hsuuw　S

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.

(五) 動物科學與畜產系

職場體驗　　1　選　　張秀鑾、劉世華、下

本課程旨在培訓學生應用人工授精基本原理與技術於實際習作技術之應用，透過民間豬隻人工授精站例行實際運作之職場實習過程，落實「人工授精站標準作業」流程之現場操作，以及豬隻精液品管檢核制度之產業化。

Practical Training of Professional Workplace　1　E　H. L. Chang、S.H. Liu　S

The objective of this course is to apply the fundamental principle and useful techniques of artificial insemination in routine operation of swine AI stations. The course is designed to provide students with the workplace internship to experience the standard operation of AI stations in pig industry, including fulfillment of SOP and setup of semen quality control.

(六) 森林系

林業工作實習　　6　必　　上

學生依據實務專題指導老師之建議，學習與森林培育與保護、森林資源調查與經營管理以及自然資源保育與利用等範疇有關之林業實務工作，透過實地工作與體驗，加強學生敬業精神與專業能力，使學生能在理論與實務兼具，增加進入產業之前的興趣與實務經驗，非以講授方式為主之綜合性活動。實習活動於大四上學期進行，未同時選修產業實習之學生，每周需實習2天以上，實習時間為18周，同時選修產業實習之學生，每周則需實習4天以上，實習時間為9周。

Forestry Practice　　6　R　　F

Students in accordance with the recommendations of his/her advisors of Monograph course to learn and experience forestry practice mainly non-lectured integrated activities about forest cultivation and protection, investigation and management of forest resources and nature resources conservation and utilization, etc. through field work. It will enhance students' dedication and professional ability, combination of theory and practice, increased interest and practical experience before entering forestry industry. This course will proceed in senior first semester. If students do not select Industrial Practice course at the same time, they must spend two days per week, 18 weeks in total semester. Otherwise, while students do select Industrial Practice course at the same time, they must spend four days per week, nine weeks in total semester.

產業實習　　6　選　　上

學生依據自己的興趣與實務專題指導老師之建議，至國內外某一特定的森林培育、自然資源保育、經營管理與利用等相關之公家機關或民營事業機構實習，透過機構之安排，讓學生體驗產業實地工作，協助增加專業能力與實務經驗，使學生能在理論與實務兼具，並瞭解產業需求與倫理，非以講授方式為主之綜合性活動。實習活動於大四上學期進行，學生每周需實習4天以上，實習時間為9周。

Industrial Practice　　6　E　　F

Students based on their interest and the recommendations of his/her advisors of Monograph course to study in a particular domestic and foreign relevant government agencies or private utility companies such as forest cultivation, natural resources

conservation, business management and utilization. The agencies/companies will arrange mainly non-lectured integrated activities of this course, to enable students to experience field work of the industry, increase the professional competence and practical experience. Students can combine both theory and practice, and understand the needs and ethical of particular industry. This course will proceed in senior first semester. Students must spend four days per week, nine weeks in total semester.

二、工學院

(一) 機械工程系

金屬模流分析　　3　選

本課程介紹現今業界普遍使用之金屬模流製程及模流分析方法，使參與本課程學生可以了解各種金屬模流製程之模具結構、材料特性、充填及成型過程，並學得基礎模流系統之網格設計、製程參數設計、流場及缺陷分析技術，以縮短先期產品開發時程。

Metallic Mold Flow analyses　　3　E

Provides an overview of manufacturing and analytic methods related to metallic mold flow processes (MMFP) to the graduate/undergraduate students using a disciplined Computer-Aided approach. Aims are to equip students understanding miscellaneous die structures, materials characteristics, filling and forming processes of MMFP, and to training students to have a fundamental ability on the design of grid and processing parameters, and associated analysis techniques to the metallic flow field and structural defects.

(二) 車輛工程系

品質改善實務　　3　選　　周秀曉

本課程主要目的為培育產業管理階層人才，使學生針對一般管理內容、品質改善價值觀念、品質改善活動計劃及實施要點、顧客關係與服務管理對產業提昇的重要性具有深入的認知與了解。內容包括管理學概要、生產品質分類、品質管理應用與實務、品管圈活動計劃與實務、品質改善提案實務、顧客關係管理概要及服務管理概要等。

Quality Improvement Practice　　3　E　　Sh. Sh. CHOU

The purpose of this course is to cultivate industrial management talented people. This course enables students to become knowledgeable of the general management process, the value and concept of quality improvement, the planning key points and the activity of quality improvement and the importance between industry level-up and customer relationship service. The content of this course includes: the outline of management, the classification of production quality, the application and practice of TQM, the planning and Practice of QCC, the practice of quality improvement proposal, the outline of customer relationship management and service management.

校外實習　　3　選　　李佳言

為促進產學間技術與人才之交流，提升產學合作研發能量，增加學生校外實習機會，並為企業培育未來人才，特開設本課程. 修習本課程之學生將在授課教師與指導教授協助之下進入業界以實習工程師進行至多六個月的實習。以其學生在畢業以前能深入了解業界生態，培養就業技能，並增進其職場競爭力。

Practice of Industrial Training　　3　E　　C.Y. Lee

Summary: The objective of the course is to promote the communication between business and school, increase students' opportunities of extracurricular intern and educate future engineers. The students should work as an intern engineer in business under the help and suggestion of advisors in six months at most. We hope the students can comprehend the business environment, incubate their technological talents and improve their competitiveness before their education.

(三) 材料工程研究所

電子顯微鏡原理　　3　選　　盧威華、林鉉凱

本課程讓學生了解掃描式電子顯微鏡及成分分析之原理及其應用，並安排示範操作及實作訓練課程，讓學生充分了解各項設備的功能，進而有深刻認識並用於其研究工作。授課內容為顯微鏡之結構及其原理、X射線之原理及應用與機台操作。

ELECTRON MICROSCOPY　　3　E　　Wei-Hua Lu、Hsuan-Kai Lin

The aim of this course is to acquaint the students with the principles of scanning electron microscopy (SEM) and energy dispersive X-ray spectrometer (EDS). The course also arranges the practical sessions to the students in order to fully understand the functions in our system. The students can make use of the system on their research in the future. This course includes the principle and structure of SEM, qualitative X-ray analysis and practical operating in our equipment.

三、管理學院

(一) 景觀暨遊憩管理研究所

環境導覽與解說系統特論　　3　選　　羅清吉、上、無

本課程主要目的在使學生者從環境規劃設計者的角度,了解景觀及遊憩環境之導覽解說相關理論技術與實務，透過課程講授、案例研究分析與討論，習得環境導覽與解說系統規劃設計之相關理論與實務、探討環境導覽與解說系統領域之實務問題及其對策。課程主要討論單元包括: 環境導覽與解說分類，特性內涵及導覽解說人員之基本學識技術與特質，環境導覽與解說系統規劃方法與專業技能,解說設施之規劃與設計，導覽解說人員專業訓練實務等。

Special Topics on Environment Interpretation System　　3　E　　Robert.C.Lo, F, Nil

The aim of this course is to assist the graduated students to be familiar with related issues of Environment Interpretation system and the interpreter training program. The major contents of this course include：the characteristics and classification of Environment interpretation system, the knowledge and skill of environment interpreter, environment interpreter training program , environment interpretation facility planning ,design and management .

環境管理系統特論　　2　選　　羅清吉、下、無

本課程主要教學目的,在使學生熟習環境管理系統的相關程序與作業規定，瞭解ISO14000系列標準,定義,環境管理系統之制定、實施、實現、評審和保持環境方針所需的組織機構、規劃活動職責、程式、過程和資源。課程內容包含組織的環境方針目標和指標管理,環境保護與污染控制技術,環境保護法律法規、標準及認證相關法規,環境管理系統審核員職業素質與能力及環境管理系統審核流程與審核技能等。

Special Topics on Environment Management System　　2　E　　Robert. C.Lo, S, Nil

This course provides a forum of discussion on the related issue of Environment Management System (EMS) , the skills, methodologies and approaches of EMS, the implement of EMS ,checklist format based on ISO 14001.

This course will assist graduated students:

- Gain a broad overview of the legal implications of environmental management
- Understand the requirements of ISO 14001 and their application
- Understand the requirements of the EU's Eco-Management and Audit Scheme

(EMAS)
・Learn how an EMS can further business success and how to benchmark best practice.

(二) 企業管理系

國際貿易實務　　3　選　　趙雨潔、陳佳誼

國際貿易實務係研討如何處理當前國際貿易之學科。隨著國內外政經情勢遽變，相關國際企業與組織不僅為了因應時代變遷之需要而調整營運活動，尚須對於國際間相關之貿易作業規則與各國貿易管理措施等影響國際貿易實務上之運作，做一通盤瞭解。因此本課程主要目的在於培養學生具備國際商務人員應有之基礎職能，將來方能勝任高技能與高知識的國際商務工作。本課程內容涵蓋：國際商業文書撰寫、國際經貿環境、進出口實務、報關實務、國際商業禮儀、全球產業分析等。

International Trade Practice　　3　E　　Y.C.Chao, C.A.Chen

The Practice of International Trade is a subject which discusses how to cope with current international trade. According to an upheaval from political and economic situation, relevant international organizations not only have to handle the needs of the times, but also use the relevant operating rules of international trading and national trade managements to affect operations about the practice of International Trade.
This course has been designed to equip students with foundation skills of international trade. The main subjects includes: business memo writing、international trade environment、import and export practices、declaration practice、international business etiquette、global industry analysis.

服務行銷職場體驗實習　　2　選　　沈慶龍

本實習課程之主要目的為提供學生職場體驗之機會，使學生能從實習工作中學習服務行銷實務，以強化服務行銷相關技能，並協助學生為日後就業做好準備。

Service Marketing Internship　　2　E　　C. L. Shen

The internship course is designed to provide students with on-the-job practical work experience to enhance service marketing skills and help them prepare for the job market.

國際商務職場體驗實習　　2　選　　趙雨潔

本實習課程之主要目的為提供學生職場體驗之機會，使學生能從實習工作中學習國際商務實務，以強化國際商務相關技能，並協助學生為日後就業做好準備。

International Business Internship　　2　E　　Y.C.Chao

The internship course is designed to provide students with on-the-job practical work experience to enhance international business skills and help them prepare for the job market.

不動產經營管理　　3　選　　謝惠元

不動產經營管理之目的是藉由對不動產之開發經營管理來創造不動產之最大利益，反應其應有價值。不動產具有不可移動性、稀少性、異質性、昂貴性、長久性、投資與消費雙重性等。投資者對不動產正確的認知不但可滿足消費需求，還可創造增值利潤。近年來「不動產證券化」已非常成熟，提供不動產經營與管理業者更具寬廣之發展空間。但不動產之流動性必須先透過良好之規劃與管理才能顯現其財務效益。因此本課程之目的是以策略之觀點來培養學生對不動產之認識並藉由對不動產經營與管理之學習來提升學生創造不動產價值之能力。尤其不動產深受外在環境與景氣循環週期等因素之影響，正與策略管理之外在環境分析相符。本課程以 SCP 理論從總體與個體角度分析不動產業，一、總體方面探討不動產業之外在影響因素(S)、產業行為(C)、產業績效(P)、產業效果(E)等，包括不動產之總體環境分析（S1）、不動產市場分析、不動產與經濟、不動產景氣循環、不動產區域發展、不動產生命週期、不動產之定義(S2)、營建業價值鏈分析、建築業行為(C)與指標(Proxy)、理性與非理性行為、網絡行為、建築業績效與指標(P)、建築業之效果與指標(E)、不動產開發、不動產興建管理、住宅不動產管理、不動產管理計畫等。二、就個體角度而言，分析建築業之企業行為與績效，包括不動產公司之績效分析、策略、經營管理、行銷計畫、與不動產財務規劃等。

Real Estate Management　　3　E　　Henry H.Y.Hsieh

Real estate management is to maximize value and profit of the property by development, operation and management. Real estate is characterized by immovability, scarcity, heterogeneity, pricey, longevity, dual purpose of investment and consumption. A correct perspective of real estate not only satisfies the demand of consumption but also creates incremental value to investor. Recently Real Estate Investment and Trusts (REITs) thrives in Taiwan providing a wider market for Real Estate Industry. However the value of real estate can only be realized by streamlined planning and management. The course's objective is to teach students a comprehensive and correct acknowledgement of real estate from a strategic perspective. In addition the course also trains students the ability to develop and manage real estate increasing the value of property. Real estate is influenced by external environment and economic cycle, same as External Environmental Analysis in Strategic Management. The course basing on SCP model analyzes real estate Industry from macro and micro perspectives. Firstly from macro perspective we study external factors influencing real estate industry (S), industry behavior (C), industry performance (P), and industry effect (E). The course contents include macro environmental analysis of real estate (S1), real estate market, real estate and economy, real estate cycle, regional development, real estate industry life cycle, definition of real estate (S2), value chain analysis, construction behavior and proxy (C), rational and irrational industrial behavior, construction network, construction performance and proxy (P), construction effects and proxy (E), real estate development, construction management, residential real estate management, real estate management plan. Secondly from micro perspective, we analyze individual

construction companies' conducts and performances, including construction company's performance, strategy, management, marketing management, real estate financial planning.

管理經濟　　3　選　　Do Anh Tai

企研所的學生在畢業後將面臨許多企業經營的問題，諸如他們必須回答應生產與銷售什麼產品?為什麼?及多少的問題等，而這些問題均需應用經濟的理論與技術來加以解決。

本課程主要在教導學生，如何應用經濟的理論與技術，以解決企業的經營問題，因此，課程的設計將提供並協助學生，了解有關需求的理論與預測，此將有助於新企業在創立時，首須檢視是否在市場上仍有其生存與立足的空間；為了有效管理其營運活動，經理人必須能從經濟的觀點，來瞭解企業管理的程序，因此，本課程亦將教導有關生產與成本的理論，此將有助於學生瞭解並分析決策制定上的原則；除此之外，本課程也將提供訂價實務與市場結構的知識，讓學生充分瞭解營運活動所面臨的企業環境；更重要的是，讓學生學習到在企業經營上，如何制定較佳的決策及其所持的理由。

在修習本課程內容上，學生應先具備代數、微積分及統計(迴歸分析)的基本知識。在修習此一課程後，學生應能瞭解需求理論與預測、生產與成本理論、具實務性的成本分析、訂價實務及市場結構，尤其是在企業營運活動上的決策制定。

Managerial Economics　　3　E　　Do Anh Tai

MBA student after graduate will face with many business problems such as they have to answer for the question what should we produce and sell? and why?, and how much? etc. which can be solved by applying economic theory and technique.

This is a course in the applications of economic theory and techniques to business problems. the course design for providing and helping our students understand about demand theory and estimation which is a starting point for any business activity that help to answer the question whether any place for an enterprise to setup new business in the market; in order to manage good business activities the manager need to understand the process in term of economic point of view therefore, this course also provide the knowledge on production and cost theory which will help our students to analyze and know the principle of a decision making for the activities; beside empirical cost analysis, this course will provide the knowledge on the area of pricing practices and market structure for our students to understand the business environment that their activity will play; and the most important for any enterprise that they need to know how to make a better decisions for their business activity and why?.

For our students in order to understand the content of the course they should have some basic knowledge and skill about algebra, calculus and statistics (regression analysis). After finish this course we expect that our students are able to understand demand theory and estimation of the function, production and cost theory as well as estimate those functions, empirical cost analysis, pricing practices and market structure, and especially decision making for their business activities.

Exams and Grading Procedure: Quiz, assignments, participation in the seminar is 60% of the total point, class attention is 10% of the total point, and Final Tests is 30% of the total point.

四、人文學院

(一) 幼兒保育系

數位媒體教學設計專題研究　　3　選　　許衷源、下

本課程目標將探討教學設計領域方面的研究，引導學生瞭解教學設計、常見教學設計模式、實務應用介紹、與相關研究討論。期能從中發掘個人的研究議題，並整合文獻和研究構想。

Introduction to instructional design research　3　E　Chung-Yuan Hsu

Syllabus: In this course we will be exploring instructional design research. Students will gain a broad understanding of instructional design, widely used instructional design models and their application, as well as relevant research. Students will be expected to explore their research topics and integrate the literature with their ideas.

數位媒體教材開發與設計　　2　選　　許衷源、下

課程大綱：本課程的目的在於透過錄影設備操作與影音編輯軟體等教學，讓學生可以從中瞭解影音類型、影音後製作業流程、特效製作、腳本設計、運用影音編輯技術完成多媒體專案、進而培養影音視訊設計與編輯興趣。

Computer assisted learning　2　E　Chung-Yuan Hsu

In this course we will instruct how to use video recording equipments, video editing software, and storyboard design. Students will gain a broad understanding of media types, process of conducting video editing, special effects, storyboard designing, and completing a multimedia project. Students will be expected to develop their video editing skills and interests.

弱勢族群音樂教育專題研究　　3　選　　李之光

本課程是提供給為了尋求更專業發展的弱勢族群音樂教學者。課程融合實務與理論。學生有機會去增進他們的教學技巧與知識，進而成為一位優良的弱勢族群音樂教學者。修習完成此課程也增進他們理解進入學術殿堂過程中所須要的專業要求，以及這樣的過程的經驗如何應用在他們實際的教學情境中。

Minority Music Education　3　E　Tze-Kuang Lee

The course is for minority music teachers who seek further professional development. The degree program blends theory and practice. Students have opportunities to further their skills and knowledge as minority music teachers. They also take the course to expand their understanding of the processes of scholarly inquiry in the profession and how those processes have application in their own teaching settings.

數位教材開發與設計專題研究　　3　選　　許衷源、上

本課程的目的在於透過錄影設備操作與影音編輯軟體等教學，讓學生可以從中瞭解影音類型、影音後製作業流程、特效製作、腳本設計、運用影音編輯技術完成多媒體專案、進而培養影音視訊設計與編輯興趣。

Computer assisted learning　　3　E　　Chung-Yuan Hsu

In this course we will instruct how to use video recording equipments, video editing software, and storyboard design. Students will gain a broad understanding of media types, process of conducting video editing, special effects, storyboard designing, and completing a multimedia project. Students will be expected to develop their video editing skills and interests.

機構實習　　5 選　　輪授、下

本課程旨在鼓勵學生參與教保相關機構的進階實習，期許學生學習產業達人的豐富經驗，靈活運用專業知識與實務技能，提升其微型創業能力。

Agency Practicum　　5 E　　，S

The aim of this course is that students could be Interaction with dimension’s experts. They can learn how to combine the dimension knowledge in order to increase the ability of the micro-ent

(二)客家文化產業研究所

客家傳統建築　2　選

建築是文化的載體，尤其台灣南部還保存了許多傳統合院建築。這堂課將帶大家認識並且論述合院建築的格局、時代特徵、建築風格、建築價值、建築與風水，並帶領學生勘

查客家歷史建築，論述其文化資產的價值。

Study on Hakka Traditional Architecture 2 E

We believe that architecture carry the culture, especially south of Taiwan kept a lot of Hakka traditional architecture all the time, like San-He-Yuan, that is Courtyard House in Taiwan. In this class, we discuss some topics about architecture, include: pattern, character, style, value, Feng-shui. In addition, we will understand these in practice, like explore Hakka traditional architecture, and explain value of cultural properties conservation.

客家文化政策 2 選

本課程旨在啟發學生們對於文化多樣性的興趣，培養認識異文化的包容、並能反省與觀察自身的社會文化，課程內容主要針對客家文化政策變遷及趨勢，提供基本知識及脈絡，協助同學了解目前客家文化政策相關之議題、現象、及發展趨勢。

Hakka Cultural Policy 2 E

This curriculum is for the purpose of inspiring the students' interest of the multiple of culture, reflect and observe their own culture. The curriculum content mainly aims at the Hakka cultural policy and the tendency, and help students know the resent issue, development trend of hakka cultural policy.

設計美學專論 2 選

本課程將有系統介紹設計美學的概念及理論。內容著重在藉由基礎美學思潮的介紹，讓學生瞭解美學的發展歷史；設計美學原理和要素的說明，讓學生明白優質設計美學的通則；設計美學欣賞力的培養，能提高學生美感鑑賞的能力。

Special Topics in Design Aesthetics 2 E

This curriculum introduce the concept and the theory of the design aesthetics systematically. The content focus on the introduction of basic aesthetics trend for the students to understand the development history of aesthetics. And the explanation of the principle of the aesthetic theory, let student know the general rule of design aesthetics. And improve the ablitity of stusdents' appreciation of design aesthetics.

文化研究導論 2 選

文化研究是一個跨學科的研究領域，它將文化當作表意實踐活動，並置文化於社會權

力的脈絡中來探究。本課程旨在幫助學生了解文化研究的一些基本分析的概念和做法。透過相關理論文獻的閱讀、引介，使學生了解文化研究的脈絡、知識傳統及研究領域，包含全球化、後現代、性別文化、族群認同、媒體與文化再現、後殖民文化論述等。最後期許學生能運用所學理論，針對當前客家文化現象進行分析。

Introduction to Cultural Studies 2 E

Cultural studies is an interdisciplinary field of research, it will be cultural as ideographic practice activities, and set to explore the culture in the context of social power.This course is designed to help the students familiarize with some fundamental analytical concepts and practices of Cultural Studies. Through the introduction of the theoretical literature, students should be able to gain an initial understanding of the context, knowledge tradition and field of research about culture study, including globalization, post-modernism, gender culture, ethnic identity, media and cultural representation, post-colonialism etc. This course is also expected that they can apply them to the current Hakka culture phenomena.

地理資訊實務與應用專論 3 選

地理資訊系統是近年來發展的一種環境資源管理工具軟體，運用電腦科技來整合各種不同來源的空間資料，如地圖、數值航照、全球定位系統、衛星遙測影像等，可以協助國土相關機構管理環境，輔助擬訂環境政策及監視環境變化，使我們能充分且永續的管理地球資源。

本課程延續理資訊系統在文化產業應用之基礎課程，進一步介紹 GIS 的各專業模組，以及其在學術研究應用與實務利用趨勢，期培養學生實際應用 GIS 以解決各種問題的基本信心及能力。透過一人一機的操作使同學能運用這項新的工具軟體，可輕易製作地理資料庫及統計地圖，使學生於修習本課程後能夠理論與實務兼備。

The application and Practice in Geographical Information System 3 E

Nowadays, the applications of Geographic Information Systems in non-hakka areas are much more than in hakka areas, so this is value to advance. This course will integrate the professional extension modules like 3D 、Spatial 、network 、Regional analysis and Image processing technologies. of Academic research deeply，and establish a complete database with a social-economic system and historical map through the Geographic Information Systems. t attempts to help students to use those tools in survey, nature resources investigation, environment, ecological monitor, and disaster first acid. With those technologies they can solve problems more efficient.

文化、空間與人地關係 3 選

老子曰：「人法地，地法天，天法道，道法自然。」（道德經第廿五章）

客家族群在千餘年來遷徙發展的歷史洪流中，歷經與生存環境的衝突、調適與融合的過程，先民學會了人地共生、善用自然資源、擇良地(環境)而居。客家可謂最了解如何與環境共存、善用地理條件的族群。從人口遷徙選擇可供生存的土地(如桃竹苗的林業、礦業；南部的優沃農地)，其後資源開採快速的衰減，促使族群的再次遷徙(如苗栗南庄)，善用自然資源的先民也建立融入環境的客家庄，例如埤塘、水圳兼具灌溉、防災、生態與今日休閒功能，並利用在地資源發展出地方特色的建築、美食、手工藝等客家文化。

「人」與「地」是地理學的兩大基本要素，「人地關係」一向被認為是地理學研究三大傳統之一。客家庄與水共生、客家族群與環境共存，實因「人地關係」乃形成「客家人文地理景觀」的原因，但在「客家文化」的研究上，「人地中的【地】」的主體角色常被簡化了。

另一方面，Castle（2001）曾經指出，空間是人們所設計的，倘若設計者或使用者本身具有既定的性別假設或偏見，空間便被「性別化(gendered)」了，因此空間就是一種性別化的科技(a gendered technology)。因此，空間的生產及設計牽涉了複雜的權力運作，背後並隱含了意識型態與刻板印象，但透過多元文化主義的觀點，不僅可以打造出新的，更符合大眾需求的公共空間，空間也有可能可以型塑出新的權力關係

本課程重點：「客家文化研究」對空間(權力、性別)、人地關係理論「新考量」。

1.培養學生在客家研究中對人地關係的正確認識，選擇合適的研究切入點。

2.訓練學生在田野實務中，對空間、人地關係的觀察能力及分析能力。

3.培養學生由空間感(地方感、鄉土感)、人地關係的具體發展內容，推演客家地域生活的特色，歸納客家地域文化的特質。

Topics in Culture、Space and Man-Land Relation　　3　E

This course will cover following topics: 1. Introduction - Man-Land Relation ; 2. to study the related issues about Hakka and Settlement, including the history of settlements, the development of settlement, spatial organization, and their conservation and adaptive use;3.A Theoretical Study of Hakka on the Regional System Coordination and Lasting Development Between man and Land, 4. with development of economy and society, people should reconsider the relation of nature and human and put the coordinated and harmonious theory of human nature symbiosis into practice.

景觀與環境規劃　　3　　選

「景觀與環境規劃」課程主要為學生學習空間規劃與設計概念，應用基地計畫與分析之基礎結果，將合於社區、生態、聚落等地域發展需要；透過文化、文創活動引入，於地域空間內適當配置規劃各種設施、安全的人車動線，同時兼顧融合周邊的社會經濟發展或自然環境限制條件，建構具有生態環境、景觀美化、社區認同的新環境。本課程旨在於提供志趣於社區營造規劃領域者，有關景觀形塑與良好環境規劃的技術，認識從空間

發展計劃設計、活動引入適切性、景觀及環境規劃的設計、經營管理過程之理論與實務。藉由了解空間營造的過程，思索如何對居住家園、社區、都市，進行生活環境的改造，甚至應用於休閒農場(產業)、觀光工廠規劃等休閒產業管理之機制中。

課程目的在促使學生能夠充份了解環境規劃的分析方法後，於社區營造案、休閒經營或活動企劃案之研擬，培育學生具備撰述規劃分析報告、個案研究、現場分析及替選方案的研擬等之相關技能，進而吸收實務經驗，以強化畢業後應付此類規劃挑戰之技能與經驗。

Topics in Landscape and Environmental Planning 3 E

This course is to introduce the basic concept of Landscape and environment planning , principle, type, information system, supply and demand of Environment and resource planning , project assessment, environmental impact statement and assessment, financial planning, management plan, computer aided planning…etc.

五、獸醫學院

(二) 動物疫苗所

疫苗產業應用　　2　選　　莊國賓等合授

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

Application of vaccine technology　2　E

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

疫苗生物資訊概論　　1　選　　鍾曜吉等合授

本課程介紹生物資訊應用於疫苗產業相關現況與發展，主題包括生物資訊資源-資料庫的介紹，生物資訊應用於生物科技現況，免疫基因簡介及免疫基因研發策略概論，最後進行分組討論報告及測驗。

Introduction to Vaccine Bioinformatics　1　E

The purpose of this course is to teach students the development and application of bioinformatics in various veterinary vaccines. The contents include the resource of bio-information-biological databases, the introduction of the immune genes, the strategies of vaccine based on bioinformatics and the current application of bio-information in vaccine technology. All topics will direct improve student in the concept of bioinformatics.

免疫基因與生物資訊實習　　1　選　　楊忠達等合授

本課程協助學生瞭解一般的生物資訊學概念，學生將學會使用並應用資料庫搜尋與免疫反應調節相關的基因，並進行核酸序列分析、序列多型性分析、蛋白質結構預測、分子間作用的模擬及蛋白質體學之蛋白質鑑定。

Practice of Immune genes and bioinformatics 1 E

The curriculum will help students realize the general concepts of bioinformatics. Students will learn to use and apply data banks to search genes, which involve immune response regulations, and perform nucleotide sequence analysis, sequence polymorphism analysis, protein structure prediction, simulation of intermolecular interactions, and proteomic approaches for protein identification.

疫苗製程特論實習 1 選 朱純燕、鄭力廷等合授

帶領學生實際操作活毒與次單位疫苗製程。同時介紹動物疫苗及佐劑先導工廠與講解優良藥品標準操作規範。

Practice of Vaccine process 1 E

Students will participate in the production of attenuated and subunit vaccine. The operation of the Vaccine Pilot Plant will be introduced and the regulations of standard vaccine production will be explained.

活毒疫苗產業製程研習 1 選 朱純燕等合授

課程內容包括：培養基及保護劑配製、細胞培養、病毒接種、病毒採收、病毒抗原與保護劑混合及凍結真空乾燥、病毒含有量測定、開凍結、封蓋及真空測試等，活毒疫苗製程之標準操作實習。全部課程於動物疫苗 GMP 廠實地操作，訓練修課學生活毒疫苗製造之能力，為產業製程研習之實用課程。

Live Vaccine industrial manufacture operation training 1 E

The purpose of this course is to teach students the production techniques of various veterinary live vaccines. The contents include the manufacture operation training of cell culture, virus infection and harvest, adjuvant formulation, filling of live vaccines,

freeze-dried, virus content test, and vacuum test. All practices will direct operate at GMP vaccine plant, providing the industry demand training.

六、國際學院

食品學位學程

分子營養學　　2　選

本課程旨在介紹分子營養學的發展及現今研究之幾種營養素對基因表達的影響，同時敘述基因多態性對部分營養物質之吸收、代謝及利用之作用。主要內容包括：代謝和基因調控、基因結構和基因表現、碳水化合物、蛋白質、脂肪對基因表達的調控、維生素及礦物質對基因表達之調節，及分子營養學之展望。

Molecular Nutrition　　2　E

The objective of this course is to introduce the development of molecular nutrition and up date information of nutrients on gene expression, and the function and metabolic pathways that the genes involved. The major concepts include: metabolism and regulation, gene structure and gene expression, carbohydrate on gene expression, protein on gene expression, lipids regulation, vitamins and gene expression, minerals and gene expression, and the perspective of molecular nutrition.

食品科學系 98 學年度產學專班

Department of Food Science

一、必修科目 Required Courses

362002 普通化學（2） 3 必 代聘，下

本課程為普通化學(一)之延續。其內容為：1. 化學鍵 I：基本觀念。2. 化學鍵：分子幾何形狀與混成軌域。3. 分子間引力及晶體結構。4. 溶液之物理性質。5. 化學動力論。6. 化學平衡。7. 酸鹼平衡及溶解度平衡。8. 熵自由能及平衡。

362002 General Chemistry (II) 3 R TBA, S

This course covers: 1. Chemical bonding I: Basic concepts. 2. Chemical bonding II: Molecular geometry and hybridization of atomic orbitals. 3. Intermolecular forces and liquids and solids. 4. Physical properties of solutions. 5. Chemical kinetics. 6. Chemical equilibrium. 7. Acid- base equilibria and solubility equilibria. 8. Entropy, free energy, and equilibrium.

362003 普通化學實驗（2） 1 必 待聘，下

本課程為普通化學實驗(一)之延續。其內容為：1. 酸鹼滴定。2. 硫之同素異形體。3. 化學反應速率。4. 化學平衡。5. 固體吸附作用與色層分析。6. 滲透作用。7. 電解質與電離學說。8. 由指示劑測定溶液中之 標值。9. 藍印刷。10. 反應熱的測定。11. 氧化還原反應。12. 鐵生銹的研究。13. 膠體溶液的製取與精製。14. 膠體溶液的性質與凝析作用。15. 聚合物的合成。

362003 **General Chemistry** Lab. (II) 1 R TBA, S

This course covers: 1. Acid-base titrations. 2. The allotropic forms of sulfur. 3. Reaction rate. 4. Chemical equilibrium. 5. Adsorption and chromatography. 6. Osmosis. 7. Electrolytes. 8. Determination of pH with the indicators. 9. Blue printing process. 10. Heats of reaction by calorimetry. 11. Oxidation-reduction reactions. 12. Iron rust. 13. Preparation and purification of colloidal solution. 14. The properties of colloidal solution. 15. Polymerization.

362006 食品加工(1) 2 必 邱文貴、蔡錦燕 下

本課程包含畜水產加工及蛋乳製品加工。包括原料種類、生化特性、鮮藏與保存，及各類加工技術。並介紹加工過程中之理化變化及產品保存與品質測定。

362006 Food Processing (I) 2 **R** **W. K. Chiu, C. Y. Tsai, S**

The course emphasizes on the processing of meat seafood, milk and egg. Biochemical properties of the raw material, its extended shelf life, preservation and quality check in products during processing are included.

362007 食品加工實習(1) **1** **必** **邱文貴、蔡錦燕，下**

本課程配合正課的內容，包括肉品生產過程及品管作業包裝，煉製品之罐頭、魚丸、魚蝦醬油及其他加工品之製造及開發。

362007 Food Processing Lab. (I) **1** R **W. K. Chiu, C. Y. Tsai, S**

The lab provides the chance to practice the processing of dried pork bundle, sausage, cured meat, fish ball, dehydrated fish stick and shrimp sauce products.

362008 有機化學（1） 2 **必** **劉展岡，上**

講授有機化學的基本觀念包括分子的結構、命名、反應及性質。內容：烷類、烯類、炔類、芳香烴、鹵烷類、醇類、醚類、酚類、醛酮類、胺類、取代反應、脫去反應、加成反應。目的：建立化學知識的良好基礎，俾能繼續研讀高階課程，如生物化學與食品化學。

362008 Organic Chemistry (I) 2 **R** **C. C. Liu, F**

Focus to teach basic concepts of organic chemistry, such as the structure of the molecules, nomenclature, reaction and characteristic properties. Contents include alkanes, alkenes, alkynes, aromatic hydrocarbons, haloalkanes, alcohols, ethers, phenols, aldehydes and ketones, amines, reactions of substitution, elimination, or addition. Objective: To establish a good foundation of chemical knowledge and prepare for advanced courses, such as Biochemistry and Food Chemistry.

362009 有機化學實習（1） **1** **必** **劉展岡，上**

本課程為配合非主修有機化學的教材而開設，期使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。

362009 Organic Chemistry Lab. (I) 1 R C. C. Liu, F

This course is devised in conjunction with the lecture material of the non-major organic chemistry. It intends to provide students a profound understanding of subject-matter from laboratory work and familiarity with basic 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.

362010 分析化學 2 必 待聘，上

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：分析化學的化學原理、實驗數據準確度與精密度的評定、介紹當前分析化學得各種技術。

362010 Analytical Chemistry 2 R TBA, F

The course of analytical chemistry is principally covered with qualitative and quantitative methods of analysis and methods of analytical separation. The major objective of this course is to familiar the student with separating identifying, and determining the relative amounts of the components making up a sample of matter. The discussion topics will include the followings: the chemical principle to analytical chemistry, judging the accuracy and precision of experimental data, introducing to a wide range of techniques of modern analytical chemistry.

362011 分析化學實習 1 必 待聘，上

本分析化學實驗課程為學生設計各種化學分析的操作，並提供各種化學分析實驗操作的詳細過程，使學生得以充分練習其中操作要領。實驗操作的項目包括重量分析、中和滴定、沉澱滴定、利用 EDTA 進行錯合物滴定、過錳酸鉀滴定、碘滴定、硫代硫酸鈉滴定、溴酸鉀滴定、電位分析法、電重量法、放射吸附法、原子光譜儀、以及利用離子交換分離陽離子。

362011 Analytical Chemistry Lab. 1 R TBA, F

The course of analytical chemistry laboratory is designed for the student to

practice a variety of chemical analyses. The objective of this course is to provide the students the opportunity to learn the operating practices with the detailed directions for the various chemical analytical experiments. The laboratory session include gravimetric methods of analysis, neutralization titrations, precipitation titrations, complex-formation titrations with EDTA, titrations with potassium permanganate, titrations with iodine, titrations with sodium thiosulfate, titrations with potassium bromated, potentiometric methods, electro gravimetric methods, methods based on the absorption of radiation ,atomic spectroscopy ,and the separation of cat ions by ion exchange .

362012 食品加工(2) 2 必 **蔡碧仁、楊季清，上**

本課程主要包含穀類加工及蔬果加工二部分。第一部分介紹穀類之種類、特性及加工原則，並說明各種穀類之處理、貯存，一次加工與再加工成品及利用，第二部份則介紹蔬果中影響色香味質地相關成份與其在加工貯存過程中之變化與防止方法。

362012 Food Processing (II) 2 R **P. J. Tsai, C. C. Yang, F**

The class includes two parts of lessons. Part I emphasizes on the variety, characteristics and principles of processing in cereals. All the handling, storage, preliminary processing of the materials and further utilization of the above products, such as bread, cake, noodle etc. are also mentioned. Part II emphasizes on the characteristic of constituents related to the color, flavor and texture of fruits and vegetables. The quality change during processing and storage and prevention of it are also introduced.

362013 食品加工實習(2) 1 必 **蔡碧仁、楊季清，上**

本實習課程第一部分為穀類加工實習，包含各種穀類之認識及品質判斷，各種配方對產品品質之影響，加工方法，程序之設設與開發。第二部分為蔬果加工實習，包含以各種蔬果進行各式加工，經由操作過程讓學生了解加工成品品質與加工操作間之關係，俾理論與實際能相印證。

362013 Food Processing Lab. (II) 1 R **P. J. Tsai, C. C. Yang, F**

Part1 will on (1) the quality judgment of the grain, flour of cereals (2) effect of

formulation on the quality of product (3) development and optimization of processing method, and procedure in cereal products.

Part2 will on relations processing by using fruit and vegetables. Students may understand the relation between quality and processing method and the quality change during processing and storage.

362014 食品工程學(1) 3 必 **古源光、林貞信、劉展岡 下**

食品工程為介紹學生食品生產製造過程中所涉及和相關的工程概念和理論。課程內容包括數學理論與應用、單位與因次、物質平衡、能量平衡、蒸汽表、黏度概念與流變學、流體的輸送、基礎熱傳學、溼度學和食品熱處理等。

362014 Food Engineering (I) 3 R **Y. K. Guu, J. S. Lin, C. C. Liu, S**

Objectives of this course are to introduce students the concepts and principles of food engineering involved in the food manufacturing processes. Contents of this course include a review of mathematical principles and the applications in food engineering, units and dimensions, material balances, energy balances, steam tables, viscosity and rheology, transport of fluids, basic heat transfer, psychrometry, and heat treatments of foods.

362015 食品工程學實習(1) 1 必 **古源光、林貞信、劉展岡，下**

實習的設計為幫助學生更加了解食品工程的概念與理論。實習課程的內容包括：數學理論與應用、食品基礎物性測量、物質平衡、能量平衡、蒸汽表、食品黏度測量、流體的輸送、食品加熱或冷凍、流體摩擦、攪拌槽、蒸發罐和串聯及並聯幫浦等實習。

362015 Food Engineering Lab. (I) **1** **R** **Y. K. Guu, J. S. Lin, C. C. Liu, S**

The labs are designed to facilitate the understanding of the concepts and principles of food engineering. Contents of the labs include: practical practices of the mathematical principles, basic physical properties of foods, material balances, energy balances, steam tables, measurement of viscosity of foods, transport of fluids, heating or cooling of foods, fluid friction, dynamics of stirred tanks, climbing film evaporator, and serial and parallel pumps.

362018 微生物學 3 必 **謝寶全，下**

本課程的內容包括：

微生物學在科學上之地位、發展歷史、未來展望。微生物之形態及分類。微生物之細胞構造及功能。微生物之遺傳。微生物之控制

362018 General Microbiology 3 R **P. C. Hsieh, S**

This course is offered to cover:

Introduction of microbiology, its history and development. Morphology and identification of microorganisms. Cell structure and function of microorganisms. Microbial genetics. Control of microorganisms.

362019 微生物學實驗 1 必 **邱秋霞，下**

本課程之內容包括：

顯微鏡之使用。培養基之配製及滅菌方法。微生物之培養分離及純化。各種不同之染色法。微生物生理及生化特性探討。微生物生長條件之探討。

362019 General Microbiology Lab. 1 R **C. H. Chiu, S**

The lab covers how to use microscope, preparation of media and methods of sterilization, culture transfer techniques, microscopic examination of stained cell preparations, microscopic examination of living bacterial preparations, the microscopic measurement of microorganisms. Gram stain, serial dilution-agar plate procedure to quantitative viable cell, the bacterial growth curve, biochemical and physiological characteristics of microbes, cultivation and morphology of molds, yeast morphology.

362020 生物化學(1) 3 必 **許祥純、吳美莉 上**

本課程主要介紹生物體構成分子之組成及結構，以提供學生生化分子之基本概念，並建立修習代謝生化及分子生物的基礎。其內容包括：水及緩衝溶液、胺基酸及蛋白質、酵素、核酸、碳水化合物及脂質之介紹。

362020 Biochemistry (I) 3 R **S. C. Sheu, M. L. Wu, F**

This course is to introduce the composition and structure of biomolecules. The purpose of this course is to provide students with basic concepts of biomolecules.

The topics involved in this course are water and buffer, amino acid and protein, enzyme, nucleic acid, carbohydrate and lipid.

362021 生物化學實習(1)　　1　必　　許祥純、吳美莉，上

本課程目的在使學生藉由實際操作了解生劃分子的特性及生化反應的原理，並學習 pH 計、分光光度計等儀器的操作。實習內容包括：緩衝溶液之製備、胺基酸之滴定、胺基酸及蛋白質之定性分析、蛋白質之定量、醣類之定量分析、酵素活性測定及膠過濾法。

362021 Biochemistry Lab. (I)　1　R　S. C. Sheu, M. L. Wu, F

This course is designed for students to understand the characteristics of biomolecules and the principles of biochemical reactions in the lab. Students will also learn how to operate the some instruments such as pH meter, spectrophotometer in this course. It includes buffer preparation, titration of amino acid, qualitative and quantitative analysis of amino of amino acid and protein, quantitative analysis of carbohydrates.

362022 食品分析　　2　必　　待聘，上

本課程分二方面討論,其一為基礎分析化學之複習, 重點包括各種濃度單位之換算、試藥溶液之配製方法及定性、定量化學反應之原理與計算等; 其二為針對食品分析實習項目之實驗原理與計算的講解, 俾使學生在操作實驗之餘, 能知其然, 並融會貫通實驗的設計原理與目的。

362022 Food Analysis　　2　R　　TBA, F

Designed to acquaint the students with the basic knowledge and fundamental principles of analytical chemistry commonly used by food analysts. Emphasis is on understanding the theoretical and practical aspects of volumetric and spectro photometric methods. Procedures for routine quality control and official tests on food components are also introduced.

362023 食品分析實習　　2　必　　待聘，上

實習項目包括食品系之一般成分分析及油脂、蛋白質食品之品管等方面。一般成分包括水分、灰分、粗蛋白、粗脂肪、磷、鈣等成分之定量；油脂之品質測定包括酸價、碘價、過氧化價及皂化價等；蛋白質之鮮度及品質測定則包括揮發性鹽基態氮及胺基態氮等。讓學生藉實際之操作過程，對相關食品之一

般成分測定及品管工作有基本的認識。

362023 Food Analysis Lab. 2 R **TBA, F**

Designed to acquaint the students with the practical operation for routine quality control and official tests used by food analysts. Students work in small groups to be familiar with the proximate analysis of food products. Techniques training of quality control on selected items in fat-containing food (such as acid value, peroxide value, iodine value and saponification value) and protein-containing food (such as volatile basic nitrogen and amino nitrogen) is also the objectives of this course.

362026 食品法規 2 必 **林頎生，下**

本課程包括食品衛生相關法規之內涵、特色及適用範圍，並介紹食品良好作業規範之精神、執行方法，讓學生瞭解食品工廠之設立、經營管理相關之規定。

362026 Food Law 2 R **C. S. Lin, S**

This course offers to cover the history, phylosophy of food safety related Acts, Laws and Regulations. Emphasis on the background of food regulation and laws. Help the students to understand the regulations and laws required for a food processing and related company.

362027 食品化學 3 必 **廖遠東，下**

本課程介紹基礎食品化學概論，設計給主修食品專長學生並可提供基本知識去克服食品工業上的技術問題，課程內容涵蓋水分、醣類、蛋白質與脂肪等四大基本營養素。並且將食品化學的理論與食品加工結合，著重在加工和貯藏上的變化，並應用於食品成分對品質促進的影響。

362027 Food Chemistry 3 **R** **E. T. Liaw, S**

The course is designed for students who are majoring in food science. It provides basic knowledge to overcome technical problems occurred in food industry. Topics include water in foods, carbohydrates, proteins and amino acids, lipids and fatty acids. Basic chemical and functional properties are emphasized in the changes during postharvest and food processing, and the application of food ingredients as quality improvement.

362029 食品衛生與安全 2 必 **郭嘉信，上**

講授食品從生產原料，經加工過程、包裝，直到人類攝食為止之各階段過程中，確保人類食生活上之衛生與安全的問題；食品與微生物、食品之腐敗、食物中毒、食品添加物，經口傳染病、人畜共通傳染病、食品與寄生蟲、食品之放射線能污染、食品衛生上之對策以及食品法規等。

362029 Food Hygiene and Safety　　2　R　　J. H. Guo, F

Food hygiene and safety is to teach the means necessary for ensuring the hygiene and safety of human being, the food at all stages from its growth, products or processing, packaging, until its final consumption. It contains food and microorganisms, food deterioration, food poisoning, food additives, oral infection, zoonosis, food and parasite, food and sanitary insects, contamination of radiation substance, the measurement of food hygiene and the laws and regulations of food.

362033 營養學　　2　必　　陳與國，下

本課程除講授營養學基本原理和正常營養之實際運用外，更藉由親自操作實習來明瞭食物的特性與營養學上的觀念和理論。主要講授內容包括介紹食物營養與健康，消化吸收與代謝，蛋白質及胺基酸、醣類、脂類、能量代謝、礦物質元素、水分及電解質平衡、脂溶性和水溶性維生素。主要實習內容包括：米飯、麵條、米粉和粉絲類吸水率之計算與製備；蛋之乳化作用及蛋黃醬之製作；肉類之收縮率與廢棄率之計算方法與製備；豆類與奶類的特性及其製品與各類食物代換單位和代換表應用練習。

362033 Nutrition　　2　R　　Y.K. Chen, S

The objective of this course is not only to introduce fundamentals of nutrition science and practical applications of the principles for normal nutrition but also to elucidate properties of different kinds of food and nutrition concepts and theory by practical manipulation. Lecture contents cover: food, nutrition and health; digestion, absorption and metabolism; proteins and amino acids; carbohydrates; lipids; energy metabolism; mineral elements; fluid and electrolyte balance; fat- and water-soluble vitamins. Laboratory work includes: preparation and water absorption ratio of different kinds of rice and noodle; dumpling making; practice of “as purchased” and “edible portion” in eggs，vegetables and fruits; emulsification of egg and predation of mayonnaise; shrinkage ratio and waste ratio of meats; properties of soybean an milk and their products an practice of exchange list of different kinds of foods.

362034 實務專題　　1　必

本課程由教師輔導學生選定其有興趣之作物及試驗題目，進行田間栽培管理調查、植體分析或生產技術之操作或實驗室內之試驗、分析，並將實驗

結果撰寫報告。

362034 **Special Project** **1** R

The students will select their crops (horticulture or agronomy) of interest and advisor with the specialty to instruct him. Course contents include either a laboratory research or cultural practice year round in the field for practical production, management, plant growth analysis techniques and the analysis of final results, report writing.

362035 校外實習(1) １２R **TBA, F**

修習本課程的學生，必須到食品相關產業去實習工作，藉由實際在食品相關產業工作，了解產業的實務工作內容，認識與了解正確的實習工作態度、需要那些專業知識、如何在工作中提升自我、學習解決問題的能力等。修習本課程後，可以使學生體認食品產業中的實務工作，回到學校後能自我要求加強專業知識的學習。

362035 Industrial Affairs Practice (I) １２ R **TBA, F**

Students taking this course must go to the food related industries for their internship. By actually working in the food related industries, students can understand the contents of the substantive works of the industry. The right internship working attitude also can be learned as well. What expertise is needed? How to upgrade oneself during his works? And students can learn the problem-solving skills. After taking this course, students will realize the practical works in the related food industries, and they will be called for the strengthening of self-learning expertise, when they go back to school.

362036 校外實習(2) １２R **TBA, S**

修習本課程的學生，必須到食品相關產業去實習工作，藉由實際在食品相關產業工作，了解產業的實務工作內容，認識與了解正確的實習工作態度、需要那些專業知識、如何在工作中提升自我、學習解決問題的能力等。修習本課程後，可以使學生體認食品產業中的實務工作，回到學校後能自我要求加強專業知識的學習。

362036 Industrial Affairs Practice (II) １２ R **TBA, F**

Students taking this course must go to the food related industries for their internship. By actually working in the food related industries, students can

understand the contents of the substantive works of the industry. The right internship working attitude also can be learned as well. What expertise is needed? How to upgrade oneself during his works? And students can learn the problem-solving skills. After taking this course, students will realize the practical works in the related food industries, and they will be called for the strengthening of self-learning expertise, when they go back to school.

二、選修科目 Elective Courses

362030 食品行銷　　2　選　　吳明昌、楊季清 上

本科目為了使學生清楚地瞭解食品行銷的基本概念和原則，進而促使學生熟悉食品交易行為，以培養出具行銷能力之食品科技人員。教學內容包括理論與實物研討兩部分。(一)在食品行銷理論方面將蓋下列範圍：行銷管理程序、策略性規劃、行銷研究、行銷資訊系統、行銷通路、產品促銷、競爭性行銷策略、國際行銷 (二)在實務研討方面：以不同食品企業之行銷方式做為研討對象，教學方式兼採講授，分組討論，專案報告與測驗。

362030 Food Marketing　　2　E　　M. C. Wu, C. C. Yang, F

The objective of this course was designed to teach food marketing basic concepts and principles. So that student could also specialize in marketing as well as food science and technology .The courses included:(A)marketing management procedure 、strategic planning 、marketing research 、marketing information system 、distribution channels、product promotion、competitive marketing strategy 、international marketing (B)Individual food enterprise marketing.

362033 烘焙學　　2　選　　蔡錦燕，上

本課程以教授各種類烘焙產品之製作原理為主，介紹各項食品組成分在烘培產品中所展現的功能特性。課程內容依產品特性，分麵包、蛋糕與西點三大類。以單項產品之製作為主軸；從麵粉的選擇，配方的計算、麵糰醱酵時間、濕度與溫度之判斷，和烘焙溫度與時間的決定等因素來探討產品的烘焙體積、口感、顏色、外觀及味道等。更希望藉由此項課程之傳授，培養學生對新產品研發的興趣。

362033 Baking　　2　E　　C. Y. Tasi, F

Objectives of this course are to introduce the baking principles and functional characteristics of various bakery products from different food ingredients. The course is divided into three major categories including breads, cakes and disserts. On the basis of sole product preparation, study of baking volume, texture, color and appearance are completely conducted by investigating flour screening, recipe calculation, judgment of dough fermentation temperature, humidity and time, and

determination of baking temperature and time. As a result, the current course training should enhance the capability of student for new product development.

362034 烘焙學實習　　1　選　　蔡錦燕，上

本課程之開設在於印證烘焙理論與實際操作之相互關係。讓學生從實習操作中，去瞭解各項食品成份對製成產品品質的影響。實習課程採小組教學與分工，共分成八組，各式麵包、蛋糕及西點共三大類，二十四項產品將列入理論設計中逐項實習反覆演練。

362034 Baking Lab.　　1　E　　C. Y. Tasi, F

This course is provided for illustrating the relationship between baking theories and practices. To make students understand the effect on quality of baking products by knowing various food ingredients. This class is classified as unit teaching and operation, and the attendees are divided into 8 groups for practicing. Selected twelve products focusing will be covered and repeatedly practiced in Lab class.

362036 食品添加物　　2　選　　邱文貴，上

該課程討論食品加工中常用之配料，如修飾澱粉、特殊功能蛋白質、膠質及加工油脂及少量使用但功能特殊之添加物，如香料、乳化劑、抗氧化劑等物理性質及其生產技術。而整合各配料主要食品加工過程中，搭配使用，發揮整體最大功能，則是本課程之討論重點。

362036 Food Ingredients　　2　E　　W. K. Chiu, F

The commonly used ingredients in food processing are discussed, including modified starch, protein with functional properties, gum and gelling material and modified fatty ingredients. The special functional ingredients such as spices, emulsifier, antioxidants are also covered. Pasteurizing and sterilizing equipments, cooling machines, drying machines, extruder, packing machines and some advanced automatic machines in food industry are mentioned too.

362037 電腦在食品科技之應用　　2　選　　林貞信，上

本課程介紹個人電腦與套裝軟體在食品科技上之應用，範圍包含數值資料蒐集整理，品質管制之分析統計，食品加工過程之數學模擬等等。教授內容涵蓋：電腦繪圖，機率與抽樣，統計結果分析檢定，簡單迴歸與複迴歸，營養調配，反應曲面法，食品工程上之應用數值解析。簡介基礎理論，重點則在套裝軟體(SAS、EXCEL)於食品科技各領域之應用實例。

362037 Applications of Computer in Food Science and Technology 2 E J. S. Lin, F

This course introduces the application of personal computer and assorted softwares in the field of food science and technology, such as data acquisition, statistical treatment on quality control, mathematical modeling involved in various food processing technologies. Contents include chart and figure generation by computer, probability and sampling, statistical analysis, regression, optimization, response surface method, applied numerical analysis in food engineering. Focus will be emphasized on practical applications of computer software instead of sophisticated theories.

362038 電腦在食品科技之應用實習 1 選 林貞信，上

本實習目標配合正課而實施，共設計有食品科學研究暨食品工業生產上所需應用到之 10 項鍊習題，分別為直方圖製作；管制圖製作；信賴區間；直條圖與 x-y 圖製作；假設檢定之施行；線性回歸與變異數分析；反應活化能計算；線性規劃應用於營養調配；反應區面法；相關性與相關係數分析。

362038 Applications of Computer in Food Science and Technology Lab. 1 E J. S. Lin, F

The lab is specifically designed to complement with the lecture, there are totally 10 practices listed as follows: Histogram Chart; Statistical Process Control; Confidence Interval; Bar Chart and X-Y Representation of scientific data; Validation of Hypothesis; Linear regression and Variance Analysis; Calculation of Activation Energy by Linear Regression; Linear Programming for Nutrition Formulation; Response Surface Methodology; Analyses on the Correlation Coefficient.

362039 食品機械 2 選 陳和賢，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。

362039 Food Machinery 2 E H. H. Chen, 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.

362042 保健食材之加工與應用　　3　選　　蔡碧仁，下

使學生了解食品材料與保健科學的基本特性及具備在保健科學應用之基礎及技術，並有效掌管保健食材的加工、產品貯存及流通。內容包括：蔬菜、水果、豆類與穀類的基本特性及保健功能、東西方保健食材，如中草藥、菇蕈類、香草類、幾丁聚糖、蜂膠等、生物技術產品，如膠原蛋白、酵素類、.乳酸製品、果寡糖、色素等之介紹、營養補充劑，如維生素、亞麻油酸、DHA、卵磷脂等

362042 Processing and Application of Health Materials　　3　E　　P. J. Tsai, S

The aim of this course is to introduce the characteristics of food materials and their application in Health Science. Handling skills during processing, storage and transportation are also mentioned. Contents include：characteristics and functions of fruits, vegetables, beans and cereals、 Health foods in orient and west word like Chinese medicine, mushroom, herb, chitosan、 Biotechnical products like collagen, enzyme, lactic acid, oligosaccharide and pigments. Nutrient supplement like vitamin, linoleic acid, DHA and lecithin.

362043 食品加工自動化元件與實習(1)　3　選　　陳和賢，下

簡介食品工業上所應用之各種自動控制系統及其組成元件。課程包含自動控制系統之組成元件分類概述，順序與回饋控制簡述，各種電力與氣壓感測控制元件介紹，各項系統元件之工作原理，以及簡易控制程式之編輯驅動。實習內容包括電氣與氣壓元件，交直流馬達，感測器，以及可程式化邏輯控制器(PLC)等模組化之教學實習套件。本課程為「機電整合與自動化」系列課程之基礎，目標是以生動之實習操作，來使學生瞭解控制系統之組成與功用。

362043 Element of Food Processing Automation and Lab. (I)　　3　E　　H. H. Chen, S

This course is designed to introduce the control systems and components applied in the automatic manufacturing processes. Topics covered are: characteristics of elements for automatic process control; sequential and feedback controls; introduction of electrical, pneumatic control elements and their operation principles; and basic programming techniques. Contents of the laboratories are: integrated systems such as electrically- and pneumatically-driven elements; DC and

AC motors; sensor devices, and programmable logic controllers (PLC). This course aims to lay the foundation for a series of courses related to “process control and automation” through the innovative hand-on experiences.

362044 食品品質管制　2　選　廖遠東，上

由統計之觀點，討論食品工廠中之品質管制事項，包括管制圖之製作原理、實際應用建立。管制要點，經由食品良好作業規範，延伸品管項目原料、製程以迄售後品質，注重製造過程中預先管制，並顧及顧客反應以求追縱改進。危害因子管制，則由加工過程中特別重要的管制點著手，以維護產品之安全性。最後，則充分運用統計數據，建立 ISO9000 系列管制制度，達到食品品質之全面品質保證。

362044 Food Quality Control　2　E　E. T. Liaw, F

From the view point of statistical technique, quality control in food processing is important. Control charts, involving X and R charts will be discussed theoretically. Application of these charts is emphasized, in good manufacturing process, food quality protection will be discussed from raw material, processing and shelf-life. Some of the major steps to maintain food quality should be achieved by applying HACCP system. Finally, use the statistical datas to match ISO9000 control system. So, the food quality will be assured entirely.

362045 食品殺菌技術　2　選　吳明昌，上

本課程在探討食品品質變化最小的條件下，惰化或殺滅食品中所含微生物而得以商業保存的技術。其內容包括利用熱、電磁波殺菌之原理及應用，放射線殺菌之理論、應用及安全性，化學藥劑之使用方法及安全性，水活性調節、超薄過濾、超高速遠心分離等之物理除菌原理、應用及無菌包裝等加工技術。

362045 Food Sterilization　2　E　M. C. Wu, F

The course discusses the techniques to achieve the preservation of food. The food sterilization can be processed under a minimized deterioration condition to reduce or remove the existing microorganism, the outlines included the heat, electromagnetic wave, radiation sterilization, the aseptic packaging and carefully control of water activity, ultrafiltration, ultra pressure, and ultrahigh speed centrifugation are also covered.

362046 食品殺菌技術實習　1　選　吳明昌，上

本課程配合食品殺菌技術之課程內容，作實際之操作、試驗或參觀等其內容包括各類食品之熱傳導速率測定、微生物耐熱性曲線製作、加熱殺菌值測定、各種密封食品加熱殺菌條件之探討、化學藥劑對食品之保存與安全性試驗、物理除菌等試驗及至加工廠或相關單位參觀，以瞭解食品生產之殺菌實務。

362046 Food Sterilization Lab.　　1　E　　M. C. Wu, F

The lab is to match the lecture to have the practice to run the food sterilization techniques. The thermal conductivity rate was determined to evaluate the thermal death curve and lethal rate of microorganisms. The chemical and physical sterilization were also tested and setup a field trip for students.

362047 食品生物技術產業與經營　　2選　　郭嘉信，上

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

362047 Industrial Business and Management for Food Biotechnology　　2　E　　J. H. Guo, F

This course will provide an overview of global food biotechnology businesses, critical developments of novel healthy foods and genetically modified foods, regulations and intellectual property protections of food biotechnology businesses, and strategy and management for running a food biotechnology business.

362049 食品加工技術特論(1)　　2選　　古源光、劉展岡，下

本課程介紹薄膜技術以及濃縮乾燥技術在食品工業上之應用。在薄膜技術方面，首先自熱力學的觀點來探討液體形成滲透壓之原因，進而教授薄膜過濾與傳統過濾之不同，以及薄膜過濾之驅動操作。此外介紹五種主要薄膜：逆滲透(RO)，次微米薄膜過濾(NF)，超薄膜過濾(UF)，微米薄膜過濾(MF)，及電透析膜過濾(ED)之特性與應用。另外也將涵蓋薄膜材料及製造方法，薄膜之裝置型式、操作原理，進而薄膜之系統設計與其在食品加工上之應用實例。在濃縮乾燥技術方面，將由基礎工程原理(例如質量、熱量之平衡與傳遞)之複習開始，進而探討食品本身物理化學特性對濃縮乾燥操作之影響。課程主題另包括蒸發濃縮原理，蒸發濃縮器之計算與設計，食品水活性，氣流濕度，乾燥速率之計算，各種乾燥設備之原理與比較，全部佐以食品工業上之應用實例加以說

明。

362049 Special Topics on Food Processing Technology (I) 2 **E** **Y. K. Guu, C. C. Liu, S**

This course consists of two categories of applied technologies involved in food processing - Membrane Technology, and Concentration and Dehydration Technology. Membrane Technology starts with osmotic pressure of liquid system through thermodynamic point of view, further to the difference between conventional and membrane filtration, and the mechanisms of membrane filtration. A broad spectrum of membrane technology such as configuration, materials, applications are included. Various membrane types like reverse osmosis (RO), nanofiltration (NF), ultrafiltration (UF), microfiltration (MF), and electrodialysis (ED) along with their specific applications are covered in this course. The applications of membrane technology in food processing forms the core of this part of course. In the field of concentration and dehydration, the essence lies in the principles and practical applications in the food industry. Course starts with the reviews on fundamental engineering basis such as mass and energy balances, then the effects of food physicochemical properties on concentration and dehydration. Also covered are principles of evaporation; calculation and design of evaporators; water activity; humidity; drying rate; and assorted drying equipment. Examples from industrial applications will be illustrated to assist comprehension.

362050 微生物檢驗技術 2 **選** **郭嘉信、邱秋霞，下**

本課程內容包括：

重要的食品微生物 。微生物的物質代謝。應用微生物的工業，包括微生物的代謝生產物、微生物的酵素、生產、菌體的利用。微生物的特殊利用。食品儲存與敗壞之原理。各種不同食物之污染。食品衛生。

262050 Microbes Detection 2 **E** **J. H. Guo, C. H. Chiu, S**

This course is offered to cover:

Important microorganisms in food microbiology. Substance metabolism for microorganisms. Applied microbiology: production of culture for food fermentations. Foods and enzymes for microorganisms. Special utilization for microorganisms. Principles of food preservation and spoilage. Contamination and

spoilage of different kinds of foods. Food sanitation and control.

362051 微生物檢驗技術實驗　　1　選　　郭嘉信、邱秋霞，下

本課程內容包括：

總生菌數的測定。大腸桿菌群、大腸桿菌的測定。黴菌及酵母菌數之檢驗。包裝飲用水中微生物之檢驗法—糞便性鏈球菌之檢驗、綠膿桿菌之檢驗。鮮肉之抗生物質殘留檢驗法。乳品檢驗法—細菌之檢驗、次甲藍還原試驗。生乳中抗生物質殘留檢驗法

362051 Microbes Detection Lab.　　1　E　　J. H. Guo, C. H. Chiu, S

This course is offered to cover:

Methods of tests for food microbiology—test of standard plate count. Test for coliform bacteria and *Escherichia coil.* Methods of test for Food Microbiology-Test of mold and yeast count. Method of test for Microbiology in Bottled Water-Test of *fecal streptococci,* test of *Pseudomonas aeruginosa*. Method of test for Residual Antibiotic substances in Fresh Meat. Methods of test for Milk and Milk products: Test of bacteria, methylene blue reduction test. Method of test for the Residual Antibiotic Substances in Raw milk.

362054　食品冷凍學　　2　選　　楊季清，下

課程包括介紹冷凍物理現象原理及冷凍食品的保鮮技術，課程包含 1.冷凍的機械原理 2.莫利爾線的製做與操作實務 3.冷凍循環原理 4.冷凍品的品質保鮮原理及技術 5.冷凍食品包裹

362054　Freezing of Food　　2　E　　C. C. Yang, S

The class including introducing basic physical phenomena in the freezing and freezing technology。The content of this course contain: 1. mechanism of freezing. 2. Mollier chart application and drawing. 3. Theory of freezing cycle. 4. quality of freezing foods control and freezing time calculation. 5. packaging of frozen foods.

362058 食品包裝　　2　選　　吳明昌，上

本課程著重於訓練學生瞭解各種不同食品該用何種包裝材料方能保護食品;另外訓練食品包裝設計，針對消費者之需要，而設計出各種商品的包裝。因為消費者到市場上購買食品，已經從以前生理上的需要演變成心理上的需求。因此今日食品包裝在食品之銷售上佔了很重要的地位。食品包裝技術講授內容包括:各類食品之包裝材質、食品包裝之管理、最新食品包裝設計以及某

些特殊功能食品在特殊用途上之包裝發展、貯存、市場。

362058 Food Packaging 2 E M. C. Wu, F

The course is designed to train students to understand "the packaging needs of foods "and the package design. Contents of the course includes packaging material of food; the packaging needs of foods ,the restriction of food packaging, the new food package design and aspects of packaging technology that are relevant to the preservation, distribution and marketing of a specific food.

362060 新產品開發與實習 3 選 楊季清，上

本課程主要介紹開發新產品之步驟與方法。結合基本的食品化學、微生物和加工技術於新產品開發。課程並介紹如何應用電腦去設計食品配方。學生必須能夠把以往所學的知識結合與應用於新產品開發。

362060 Food Product Development and Lab. 3 E C. C. Yang, F

The objectives of this course included procedure new product development and the approach to achieve the R&D. the use of food chemistry, microbiology and food processing techniques were combined with the computer formulation methods to formulate new products.

362061 感官品評學與實習 3 選 林頎生，上

以實用方式，配合理論的資料，輔以實物品評方式，來介紹何謂感官品評。針對學生將來在工業界或研究單位的需求，教授感官品評的基本生理、實驗環境的要求條件，樣品取樣及準備等硬體教育，再從軟體方面之人員選擇及訓練以及數據的收集及分析逐步加強。針對影響感官測驗精確度的因素加以說明，再進一步的實際操演各類型的感官測驗，包括差異選別試驗(Difference Test)，特性敘述試驗(Descriptive analysis)及嗜好性測驗(Preference Test)等。並以品評組長訓練方式分組實作品評實驗，包括實驗設計、預備工作數據收集、統計分析與研判。

362061 Sensory Evaluation and Lab. 3 E C. S. Lin, F

Students are separated into several discussion panel groups. Tasting and discussions of primary source materials according sensory evaluation methods, including historical perspectives, psychophysics, perceptual biases, sensory environment. Concepts influencing detection of sensory differences, use of rating scales, and characterization of sensory properties will also be emphasized. Further

studies include sensory techniques and statistical methods for analyzing results in order to establish a full sensory evaluation program.

362062 食品加工技術特論(2) 2 選 **楊季清、林貞信，上**

食品冷藏、冷凍與擠壓技術為本課程教授的主題。課程中將介紹食品在冷藏與冷凍前的處理、冷藏與冷凍期間食品品質之變化、以及如何延長低溫儲存食品之保存期和冷凍食品解凍之各種方法；同時，食品擠壓技術的由來、擠壓機的構造與維護、食品流變學、食品擠壓操作、影響食品擠壓的變數和食品擠壓程序的控制等亦將在此課程中介紹。

362062 Special Topics on Food Processing Technology (II) 2 **E** **C.C. Yang, J. S. Lin, F**

Specific subjects covered in this course are cooling, freezing and extrusion technologies applied in the food industry. Contents include pre-treatment of foods prior to the cooling and freezing processes, changes of food qualities during these operations, how to prolong the shelf life of foods stored at sub-ambient and low temperature, and different thawing methods for frozen foods. In addition, lectures on food extrusion technology, configuration and maintenance of extruders, food rheology, operations of an extruder, variables affecting food extrusion, and its process control are also covered.

362063 醱酵學 2 選 **謝寶全、邱秋霞，上**

講授以應用微生物的醱酵技術製造各種發酵產品之生產技術，如酒類工業、有機酸工業、發酵食品工業、胺基酸工業、酵素工業、菌體生產工業、抗生物質工業、核酸關連物質工業、微生物轉換醱酵工業、生理活性物質生產工業等，以及利用微生物之醱酵技術於培養植物細胞生產有用物質與生產細胞的方法。

362063 Fermentation 2 **E** **P. C. Hsieh, C. H. Chiu, F**

The course based on the knowledge of applied microbiology to discuss the related fermentation industry: brewing, organic acids, food fermentation, amino acids, enzymes, antibiotic, etc. The course also covered the technique of cell

production.

362064 醱酵學實驗　　1　選　　邱秋霞，上

使學生練習生產單細胞蛋白質之培養技術、酒精醱酵技術、有機酸醱酵技術、胺基酸醱酵技術酵素生產醱酵技術、抗生物質生產技術、醱酵食品製造之技術以及培養植物細胞生產有用物質與大量生產有用細胞之培養技術等。

362064 Fermentation Lab.　　1　E　　C. H. Chiu, F

The lab covers the single cell protein, technique in alcohol fermentation, amino acids, enzymes, antibiotics production and food fermentation, and the cell production technique.

362071 食物學原理　　2　選　　蔡錦燕、上

此課程介紹食物材料的特性，包括糖、澱粉、蔬菜、肉、蛋、豆類、乳品及油脂，並比較食物材料在烹製過程中發生的變化。內容包括：糖的褐變，澱粉的糊化，蛋的起泡力、乳化力，油溫與炸物質地的關係.... 等等。

362071 Principles of Food　　2　E　　C. Y. Tasi, F

This course will introduce the basic properties of food ingredients and the chemical, physical change at the process of preparation. The aim of this course is to provide students with the ability to compare the change of food ingredients, that includes of the browning of sugar, gelatinization of starch, beating foam and emulsification of egg, fat/oil heating and deep frying etc.

食品科學系 101 學年度產學攜手合作計畫專班

Department of Food Science

一、必修科目 Required Courses

362002 普通化學（2）　3　必　王慶義，上

本課程為普通化學(一)之延續。其內容為：1. 化學鍵 I：基本觀念。2. 化學鍵：分子幾何形狀與混成軌域。3. 分子間引力及晶體結構。4. 溶液之物理性質。5. 化學動力論。6. 化學平衡。7. 酸鹼平衡及溶解度平衡。8. 熵自由能及平衡。

362002 General Chemistry（2）　3　R　C. Y. Wang, S

This course covers:1.Chemical bonding I: Basic concepts. 2.Chemical bonding II: Molecular geometry and hybridization of atomic orbitals. 3.Intermolecular forces and liquids and solids. 4.Physical properties of solutions. 5.Chemical kinetics. 6.Chemical equilibrium. 7.Acid-base equilibria and solubility equilibria. 8.Entropy, free energy , and equilibrium.

362003 普通化學實驗（2）　1　必　王慶義，下

本課程為普通化學實驗(一)之延續。其內容為：1. 酸鹼滴定。2. 硫之同素異形體。3. 化學反應速率。4. 化學平衡。5. 固體吸附作用與色層分析。6. 滲透作用。7. 電解質與電離學說。8. 由指示劑測定溶液中之 標值。9. 藍印刷。10. 反應熱的測定。11. 氧化還原反應。12. 鐵生銹的研究。13. 膠體溶液的製取與精製。14. 膠體溶液的性質與凝析作用。15. 聚合物的合成。

362003 General cry Lab.（2）　1　R　C. Y. Wang, S

This course covers: 1.Acid-base tritrations. 2.The allotropic forms of sulfur. 3.Reaction rate. 4.Chemical equilibrium. 5.Adsorption and chromatography. 6.Osmosis. 7.Electrolytes. 8.Determination of pH with the indicators. 9.Blue printing process. 10.Heats of reaction by calorimetry. 11.Oxidation- reduction reactions. 12.Iron rust. 13.Preparation and purification of colloidal solution. 14.The properties of colloidal solution. 15.Polymerization.

362006 食品加工實習(1)　2　必　邱文貴、蔡錦燕 下

本課程包含畜水產加工及蛋乳製品加工。包括原料種類、生化特性、鮮藏與保存，及各類加工技術。並介紹加工過程中之理化變化及產品保存與品質測定。

362006 Food Processing Lab.(1)　2　R　W. K. Chiu, C. Y. Tsai, S

The course emphasizes on the processing of meat seafood, milk and egg. Biochemical properties of the raw material, its extented shelf life, preservation and quality check in

products during processing are included

362012 食品加工實習(2)　　2　必　　蔡碧仁、楊季清，上

本課程主要包含穀類加工及蔬果加工二部分。第一部分介紹穀類之種類、特性及加工原則，並說明各種穀類之處理、貯存，一次加工與再加工成品及利用，第二部份則介紹蔬果中影響色香味質地相關成份與其在加工貯存過程中之變化與防止方法。

362012 Food Processing Lab. (2)　　2　R　　P. J. Tsai, C. C. Yang, F

The class includes two part of lessons. Part I emphasizes on the variety, characteristics and principles of processing in cereals. All the handling, storage, preliminary processing of the materials and further utilization of the above products, such as bread, cake, noodle etc. are also mentioned. Part2 emphasizes on the characteristic of constituents related to the color, flavor and texture of fruits and vegetables. The quality change during processing and storage and prevention of it are also introduced.

362008 有機化學（1）　　2　必　　劉展岡，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）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。

362008 Organic Chemistry (1)　　2　R　　C. C. Liu, 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. protein are presented.

362009 有機化學實習（1）　　1　必　　劉展岡，上

本課程為配合非主修有機化學的教材而開設，期使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。

362009 Organic Chemistry Lab.（1）　　1　R　　C. C. Liu, 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 familarity with basic technique. 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 on the common chemical properties ascribed to funtional groups.

362010 分析化學　　2　必　　待聘，上

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：分析化學的化學原理、實驗數據準確度與精密度的評定、介紹當前分析化學得各種技術。

362010 Analytical Chemistry 2 R **TBA, F**

The course of analytical chemistry is principally covered with qualitative and quantitative methods of analysis and methods of analytical separation. The major objective of this course is to familiar the student with separating identifying, and determining the relative amounts of the components making up a sample of matter. The discussion topics will include the followings：the chemical principle to analytical chemistry、judging the accuracy and precision of experimental data、introducing to a wide range of techniques of modern analytical chemistry.

362011 分析化學實驗 1 必 **待聘，上**

本分析化學實驗課程為學生設計各種化學分析的操作，並提供各種化學分析實驗操作的詳細過程，使學生得以充分練習其中操作要領。實驗操作的項目包括重量分析、中和滴定、沉澱滴定、利用 EDTA 進行錯合物滴定、過錳酸鉀滴定、碘滴定、硫代硫酸鈉滴定、溴酸鉀滴定、電位分析法、電重量法、放射吸附法、原子光譜儀、以及利用離子交換分離陽離子。

362011 Analytical Chemistry Lab. **1** **R** **TBA, F**

The course of analytical chemistry laboratory is designed for the student to practice a variety of chemical analyses. The objective of this course is to provide the students the opportunity to learn the operating practices with the detailed directions for the various chemical analytical experiments. The laboratory session include gravimetric methods of analysis, neutralization titrations, precipitation titrations, complex-formation titrations with EDTA, titrations with potassium permanganate, titrations with iodine, titrations with sodium thiosulfate, titrations with potassium bromated, potentiometric methods, electro gravimetric methods, methods based on the absorption of radiation ,atomic spectroscopy ,and the separation of cat ions by ion exchange .

362014 食品工程學 (1) 3 必 **古源光、林貞信、劉展岡 下**

食品工程為介紹學生食品生產製造過程中所涉及和相關的工程概念和理論。課程內容包括數學理論與應用、單位與因次、物質平衡、能量平衡、蒸汽表、黏度概念與流變學、流體的輸送、基礎熱傳學、溼度學和食品熱處理等。

362014 Food Engineering(1) 3 R **Y. K. Guu, J. S. Lin, C. C. Liu, S**

Objectives of this course are to introduce students the concepts and principles of food engineering involved in the food manufacturing processes. Contents of this course include a review of mathematical principles and the applications in food engineering, units and dimensions, material balances, energy balances, steam tables, viscosity and rheology, transport of fluids, basic heat transfer, psychrometry, and heat treatments of foods.

362015 食品工程實習(1) 1 必 **古源光、林貞信、**

劉展冏，下

實習的設計為幫助學生更加了解食品工程的概念與理論。實習課程的內容包括：數學理論與應用、食品基礎物性測量、物質平衡、能量平衡、蒸汽表、食品黏度測量、流體的輸送、食品加熱或冷凍、流體摩擦、攪拌槽、蒸發罐和串聯及並聯幫浦等實習。

362015 Food Engineering Lab.(1) **1** **R** **Y. K. Guu, J. S. Lin, C. C. Liu, S**

The labs are designed to facilitate the understanding of the concepts and principles of food engineering. Contents of the labs include: practical practices of the mathematical principles, basic physical properties of foods, material balances, energy balances, steam tables, measurement of viscosity of foods, transport of fluids, heating or cooling of foods, fluid friction, dynamics of stirred tanks, climbing film evaporator, and serial and parallel pumps.

362018 微生物學 **3** **必** **謝寶全，下**

本課程的內容包括：

微生物學在科學上之地位、發展歷史、未來展望。微生物之形態及分類。微生物之細胞構造及功能。微生物之遺傳。微生物之控制

362018 General Microbiology **3** **R** **P. C. Hsieh, S**

This course is offered to cover:

Introduction of microbiology, its history and development. Morphology and identification of microorganisms.Cell structure and function of microorganisms. Microbial genetics. Control of microorganisms.

362019 微生物學實驗 **1** **必** **邱秋霞，下**

本課程之內容包括：

顯微鏡之使用。培養基之配製及滅菌方法。 微生物之培養分離及純化。 各種不同之染色法。 微生物生理及生化特性探討。 微生物生長條件之探討。

362019 General Microbiology Lab. **1** **R** **C. H. Chiu, S**

The lab covers how to use microscope, preparation of media and methods of sterilization, culture transfer techniques, microscopic examination of stained cell preparations, microscopic examination of living bacterial preparations, the microscopic measurement of microorganisms. Gram stain, serial dilution-agar plate procedure to quantitative viable cell, the bacterial growth curve, biochemical and physiological characteristics of microbes, cultivation and morphology of molds, yeast morphology.

362027 食品化學 **3** **必** **廖遠東，下**

本課程介紹基礎食品化學概論，設計給主修食品專長學生並可提供基本知識去克服食品工業上的技術問題，課程內容涵蓋水分、醣類、蛋白質與脂肪等四大基本營養素。並且將食品化學的理論與食品加工結合，著重在加工和貯藏上的變化，並應用於食品成分對品質促進的影響。

362027 Food Chemistry **3** **R** **E. T. Liaw, S**

The course is designed for students who are majoring in food science. It provides basic

knowledge to overcome technical problems occurred in food industry. Topics include water in foods, carbohydrates, proteins and amino acids, lipids and fatty acids. Basic chemical and functional properties are emphasized in the changes during postharvest and food processing, and the application of food ingredients as quality improvement.

362020 生物化學(1)　　3　必　　許祥純、吳美莉 上

本課程主要介紹生物體構成分子之組成及結構，以提供學生生化分子之基本概念，並建立修習代謝生化及分子生物的基礎。其內容包括：水及緩衝溶液、胺基酸及蛋白質、酵素、核酸、碳水化合物及脂質之介紹。

362020 Biochemistry（1）　　3　R　　S. C. Sheu, M. L. Wu, F

This course is to introduce the composition and structure of biomolecules. The purpose of this course is to provide students with basic concepts of biomolecules. The topics involved in this course are water and buffer, amino acid and protein, enzyme, nucleic acid, carbohydrate and lipid.

362021 生物化學實習(1)　　1　必　　許祥純、吳美莉，上

本課程目的在使學生藉由實際操作了解生劃分子的特性及生化反應的原理，並學習 pH 計、分光光度計等儀器的操作。實習內容包括：緩衝溶液之製備、胺基酸之滴定、胺基酸及蛋白質之定性分析、蛋白質之定量、醣類之定量分析、酵素活性測定及膠過濾法。

362021 Biochemistry Lab.（1）　　1　R　　S. C. Sheu, M. L. Wu, F

This course is designed for students to understand the characteristics of biomolecules and the principles of biochemical reactions in the lab. Students will also learn how to operate the some instruments such as pH meter, spectrophotometer in this course. It includes buffer preparation, titration of amino acid, qualitative and quantitative analysis of amino of amino acid and protein, quantitative analysis of carbohydrates.

362007 食品加工實習(1)　　1　必　　邱文貴、蔡錦燕，下

本課程配合正課的內容，包括肉品生產過程及品管作業包裝，煉製品之罐頭、魚丸、魚蝦醬油及其他加工品之製造及開發。

362007 Food Processing Lab.(1)　　1　R　　W. K. Chiu, C. Y. Tsai, S

The lab provides the chance to practice the processing of dried pork bundle、 sausage、 cured meat、fish ball、dehydrated fish stick and shrimp sauce products.

362013 食品加工實習(2)　　1　必　　蔡碧仁、楊季清，上

本實習課程第一部分為穀類加工實習，包含各種穀類之認識及品質判斷，各

種配方對產品品質之影響，加工方法，程序之設設與開發。第二部分為蔬果加工實習，包含以各種蔬果進行各式加工，經由操作過程讓學生了解加工成品品質與加工操作間之關係，俾理論與實際能相印證。

362013 Food Processing Lab.(2) **1** R **P. J. Tsai, C. C. Yang, F**

Part1 will on (1) the quality judgment of the grain, flour of cereals(2) effect of formulation on the quality of product(3) development and optimization of processing method, and procedure in cereal products.

Part2 will on relations processing by using fruit and vegetables. Students may understand the relation between quality and processing method and the quality change duving processing and storage.

362029 食品衛生與安全 2 必 **郭嘉信，上**

講授食品從生產原料，經加工過程、包裝，直到人類攝食為止之各階段過程中，確保人類食生活上之衛生與安全的問題；食品與微生物、食品之腐敗、食物中毒、食品添加物，經口傳染病、人畜共通傳染病、食品與寄生蟲、食品之放射線能污染、食品衛生上之對策以及食品法規等。

362029 Food Hygiene and Safety 2 R **J. H. Guo, F**

Food hygiene and safety is to teach the means necessary for ensuring the hygiene and safety of human being , the food at all stages from its growth, products or processing, packaging, until its final consumption. It contains food and microorganisms, food deterioration, food poisoning, food additives, oral infection, zoonosis, food and parasite, food and sanitary insects, contamination of radiation substance, the measurememt of food hygiene and the laws and regulations of food.

362033 營養學 2 必 **林頎生，下**

本課程除講授營養學基本原理和正常營養之實際運用外，更藉由親自操作實習來明瞭食物的特性與營養學上的觀念和理論。主要講授內容包括介紹食物營養與健康，消化吸收與代謝，蛋白質及胺基酸、醣類、脂類、能量代謝、礦物質元素、水分及電解質平衡、脂溶性和水溶性維生素。主要實習內容包括：米飯、麵條、米粉和粉絲類吸水率之計算與製備；蛋之乳化作用及蛋黃醬之製作；肉類之收縮率與廢棄率之計算方法與製備；豆類與奶類的特性及其製品與各類食物代換單位和代換表應用練習。

362033 Nutrition 2 R **C. S. Lin, S**

The objective of this course is not only to introduce fundamentals of nutrition science and practical applications of the principles for normal nutrition but also to elucidate properties of different kinds of food and nutrition concepts and theory by practical manipulation. Lecture contents cover: food, nutrition and health; digestion, absorption and metabolism; proteins and amino acids; carbohydrates; lipids; energy metabolism; mineral elements; fluid and electrolyte balance; fat–and water-soluble vitamins. Laboratory work includes: preparation and water absorption ratio of different kinds of rice and noodle; dumpling making; practice of “as purchased “and “edible portion” in eggs，vegetables and fruits; emulsification of egg and predation of mayonnaise; shrinkage ratio and waste ratio of meats; properties of soybean

an milk and their products an practice of exchange list of different kinds of foods.

362022 食品分析　　2　必　　溫惠美，上

本課程分二方面討論，其一為基礎分析化學之複習，重點包括各種濃度單位之換算、試藥溶液之配製方法及定性、定量化學反應之原理與計算等；其二為針對食品分析實習項目之實驗原理與計算的講解，俾使學生在操作實驗之餘，能知其然，並融會貫通實驗的設計原理與目的。

362022 Food Analysis　　2　R　　H. M. Wen, F

Designed to acquaint the students with the basic knowledge and fundamental principles of analytical chemistry commonly used by food analysts. Emphasis is on understanding the theoretical and practical aspects of volumetric and spectro photometric methods. Procedures for routine quality control and official tests on food components are also introduced.

362023 食品分析實習　　1　必　　溫惠美，上

實習項目包括食品系之一般成分分析及油脂、蛋白質食品之品管等方面。一般成分包括水分、灰分、粗蛋白、粗脂肪、磷、鈣等成分之定量；油脂之品質測定包括酸價、碘價、過氧化價及皂化價等；蛋白質之鮮度及品質測定則包括揮發性鹽基態氮及胺基態氮等。讓學生藉實際之操作過程，對相關食品之一般成分測定及品管工作有基本的認識。

362023 Food Analysis Lab.　　1　R　　H. M. Wen, F

Designed to acquaint the students with the practical operation for routine quality control and official tests used by food analysts. Students work in small groups to be familiar with the proximate analysis of food products. Techniques training of quality control on selected items in fat-containing food (such as acid value, peroxide value, iodine value and saponification value) and protein-containing food (such as volatile basic nitrogen and amino nitrogen) is also the objectives of this course.

362026 食品法規　　2　必　　林頎生，下

本課程包括食品衛生相關法規之內涵、特色及適用範圍，並介紹食品良好作業規範之精神、執行方法，讓學生瞭解食品工廠之設立、經營管理相關之規定。

362026 Food Law　　2　R　　C. S. Lin, S

This course offers to cover the history, phylosophy of food safety related Acts, Laws and Regulations. Emphasis on the background of food regulation and laws. Help the students to understand the regulations and laws required for a food processing and related company.

362024 食品微生物　　3　必　　謝寶全、邱秋霞、郭嘉信，上

講授與食品有關的微生物及其各種有關的生理、酵素等一般的概念。利用食品微生物之發酵技術來製造食品的方法，以及食品腐敗之原因與其防止方法。

362024 Food Microbiology 3 **R** **P. C. Shieh, C.H.Chiu, J. H. Guo, F**

The course is to teach the food related microorganisms and the common concept of their physiological, enzyme etc. Application the fermentation technique of microbes on food processing. The food putrefaction and the contamination prevention were also introduced.

362025 食品微生物實驗 1 **必** **謝寶全、邱秋霞、郭嘉信，上**

講授食品中微生物數之計測方法，有用食品微生物之分離、培養方法，以及單獨利用細菌、酵母、黴菌或混合菌來製造食品的方法，食物中毒菌之分離鑑定及其計測。

362025 Food Microbiology Lab. **1R** **P. C. Shieh, C. H. Chiu, J. H. Guo, F**

The lab technique covers the cell count of microbes in food, the isolation and cultivation of food microbes. Bacteria、yeast、mold or mixed of them were applied on food processing, the isolation, identification and counting of food poisoning microbes were also involved.

362072 校外實習 24 **必** **林貞信、下**

本課程的開設在使食品科學系的學生，藉由暑期到食品相關產業去實習工作，可以了解食品相關產業的實務工作內容。學生能由做的過程當中，認識與了解正確的實習工作態度、需要那些專業知識、如何在團體工作、提升自我解決問題的能力等。修習本課程，可以使學生體認食品產業中的實務工作，回到學校後能自我要求加強專業知識的學習。

362072 Principles of Food **24** **R** **J. S. Lin,F**

This course is offered for food science students who can practically work in food related industry in summer. So, they will understand what are those works in the food reated industry. Students will learn and understand the right working attitude, needed profession knowledges, how independently work in group, increae the ability of self-resolving problems, in the working process. After having this course, students will understand those practical works in the food related industry, and will push themselves to learn and strengthen needed professional knowledge.

362034 實務專題 **1** 必

本課程由教師輔導學生選定其有興趣之作物及試驗題目，進行田間栽培管理調查、植體分析或生產技術之操作或實驗室內之試驗、分析，並將實驗結果撰寫報告。

362034 Special Project **1** **R**

The students will select their crops (horticulture or agronomy) of interest and advisor with the specialty to instruct him. Course contents include either a laboratory research or cultural practice year round in the field for practical production, management, plant growth analysis techniques and the analysis of final results, report writing.

二、選修科目 **Elective Courses**

362030 食品行銷　　2　選　　吳明昌、楊季清 上

本科目為了使學生清楚地瞭解食品行銷的基本概念和原則，進而促使學生熟悉食品交易行為，以培養出具行銷能力之食品科技人員。教學內容包括理論與實物研討兩部分。(一)在食品行銷理論方面將蓋下列範圍：行銷管理程序、策略性規劃、行銷研究、行銷資訊系統、行銷通路、產品促銷、競爭性行銷策略、國際行銷 (二)在實務研討方面：以不同食品企業之行銷方式做為研討對象，教學方式兼採講授，分組討論，專案報告與測驗。

362030 Food Marketing　　2　E　　M. C. Wu, C. C. Yang, F

The objective of this course was designed to teach food marketing basic concepts and principles. So that student could also specialize in marketing as well as food science and technology .The courses included:(A)marketing management procedure 、 strategic planning 、marketing research 、marketing information system 、distribution channels、 product promotion、competitive marketing statagy 、international marketing (B)Individual food enterprise marketing.

362037 電腦在食品科技之應用　　2　選　　劉展岡、林貞信，上

本課程介紹個人電腦與套裝軟體在食品科技上之應用，範圍包含數值資料蒐集整理，品質管制之分析統計，食品加工過程之數學模擬等等。教授內容涵蓋：電腦繪圖，機率與抽樣，統計結果分析檢定，簡單迴歸與複迴歸，營養調配，反應曲面法，食品工程上之應用數值解析。簡介基礎理論，重點則在套裝軟體(SAS、EXCEL)於食品科技各領域之應用實例。

362037 Application of Computer Technology in Food　　2　E　　C. C. Liu, J. S. Lin, F

This course introduces the application of personal computer and assorted softwares in the field of food technology, such as data acquisition, statistical treatment on quality control, mathematical modeling involved in various food processing technologies. Contents include chart and figure generation by computer, probability and sampling, statistical analysis, regression, optimization, response surface method, applied numerical analysis in food engineering. Focus will be emphasized on practical applications of computer software instead of sophisticated theories.

362038 電腦在食品科技之應用實習　　1　選　　劉展岡、林貞信，上

本實習目標配合正課而實施，共設計有食品科學研究暨食品工業生產上所需應用到之 10 項鍊習題，分別為直方圖製作；管制圖製作；信賴區間；直條圖與 x-y 圖製作；假設檢定之施行；線性回歸與變異數分析；反應活化能計算；線性

規劃應用於營養調配；反應區面法；相關性與相關係數分析。

362038 Application of Computer Technology in Food Lab. **1 E C. C. Liu, J. S. Lin, S**

The lab is specifically designed to complement with the lecture, there are totally 10 practices listed as follows: Histogram Chart; Statistical Process Control; Confidence Interval; Bar Chart and X-Y Representation of scientific data; Validation of Hypothesis; Linear regression and Variance Analysis; Calculation of Activation Energy by Linear Regression; Linear Programming for Nutrition Formulation; Response Surface Methodology; Analyses on the Correlation Coefficient.

362042 保健食材之加工與應用 3 選 蔡碧仁，下

使學生了解食品材料與保健科學的基本特性及具備在保健科學應用之基礎及技術，並有效掌管保健食材的加工、產品貯存及流通。內容包括：蔬菜、水果、豆類與穀類的基本特性及保健功能、東西方保健食材，如中草藥、菇蕈類、香草類、幾丁聚糖、蜂膠等、生物技術產品，如膠原蛋白、酵素類、.乳酸製品、果寡糖、色素等之介紹、營養補充劑，如維生素、亞麻油酸、DHA、卵磷脂等

362042 Processing and Application of Health Materials **3 E P. J. Tsai, S**

The aim of this course is to introduce the characteristics of food materials and their application in Health Science. Handling skills during processing, storage and transportation are also mentioned. Contents include：characteristics and functions of fruits, vegetables, beans and cereals、 Health foods in orient and west word like Chinese medicine, mushroom, herb, chitosan、 Biotechnical products like collagen, enzyme, lactic acid, oligosaccharide and pigments. 4. Nutrient supplement like vitamin, linoleic acid, DHA and lecithin.

362044 食品品質管制 2 選 廖遠東，上

由統計之觀點，討論食品工廠中之品質管制事項，包括管制圖之製作原理、實際應用建立。管制要點，經由食品良好作業規範，延伸品管項目原料、製程以迄售後品質，注重製造過程中預先管制，並顧及顧客反應以求追縱改進。危害因子管制，則由加工過程中特別重要的管制點著手，以維護產品之安全性。最後，則充分運用統計數據，建立 ISO9000 系列管制制度，達到食品品質之全面品質保證。

362044 Food Quality Control **2 E E. T. Liaw, F**

From the view point of statistical technique, quality control in food processing is important. Control charts, involing X and R charts will be discussed theoretically. Application of these charts is emphasized, In good manufacturing process, food quality protection will be discussed from raw material, processing and shelf-life. Some of the major steps to maintain food quality should be achieved by applying HACCP system. Finally, use the statistical datas to match ISO9000 control system. So, the food quality will be assured entirely.

362054 食品冷凍學 2選 楊季清，下

課程包括介紹冷凍物理現象原理及冷凍食品的保鮮技術，課程包含 1.冷凍的機械原理 2.莫利爾線的製做與操作實務 3.冷凍循環原理 4.冷凍品的品質保鮮原

理及技術 5. 冷凍食品包裹

362054 Freezing of Food 2 E C. C. Yang, S

The class including introducing basic physical phenomena in the freezing and freezing technology。The content of this course contain: 1 mechanism of freezing 2.Mollier chart application and drawing.3Theory of freezing cycle. 4. quality of freezing foods control and freezing time calculation.5.packaging of frozen foods.

362058 食品包裝 2 選 吳明昌，上

本課程著重於訓練學生瞭解各種不同食品該用何種包裝材料方能保護食品; 另外訓練食品包裝設計, 針對消費者之需要, 而設計出各種商品的包裝。因為消費者到市場上購買食品, 已經從以前生理上的需要演變成心理上的需求。因此今日食品包裝在食品之銷售上佔了很重要的地位。食品包裝技術講授內容包括:各類食品之包裝材質、食品包裝之管理、最新食品包裝設計以及某些特殊功能食品在特殊用途上之包裝發展、貯存、市場。

362058 Food Packaging 2 E M. C. Wu, F

The course is designed to train students to understand "the packaging needs of foods "and the package design . Contents of the course includes packaging material of food; the packaging needs of foods ,the restriction of food packaging, the new food package design and aspects of packaging technology that are relevant to the preservation, distribution and marketing of a specific food.

362043 食品加工自動化元件與實習(1) 3 選陳和賢，下

簡介食品工業上所應用之各種自動控制系統及其組成元件。課程包含自動控制系統之組成元件分類概述，順序與回饋控制簡述，各種電力與氣壓感測控制元件介紹，各項系統元件之工作原理，以及簡易控制程式之編輯驅動。實習內容包括電氣與氣壓元件，交直流馬達，感測器，以及可程式化邏輯控制器(PLC)等模組化之教學實習套件。本課程為「機電整合與自動化」系列課程之基礎，目標是以生動之實習操作，來使學生瞭解控制系統之組成與功用。

362043 Element of Food Processing Automation and Lab.(1) 3 E H. H. Chen, S

This course is designed to introduce the control systems and components applied in the automatic manufacturing processes. Topics covered are: characteristics of elements for automatic process control; sequential and feedback controls; introduction of electrical, pneumatic control elements and their operation principles; and basic programming techniques. Contents of the laboratories are: integrated systems such as electrically- and pneumatically-driven elements; DC and AC motors; sensor devices, and programmable logic controllers (PLC). This course aims to lay the foundation for a series of courses related to “process control and automation” through the innovative hand-on experiences.

362061 感官品評學與實習 3 選 林頎生，上

以實用方式，配合理論的資料，輔以實物品評方式，來介紹何謂感官品評。針對學生將來在工業界或研究單位的需求，教授感官品評的基本生理、實驗環境的要求條件，樣品取樣及準備等硬體教育，再從軟體方面之人員選擇及訓練以及

數據的收集及分析逐步加強。針對影響感官測驗精確度的因素加以說明，再進一步的實際操演各類型的感官測驗，包括差異選別試驗(Difference Test)，特性敘述試驗(Descriptive analysis)及嗜好性測驗(Preference Test)等。並以品評組長訓練方式分組實作品評實驗，包括實驗設計、預備工作數據收集、統計分析與研判。

362061 Sensory Evaluation and Lab. 3 **E** **C. S. Lin, F**

Students are separated into several discussion panel groups. Tasting and discussions of primary source materials according sensory evaluation methods, including historical perpectives, psychophysics, perceptual biases, sensory environment. Concepts influencing detection of sensory differences, use of rating scales, and characteriztion of sensory properties will also be emphasized. Further studies include sensory technigues and statistical methods for analyzing results in order to establish a full sensory evaluation program.

362036 食品添加物 2 選 邱文貴，上

該課程討論食品加工中常用之配料，如修飾澱粉、特殊功能蛋白質、膠質及加工油脂及少量使用但功能特殊之添加物，如香料、乳化劑、抗氧化劑等物理性質及其生產技術。而整合各配料主要食品加工過程中，搭配使用，發揮整體最大功能，則是本課程之討論重點。

362036 Food Ingredients 2 **E** **W. K. Chiu, F**

The commonly used ingredients in food processing are discussed, including modified starch, protein with functional properties, gum and gelling material and modified fatty ingredients. The special functional ingredients such as spices, emulsifier, antioxidants are also covered. Pasteurizing and sterilizing equipments, cooling machines, drying machines, extruder, packing machines and some advanced automatic machines in food industry are mentioned too.

362047 食品生物技術產業與經營 2 **選** **郭嘉信，上**

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

362047 Industrial Business and Management for Food Biotechnology 2 **E** **J. H. Guo, F**

This course will provide an overview of global food biotechnology businesses, critical developments of novel healthy foods and genetically modified foods, regulations and intellectual property protections of food biotechnology businesses, and strategy and management for running a food biotechnology business.

362049 食品加工技術特論(1) 2 **選** **古源光、劉展冏，下**

本課程介紹薄膜技術以及濃縮乾燥技術在食品工業上之應用。在薄膜技術方面，首先自熱力學的觀點來探討液體形成滲透壓之原因，進而教授薄膜過濾

與傳統過濾之不同，以及薄膜過濾之驅動操作。此外介紹五種主要薄膜：逆滲透(RO)，次微米薄膜過濾(NF)，超薄膜過濾(UF)，微米薄膜過濾(MF)，及電透析膜過濾(ED)之特性與應用。另外也將涵蓋薄膜材料及製造方法，薄膜之裝置型式、操作原理，進而薄膜之系統設計與其在食品加工上之應用實例。在濃縮乾燥技術方面，將由基礎工程原理(例如質量、熱量之平衡與傳遞)之複習開始，進而探討食品本身物理化學特性對濃縮乾燥操作之影響。課程主題另包括蒸發濃縮原理，蒸發濃縮器之計算與設計，食品水活性，氣流濕度，乾燥速率之計算，各種乾燥設備之原理與比較，全部佐以食品工業上之應用實例加以說明。

362049 Special Topics on Food Processing Technology (1) 2E Y.K. Guu, C. C. Liu,S

This course consists of two categories of applied technologies involved in food processing — Membrane Technology, and Concentration and Dehydration Technology. Membrane Technology starts with osmotic pressure of liquid system through thermodynamic point of view, further to the difference between conventional and membrane filtration, and the mechanisms of membrane filtration. A broad spectrum of membrane technology such as configuration, materials, applications are included. Various membrane types like reverse osmosis (RO), nanofiltration (NF), ultrafiltration (UF), microfiltration (MF), and electrodialysis (ED) along with their specific applications are covered in this course. The applications of membrane technology in food processing forms the core of this part of course. In the field of concentration and dehydration, the essence lies in the principles and practical applications in the food industry. Course starts with the reviews on fundamental engineering basis such as mass and energy balances, then the effects of food physicochemical properties on concentration and dehydration. Also covered are principles of evaporation; calculation and design of evaporators; water activity; humidity; drying rate; and assorted drying equipment. Examples from industrial applications will be illustrated to assist comprehension.

362060 新產品開發與實習 3 選 楊季清，上

本課程主要介紹開發新產品之步驟與方法。結合基本的食品化學、微生物和加工技術於新產品開發。課程並介紹如何應用電腦去設計食品配方。學生必須能夠把以往所學的知識結合與應用於新產品開發。

362060 Food Product Development and Lab. 3 E C. C. Yang, F`

The objectives of this course included procedure new product development and the

approach to achieve the R&D. the use of food chemistry, microbiology and food processing techniques were combined with the computer formulation methods to formulate new products.

362045 食品殺菌技術　　2　選　　吳明昌，上

本課程在探討食品品質變化最小的條件下,惰化或殺滅食品中所含微生物而得以商業保存的技術。其內容包括利用熱、電磁波殺菌之原理及應用，放射線殺菌之理論、應用及安全性，化學藥劑之使用方法及安全性，水活性調節、超薄過濾、超高速遠心分離等之物理除菌原理、應用及無菌包裝等加工技術。

362045 Food Sterilization　　2　E　　M. C. Wu, F

The course discusses the techniques to achieve the preservation of food. The food sterilization can be processed under a minimized deterioration condition to reduce or remove the existing microorganism, the outlines included the heat, electromagnetic wave, radiation sterilization, the aseptic packaging and carefully control of water activity, ultrafiltration, ultrapressure, and ultrahigh speed centrifugation are also covered.

362046 食品殺菌技術實習　　1　選　　吳明昌，上

本課程配合食品殺菌技術之課程內容,作實際之操作、試驗或參觀等其內容包括各類食品之熱傳導速率測定、微生物耐熱性曲線製作、加熱殺菌值測定、各種密封食品加熱殺菌條件之探討、化學藥劑對食品之保存與安全性試驗、物理除菌等試驗及至加工廠或相關單位參觀,以瞭解食品生產之殺菌實務。

362046 Food Sterilization Lab.　　1　E　　M. C. Wu, F

The lab is to match the lecture to have the practice to run the food sterilization techniques. The thermal conductivity rate was determined to evaluate the thermal death curve and leathal rate of microorganisms. The chemical and physical sterilization were also tested and setup a field trip for students.

362062 食品加工技術特論(2)　　2　選　　楊季清、林貞信，上

食品冷藏、冷凍與擠壓技術為本課程教授的主題。課程中將介紹食品在冷藏與冷凍前的處理、冷藏與冷凍期間食品品質之變化、以及如何延長低溫儲存食品之保存期和冷凍食品解凍之各種方法；同時，食品擠壓技術的由來、擠壓機的構造與維護、食品流變學、食品擠壓操作、影響食品擠壓的變數和食品擠壓程序的控制等亦將在此課程中介紹。

362062 Special Topics on Food Processing Technology（2） **2 E** **C.C. Yang, J. S. Lin, F**

Specific subjects covered in this course are cooling, freezing and extrusion technologies applied in the food industry. Contents include pre-treatment of foods prior to the cooling and freezing processes, changes of food qualities during these operations, how to prolong the shelf life of foods stored at sub-ambient and low temperature, and different thawing methods for frozen foods. In addition, lectures on food extrusion technology, configuration and maintenance of extruders, food rheology, operations of an extruder, variables affecting food extrusion, and its process control are also covered.

362063 酸酵學 2 選 謝寶全、邱秋霞，上

講授以應用微生物的酸酵技術製造各種發酵產品之生產技術，如酒類工業、有機酸工業、發酵食品工業、胺基酸工業、酵素工業、菌體生產工業、抗生物質工業、核酸關連物質工業、微生物轉換酸酵工業、生理活性物質生產工業等,以及利用微生物之酸酵技術於培養植物細胞生產有用物質與生產細胞的方法。

362063 Fermentation 2 E P. C. Hsieh, **C. H. Chiu, F**

The course based on the knowledge of applied microbiology to discuss the related fermentation industry: brewing, organic acids, food fermentation, amino acids, enzymes, antibiotic, etc. The course also covered the technique of cell production.

362064 酸酵學實驗 1 選 邱秋霞，上

使學生練習生產單細胞蛋白質之培養技術、酒精酸酵技術、有機酸酸酵技術、胺基酸酸酵技術酵素生產酸酵技術、抗生物質生產技術、酸酵食品製造之技術以及培養植物細胞生產有用物質與大量生產有用細胞之培養技術等。

362064 Fermentation Lab. 1 E C. H. Chiu, F

The lab covers the single cell protein, technique in alcohol fermentation、amino acids、enzymes、antibiotics production and food fermentation, and the cell production technique.

動物科學與畜產系（產學專班）
Department of Animal Science

專業必修科目 Required Courses

262001 動物學	2	必	劉炳燦、劉世賢、沈朋志	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	B.T. Liu, S. S. Liu, P.C. Shen	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	沈朋志、劉世賢	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 Practice of Zoology	1	R	P.C. Shen, S. S. Liu	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, observating the external features of animal cells and protozoas, observating the anatomic structures of pheretima, and crayfish, understanding the anatomic structures of circulatory, respiratory, excretory, reproduction, digestive, muscle and skeleton systems of vertebrates.

262004 動物解剖生理學	3	必	余祺、劉世華	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 Animal	3	R	Y. D, S.H. Liu	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.

262006 畜產微生物學	2	必	林美貞	下

本課程講授微生物之特性及分類、原核細胞之結構、細菌之分類及鑑定、真核細胞之結構、真菌、原生生物及寄生蟲、病毒之分類及鑑定、微生物之生長、微生物之營養與代謝、微生物之控制及於基因工程之應用。並針對畜產相關之微生物加以探討，包括畜產品原料中微生物之性質和殺菌條件、原料之貯存技術、發酵微生物之加工特性及成品之微生物變敗。

262006 Microbiology of Animal Products 2 R M. J. Lin S

This course includes characteristics and classification of microorganisms, structure of procaryotes, classification and identification of bacteria, structure of eucaryotes, fungi, protists, parasites, classification and identification of virus, growth, nutrition and metabolism of microorganisms, microbial control, and genetic engineering. The course will focus on the microbiology related to animal production, including microbial control of animal products, properties and destruction of microorganism in animal products, storing technique of raw materials, processing characters of fermented culture, and microbial spoilage final products.

262009 生物化學 3 必 劉世華 上

本課程主要提供學生對於生物體內構成物質及其生物化學作用之基本認知，以作為修習營養學、遺傳學等之基礎。課程內容包括：1.生物體之構成物質－包括碳水化合物、蛋白質、脂質等之構造與代謝；2.生物能量之代謝；3.生化反應之催化及控制－酵素；4.遺傳訊息之傳遞－核酸。

262009 Biochemistry 3 R S.H. Liu F

This course offer students the basic concepts of Biochemistry for further studying in nutrition and genetics. The contents include：the structure and metabolism of carbohydrates, proteins and lipids; the metabolism of energy; biochemical reaction catalysis and regulations－enzymes; and genetic control－nucleic acids.

262010 生物化學實驗 1 必 劉世華 上

本課程主要配合生物化學正課提供學生對於生物化學相關實驗之基本操作。課程內容包括： PH 值之測定法、緩衝溶液之製備、氨基酸之滴定曲線；2. 蛋白質一般反應、氨基酸與蛋白質之定性分析、蛋白質之定量分析；3. 醣類之定性分析與定量分析。

262010 Biochemistry Lab. 1 R S.H. Liu F

This course is to offer students about the basic practice of biochemistry. The contents of the basic practice were to include： 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; and qualitative and quantitative determination of carbohydrates.

262011 肉品原料與利用 2 必 陳志銘 上

本課程介紹畜產品原料的種類與特性，使學生對乳、肉、蛋及禽肉與副產物的特性有概括認識，並可提供往後研習肉品、乳品與蛋品加工之參考。主要內容包括各種

畜產食品原料之構造、特性、組成營養價值、影響產品原料之因素以及原料之貯存與處理等。

262011 Raw Material Quality and Utilization of Meat 2 R C.M.Chen F

This course will discuss the types and characteristics of animal product materials, in order to give students a basic insight into the materials of meat, milk, egg, and poultry meat and their by-products, and for the further study of meat, dairy and egg processing technique. The major contents conclude structure, characteristics, and composition of materials, functional properties of raw materials of animal products quality influencing factors, storage and handling of materials, and etc.

262012 生物統計 2 必 張秀鑾 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 H. L. Chang 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 張秀鑾 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 Practice of Biometry 1 R H. L. Chang 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.

262014 動物遺傳學 2 必 張秀鑾 下

本課程旨在介紹遺傳學基本原理與解說生物體之遺傳特徵在世代間如何傳遞、遺傳密碼如何複製與表現，及其變異原因。課程內容包括古典孟德爾遺傳學、基因表現與交感、連鎖與性聯遺傳、遺傳之染色體學說、DNA 之遺傳功能、複製、重組、轉錄與轉譯；最後簡介突變與核外遺傳對家畜之影響。

262014 Animal Genetics 2 R H. L. Chang S

The objectives of this course are to introduce the principles of genetics and to state how

the genetic characteristics being transmitted between generations, how the genetic code being replicated and expressed, and the causes of variation. It covers major topics usually taught in an introductory course, including classical Mendelian genetics, gene expression and interaction, linkage and sex linked inheritance, chromosome theory of inheritance, genetic function of DNA, replication, recombination, transcription and translation. In addition, both mutation and extranuclear inheritance are to be briefly introduced but not covered in detail.

262016 動物營養學 2 必 謝豪晃 下

本課程主要討論動物營養學的原理，包括：營養學的發展、動物營養消化生理、飼料的營養組成分、消化率測定、營養需要量測定、營養素的代謝利用過程，包括碳水化合物、脂質、蛋白質、礦物質、維生素及水之代謝；最後並討論營養性疾病及營養知識的應用。

262016 Animal Nutrition 2 R H. H. Hsieh S

This course will discuss the principle and application of animal nutrition. The contents include：the development of nutrition, digestive physiology, the composition of feed, the measurement of digestibility, the metabolism of nutrients；carbohydrates, fats, proteins, minerals, vitamins and water；nutritional deficiency and application of nutritional knowledge.

262017 乳蛋品原料與利用 2 必 林美貞 下

本課程介紹畜產品加工利用的方式與種類，使學生對乳、蛋與副產物利用有概括認識，並可提供往後研習乳品與蛋品加工之參考。主要內容包括各種畜產食品之原料特性、加工原理、以及加工步驟等。

262017 Raw Material Quality and Utilization of Milk and Eggs 2 R M. J. Lin S

This course will discuss the methods and type of animal products utility, in order to give students a basic insight into the meat, milk, egg, and poultry meat and their by-products utilization, and for the further study of meat processing and egg processing technique. The major content concludes animal food on structure and composition, functional properties of raw material of animal products, processing principles and procedures

262018 實務專題 2 必 上、下

本課程由教師輔導學生選定其有興趣之作物及試驗題目，進行田間栽培管理調查、植體分析或生產技術之操作或實驗室內之試驗、分析，並將實驗結果撰寫報告。

262018 Special Projects 2 R F、S

The students will select their crops (horticulture or agronomy) of interest and advisor with the speciality to instruct him. Course contents include either a laboratory research or cultural practice year round in the field for practical production, management, plant growth analysis techniques and the analysis of final results, report writing

262019 生物技術 2 必 上

本課程著重於遺傳工程技術、細胞融合技術、蛋白質工程技術與中草藥生物技術等四大領域，課程之目的在於使學生了解生物技術之理論及其應用。

262019 Biotechnology 2 R F

The curriculum will emphasize four major areas, including genetic engineering, hydridoma techniques, protein engineering, and herbal biotechnology. The purpose of this course is to train students understanding the concept of biotechnology and their applications.

262020 家禽飼養管理 1 必 謝豪晃 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 H. H. Hsieh 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 謝豪晃 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 H. H. Hsieh 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.

262022 動物育種學 3 必 張秀鑾 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 R H. L. Chang 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.

262023 經濟動物繁殖學 3 必 沈朋志、劉世賢 上

本課程著重於討論禽畜繁殖問題及新近發展之繁殖技術，包括雌雄種畜生殖機能之評估與改善，繁殖管理之新觀念與方法，生殖性狀之選拔，人工授精與體外授精技術之應用，性別選擇，配子和胚之顯微操作及保存，與胚移置技術等，並以有助於解除緊迫環境下禽畜之繁殖困擾者為優先．修習本課程之學生可藉課堂討論與國內外相關文獻之閱讀以掌握繁殖技術之最新發展，提升改善禽畜繁殖效率之能力。

262023 Reproduction of Farm Animal 3 R P. C. Shen, S. S. Liu, F F

The objective of this course is to give the students more confidence in their abilities for improving the reproductive efficiency of the livestock. Dealing with the modern concepts and the recent techniques in livestock reproduction, it consists of the following subjects: evaluation and improving of the reproductive functions of the breeding livestock; reproductive management; selection on the reproductive characteristics; methods of sex selection; applications of artificial insemination and in vitro fertilization; micromanipulation and preservation of the gametes and embryos; the technique of embryo transfer; and so on. The topics being put in the priority are those techniques that are capable of being used for restoring the prevalent reproductive failure of the livestock under the environmental stress. For catching up the new developing concepts.

262024 豬隻飼養管理 1 必 翁瑞奇 下

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 R.C. Weng 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 翁瑞奇 下

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 R.C. Weng 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.

262026 禽畜保健 4 必 獸醫系 下、上

本課程目的在使學生瞭解重要禽畜疾病之理論與實際及簡單外科手術。其中包括有關傳染性、內科性及繁殖性疾病之控制、消毒及預防措施，並同時教導學生有關外傷性之簡單外科處理技術。期能使學生瞭解疾病之發生、處理及預防方法。

262026 Livestock Health 4 R Dept. of Verterinary S、F

This course will introduce students the theory of important domestic animal diseases and simple surgical techniques. It provides students general knowledge of disease control; aseptic procedure; and prevention of infectious diseases, internal diseases and reproductive disorder. It also teaches students basic surgical techniques for wounds care. Students are expected to understand the knowledge of diseases occurrence, and the methods of medical treatment and disease prevention.

262028 乳用家畜飼養管理 1 必 沈朋志等 下

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 P. C. Shen, et al. 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 沈朋志、劉世賢 下

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 P. C. Shen、S. S. Liu 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

262030 專題討論 2 必 上、下

本課程旨訓練研究生對於與畜產科學或論文有關的題目，經由資料之收集、研讀與彙整，令學生從而習得相關之專業知識，並由之獲得資料之分析、歸納與邏輯思考、試驗設計與統計、數據分析與統整之能力。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。

262030 Seminar 2 R F、S

The purpose of this course is to give graduate students the trainings on searching information, reviewing references related to animal science or their research topics, therefore, the abilities on logical thinking, experimental design, data collection and analysis, results discussion. Students are required to select a topic in the field of animal science or that related to their thesis. Students must give oral presentation and dissertation.

262031 動物舍規劃與自動化 2 必 翁瑞奇 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 R R.C. Weng 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.

262095 校外實習(1) 4 必 上

本課程目的在，讓學生於校內學習後，對產業的運作有初步的認識與瞭解後。進而實際投入產業的運作，更進一步讓學理與實際的配合，更能充分瞭解的全程實際運作，時所遇到的問題與結局方法的訂定。作為日後投入業界的基礎訓練。

262095 Practice of Animal Science(1) 4 R F

This course aims to enable students to learn at school after the initial operation of the industry\'s awareness and understanding later. And thus the operation of actual investment industry, further to the theoretical and practical cooperation, better understanding of the actual operation of the whole, the problems encountered when the method set with the outcome. The basis for future investment in industry training.

262096 校外實習(2) 4 必 下

本課程之目的在使學生在校外實務實習中，將所學理論與實際配合，在操作中學習。課程內容包括，畜牧之現在及未來之展望、牧場工作簡介及豬隻飼養管理。

262096 Practice of Animal Science(2) 4 R S

This course aims to enable students to learn at school after the initial operation of the industry\'s awareness and understanding later. And thus the operation of actual investment industry, further to the theoretical and practical cooperation, better understanding of the actual operation of the whole, the problems encountered when the method set with the outcome. The basis for future investment in industry training.

專業選修科目 Elective Courses

262032 畜產品營養與健康 2 選 陳志銘 上

畜產品包括乳品、肉品、蛋品是人類優良的食物來源之一，尤其是人類的主要蛋白質來源，對人類健康有舉足輕重的影響。本課程主要介紹乳品、肉品、蛋品之主要營養成分：水分、蛋白質、脂肪、維他命、礦物質及其他微量元素，還包括部分重要機能性成分；並進一步說明這些營養素對人體健康的優點、貢獻及影響；尤其是其機能性保健成份對人體健康與保健的效果及加工時應注意事項。其次，也會探討攝食畜產品的正確觀念，使大眾可以健康、安心地享受美食。

262032 Nutrition and Health of Animal 2 E C.M.Chen F

Animal products, including milk, meat and egg products, are one of the major excellent food sources, especially, those are major protein resources of human being, and are quite important for human health. This course mainly introduces the major components, including moisture, proteins, fats, vitamins, minerals and other microingredients, milk, meat and egg, as well some vital functional ingredients of them. Furthermore, it also illustrates the merits, contribution and effects of those nutrients for human health. Especially, it focuses the human health and functional efficiency of those functional ingredients and the matters needing attention during the processing procedures. The next, this course investigates the correct concept to intake animal products, and make the people can feeling at ease to enjoy the feats in healthy way.

262033 動物行為 2 選 翁瑞奇 上

本課程在使學生瞭解動物行為學之一般原理，課程內容包括：什麼是行為、適應性行為、簡單行為、生物節奏與時鐘、訊號刺激、行為的基因基礎、生理準備、學習、銘印、遷移、社會行為、溝通、統治階級、領域、性行為、轉移動作及社會生物學等。

262033 Animal Behavior 2 E R.C. Weng F

This course is on introduction to the study of general concepts of animal behavior. It is offered to cover topics such as what is behavior?; behavior as adaptation; simple behavior; biological rhythms; sign stimuli; the genetic; physiological readiness; learning; imprinting; migration; social behavior; communication; dominance; territoriality; sexual behavior; displacement activity; and sociobiology.

262034 畜產機械 2 選 上

本課程之目的為介紹畜產機械之種類構造原理利用與維護，其內容包括緒論、機械原理、牧草地之造成機械、畜舍建築及管理利用機械、放牧利用之設施與機械、畜產品加工利用與機械及畜舍廢棄物處理與利用機械等。

262034 Animal Production Machinery 2 E F

The subject of this course contains structure utilization and maintenance of animal husbandry machinery. Main topics include introduction, theory of machines, reclamation machinery for pasture, animal house management machines, pasture machines and installations, equipment for animal products, and equipment for livestock wastes.

262035 畜產機械實習 1 選 上

本課程為配合正課實際需要，其重點為注重操作管理及維護保養以達到理論與實際技術相配合，其內容包括汽柴油引擎之維護保養與實習、曳引機駕駛維護保養與實習、牧草機操作機械保養與實習、畜舍建築及利用機械操作實習、自動給飼機械之操作及保養實習、畜產品加工利用機械實習及畜舍廢棄物處理及利用機械操作保養實習。

262035 Practice of Animal Production Machinery 1 E F

This practice course provides essential technology training for students to operate, and maintenance for animal husbandry machinery. Main topics include training to skill of operate and maintenance for diesel engine, training to skill of operate and maintenance for tractor, forage harvesting operate and maintenance, animal house management machines, automatic feeding machine, equipment for animal products, and equipment for livestock waste.

262036 畜產生物多樣性 2 選 張秀鑾 上

本課程旨在介紹生物多樣性維護之理論基礎、種原基因保存、管理與應用機制，以達到動物遺傳資源永續利用之目的。課程內容包括台灣畜產資源簡介、畜產動物活體與離體保存法、國內外畜產遺傳資源交流國外機制、國際條約與國內相關法規等。

262036 Biodiversity in Farm Animal 2 E H. L. Chang F

The objectives of this course are to state the fundamental theory of biodiversity maintenance, germplasm preservation, management and application mechanism for sustainable utilization of farm animal. Material includes an introduction of Taiwan farm animal genetic resources, both in- and ex-situ conservation protocols, and exchange mechanism of genetic resources for local and global usages, as well as acts, rules and regulations applied to nation and international purpose.

262037 有機化學 3 選 下

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

262037 Organic Chemistry 3 E S

A systematic study of the reaction in each functional group in the important classes of carbon compounds (alkane, alcohol, ether, organic halides, aromatic compounds, aldehyde, ketone, carboxylic acids, ester and amine) the methods of the synthesis of each compound, the relationship and it’s uses in each compound.

262038 有機化學實習 1 選 下

本課程係為非提供主修有機化學之學生而開設，其促使學生得以熟悉一般有機化學之實驗技術，並從實驗中增加對教材之瞭解。本實驗除授以物理常之測定外，並依各官能基之不同之化合物逐一實驗：烷、炔、苯、有機鹵化物、醇、醚、酮、羧酸衍生物及胺等，每一實驗之重點是不同之官能基所產生的不同化學反應的試驗。

262038 Practice of Organic Chemistry. 1 E S

This course is designed in conjunction with the lecture of organic chemistry for the students that are not major in organic chemistry. It intends to provide students a profound understanding of subject, matter from laboratory work and familiar with basic laboratory technique. In addition to the 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 will emphasize on the common chemical properties ascribed to functional groups.

262039 動物福祉 2 選 翁瑞奇 下

本課程之目的在使學生能深刻瞭解動物福利，以為從事畜牧生產之基礎。課程內容包括：動物福利定義、緊迫對動物的影響、動物福利和產業之關係、各種家畜禽動物之福利。

262039 Animal Welfare 2 E R.C. Weng S

The arrangement of this course is to let the students understand the knowledge about animal welfare. The following topics included in the course: definition of animal welfare, the influence of stress on farm animals, animal welfare, animal welfare and industry, and specific topic of animal welfare on different farm animals.

262040 農業政策與法規 2 選 張秀鑾 下

本課程旨在介紹農業政策的意義、內容與相關法規，培養學生具備農業動物資源政策分析與援用相關法規之能力。課程內容包括農業政策、畜牧法規與施行細則、農業資源管理、畜產品生產與廢棄物資源化等有關法令，藉以充實法律常識、培育動物科技人員兼具專業與法律素養。

262040 Agricultural Policy and Laws 2 E H. L. Chang S

The objective of this course is to introduce the concept and contents of agricultural policy, laws and regulations related to animal industry, and thus provide students with the ability of

invoking an article of law or regulations. Material includes current agricultural policy, animal industry act and the enforcement rules, rules or regulations for management of agricultural resources, and for animal production as well as for waste treatment law with promoting in both reducing waste and recycling resources.

262041 畜產檢驗與分析 2 選 劉世華、陳志銘 上

本課程之設計主要在介紹正確的分析方法，儀器的正確使用，以減少分析結果之誤差，配合畜產品之品質檢查方法及配合畜產品製造流程之品管現代技術，內容包括：一般成分分析及精密儀器的基本操作、方法、原理和應用等。

262041 Analysis of Animal Products 2 E S.H.Liu,C.M. Chen F

This course is designed to give the students to use the instruments correctly and accurately, to reduce the analytical error, to assist the students to understand the modern technique about the detection of the ingredients and the quality control of the formula feeds. The contents include basic operation of proximate composition analysis, and methods, principles and applications of instrument analysis for animal products.

262042 畜產檢驗與分析實習 1 選 劉世華、陳志銘 上

本實習內容主要是配合「畜產品檢驗與分析」課程，使學生實際進行所需要之操作訓練；其內容包括：實驗室的安全認識、採樣及分析基本訓練、畜產品各項分析的分析方法及儀器操作等。

262042 Practice of Animal Products Analysis 1 E S.H.Liu,C.M. Chen F

This practice course is in associate with the course of analysis of animal products to provide the training to students on this technique. The contents include the safety of laboratory, sampling and basic operation of analysis, the methods that may be employed for the detection and determination of animal products.

262043 動物內分泌學 2 選 余祺 上

本課程主要講授家畜內分泌腺（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，及各激素的生理機能，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。

262043 Animal Endocrinology 2 E C. Yu 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.

262044 禽畜環境生理學 2 選 謝豪晃 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 E H. H. Hsieh 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.

262045 細胞分子生物學 3 選 余祺、劉世華 上

本課程講授細胞結構、生理與功能、細胞膜運輸、信息傳導、細胞能量轉換、細胞核、細胞週期、基因重組、轉錄、轉譯、基因表現調節等，使學生瞭解細胞的生命現象，奠定學生對動物科學之認知。

262045 Cell Biology 3 E C. Yu,S.H. Liu F

The basic structure, physiology and function of the cell, membrane transport, signal

transduction, energy flow in cells, cell cycle, genetic recombination, transcription, translation, gene expression are discussed in this course. It makes the students aware the basic animal science.

262046 免疫學 3 選 莊秀琪、鍾文彬 上

本課程主要提供非獸醫學生學習一般的免疫學概論，將介紹免疫系統之作用，包括免疫細胞的種類與生成機制，介紹抗原、半抗原與抗體之定義與應用，免疫系統之基本運作機制，免疫球蛋白之種類與結構，免疫細胞之功能以及免疫化學相關之應用。

262046 Immunology 3 E C.H. Chaung, W.B.Chung F

General concepts on Immunology will be introduced in this course, including different types of immune cells and their synthesis, definitions of antigens, haptens and antibodies and their applications, the basic mechanisms in regulating immune responses, types of immunoglobulins and their structures, the functions of different immune cells and the applications of immunochemistry.

262049 應用生物統計學 2 選 張秀鑾 下

本課程旨在介紹常用於資料分析之統計基礎原理，課程內容包括矩陣代數複習、二次型分布、迴歸、變方分析與統計模式建立策略等；最終目的在建立學生具備應用 SAS 商業套裝軟體，進行複雜資料分析與準確地解釋分析結果之能力。

262049 Applied Biostatistics 2 E H. L. Chang S

The course provides an introduction to fundamental theory of the most commonly used linear models in statistical data analysis. Review of matrix algebra, distribution of quadratic forms, regression, and analysis of variance are covered, as well as statistical model-building strategies. The final goal is to equip the students with the ability to correctly apply the SAS commercial statistical packages to analyze the complex data and to interpret the results accurately.

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 E 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.

262052 肉用草食家畜飼養管理 2 選 余祺 下

本課程主要討論兔及山羊等草食肉用家畜之飼養管理。內容包括品種特性、營養與飼養、管理與設備、遺傳育種與繁殖技術、疾病防治與產品利用，畜舍規劃與市場經營等主題，並特別強調在本省地區之特殊環境下，如何經由學理與技術之應用，以調適經營及管理方法，提昇生產效率。

262052 Meat-production Ruminant Farm Animal Feeding and Management 2 E C. Yu, S S

The objective of this course is to give the students more confidence in their abilities for meat-production herbivorous farm animals. The major concepts of this course include: major breeds of rabbits and goats, their characteristics, principles of genetics, nutrition, feeds and feeding, herd and reproductive managements, reproductive techniques, disease control, marketing, and management of products. The topics being put in the priority are those factors and techniques that are capable of being used for improving the efficiency of rabbits and goats production under the adverse environmental conditions.

262053 禽畜副產物利用 2 選 下

本課程之主要內容包含：禽畜副產物之種類、生產量、價值與特性，腸衣、脂肪、明膠、血液、毛皮及羽毛、乳品副產物及蛋品副產物等之處理與應用，及禽畜副產物在食品加工、工業與醫學上之應用

262053 Utilization of Animal and Poultry 2 E S

The major contents in this course include kinds, production quantity, values, and characteristics of animal and poultry byproducts. In addition, many byproducts, including casing, lipids, gelatin, blood, father, dairy, and egg byproducts will also be addressed. Finally, uses of these byproducts in food processing, industries, and medical application will also be included.

262054 經濟動物繁殖實作技術 1 選 沈朋志、 劉世賢 上

本實習之目的在配合「禽畜繁殖技術」課程進度，使學生藉由人為之控制提高禽畜繁殖效率，並育成合乎人類所需之經濟動物。課程內容設計以禽畜類別為單位，分別探討其繁殖生理特性、繁殖方法與繁殖管理、人為控制之發情與排卵、人工授精、懷孕診斷、分娩控制、胚移置及縮短世代間距之各種方法。

262054 Reproductive Techniques of Farm Animal 1 E P.C. Shen, S. S. Liu F

Objectives of this course are: 1) increasing reproductive efficiency by artificial control, 2) cropping desired economic animal. Class is arranged by animal species. Topics include the characteristics of reproductive physiology and management, artificial control of estrus, ovulation, and insemination, pregnancy diagnosis, control of parturition, reducing calving interval and embryo transfer.

262056 單胃動物營養與飼料 2 選 謝豪晃 上

本課程係針對單胃動物之營養需要，給予飼料之種類，及特性作較深入之闡述，其內容包括：肉豬各生長階段之營養需要、種豬之營養需要、養豬飼料之種類及特性、馬不同用途之營養需要、馬飼料之特性。

262056 Monogastric Animal Nutrition and Feed 2 E H. H. Hsieh F

The object of this course is to give the students more deep descriptions on the nutrition requirements and feed kinds and characteristics of the monogastric animals. The course includes the nutrition requirements for swine in different growing stage, the nutrition requirements for the sow and boar, the kinds and characteristics of swine feed, the nutrition requirements for the horses of different uses, and the kinds and characteristics of horses.

262057 飼料製造技術 2 選 謝豪晃 上

本課程乃教授禽畜及魚類完全配合飼料製造工業之現代技術，內容包括：單味飼料之生產方式與一般生產過程之影響因素、飼料預混劑之製造技術、配合飼料之製造包括設計、收料、混合、製粒、包裝儲存與糖蜜、油脂等液體原料添加之有關技術、養魚飼料之製造技術等。

262057 Feed Manufacture Technology 2 E H. H. Hsieh F

The objective of this course is to acquaint the students with the modern technique about the formula feed industry of the livestock, poultry and fish. The course contains the processing of the ingredient feed and the influent factors about general processing problems; processing and adding of feed premix; the engineering of formula feed, including design, receiving, grinding, mixing, pelleting, bagging, weighing, loading and the technique of addition of liquid ingredients; and the technique of manufacturing of the fish formula feeds.

262059 乳品加工 2 選 林美貞 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 E M. J. Lin 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.

262062 無特定病原實驗動物飼養與管理 2 選 沈朋志等 上

本課程主要介紹應用於農學及生物醫學之實驗動物的飼養管理及其動物學之基礎特性，以作為研究、治療及實驗之模式系統。課程內容包括實驗動物種類與命名及育種、實驗動物管理標準操作程序；實驗動物飼養環境與設施；實驗動物營養與飼養管理；實驗動物網路資源；實驗動物品質管制；以及實驗動物疾病與人畜共通傳染病等，涵蓋之實驗動物有小鼠、大鼠、倉鼠、天竺鼠、家兔、犬及家畜等，以有助於瞭解實驗動物在農學及生物醫學等領域之科技研發上所扮演之角色與特性。

262062 Specific Pathogen Free Laboratory Animal Feeding and Management 2 E P. C. Shen et al F

This course provides a concept and introduction to the feeding and management of laboratory animals applied in the research of agriculture and biomedical medicine. It includes the standard operative procedures, environmental control, nutrition and feeding, network resources for laboratory animals, quality control, important zoonosis and health control.

262063 無特定病原實驗動物飼養與管理實習 1 選 沈朋志等 上

本課程主要介紹應用於農學及生物醫學之實驗動物的飼養管理方法及其實務操作，以作為研究、治療及實驗之模式系統。課程內容包括實驗動物之動物識別與記錄；實驗動物國際認證及標準操作程序編寫；實驗動物之大體解剖操作與生理構造；動情週期及配種觀察；實驗動物之保定、採血、注射與麻醉；實驗動物之健康診斷與治療等，涵蓋之實驗動物有小鼠、大鼠、倉鼠、天竺鼠、家兔、犬及家畜等，以有助於學生習得各種實驗動物之飼養管理技術。

262063 Practice of Specific Pathogen Free Laboratory Animal Feeding and Management 1 E P. C. Shen et al F

This practical course emphasizes on the technical training about identification, record, recognizance and SOP of the laboratory animals, gross anatomy and physiological function, reproductive cycles and breeding observation, holding, bleeding, injection and anesthesia, health monitoring and simple practice in disease diagnosis and exclusion.

262064 肉品加工 2 選 陳志銘 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 E C.M. Chen 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.

262068 實驗動物應用學 2 選 劉世賢等 下

本課程以實驗動物在各重要領域之應用之講授主體,授課內容由法規及管理以及應用概論入手,進而至醫學、健康食品檢測、臨床前安全及功能評估、疫苗工業以及在生殖科技等之應用進行講授。期能使學生瞭解實驗動物在各領域應用相關資訊,進而提昇未來投入實驗動物相關行業興趣。

262068 Application of Laboratory Animals 2 E S. S. Liu et.al S

This course is to study the application of laboratory animals in different field. The content of this course includes regulation, management, general application, application in medicine, monitoring system of health foods, estimation of security and function before clinical

treatment, vaccine industry and reproductive biotechnology. Students could learn the relevant information in different fields, and increase their interest in joining the industry of applied laboratory animals in the future.

262069 實驗動物應用學實習 1 選 劉世賢等 下

本課程以實驗動物在各重要領域之應用之實習及實地參訪為主體,授課內容包括醫學、健康食品檢測、臨床前安全及功能評估、疫苗工業以及在生殖科技等之應用進行實習與實地參訪行程。期能使學生瞭解實驗動物在各領域應用相關資訊,進而提昇未來投入實驗動物相關行業興趣。

262069 Practice of Application of Laboratory Animals 1 E S. S. Liu et.al S

This course is major in the practice and visiting of application of Laboratory animals in different field. The content includes the application in the medicine, the monitor of health foods, the estimate of security and function before clinical treatment, vaccine industry and reproductive biotechnology, etc. From those practice and visiting will let students understand that the relevant information in different fields are used, and then promote and invest the relevant trade interest of Laboratory animals in the future.

262072 反芻動物營養與飼料 2 選 余祺 下

本課程之設計在討論反芻動物營養與飼料之特性和應用。內容包括瘤胃的環境，各種養分如碳水化合物、蛋白質和脂質在瘤胃的發酵，與胃腸道有關的營養性問題，進而討論反芻動物營養需要量，飼料之類別及日糧之平衡。

262072 Ruminant Nutrition and Feeds 2 E C.J. Sue S

This course is designed to discuss the characteristicsand application of ruminant animal nutrition and feeds. The contents include : rumen environment; carbohydrate, protein and lipid fermentation in rumen; nutritional problems related to the gastro-intestinal tract; nutrient requirement of ruminant animal; classification of feeds and balance of ration.

262073 飼料配方設計 2 選 謝豪晃 下

本課程係傳授各種禽畜飼料添加物及飼料配方之最新設計技術，其內容包括：飼料添加物之種類、特性及用途、飼料配方之設計原理與設計方法、養豬飼料配方之設計、養雞飼料配方之設計、反芻動物飼料配方之設計、其他飼料配方之設計。

262073 Design of Feed Formulation 2 E H. H. Hsieh S

The object of this course is to acquaint the students with feed additives and the modern design technique of feed formulation for the livestock and poultry. The contents of this course are the kind and using of the feed additives, principle and method of designing feed formulations, design of swine feed formulation, design of poultry feed formulation, design of ruminants feed formulation, and design of the other animal feed formulation.

262074 蛋品加工 2 選 林美貞 上

本課程介紹蛋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，包括蛋品之濃縮、蒸煮、乾燥、酸鹼值改變、添加物使用與蛋品保存等之原理與應用。

262074 Processing of Egg Products 2 E M.J. Lin F

This course introduces technologies related to egg processing and principles of the equipments and facilities related. The purpose of this course is educating students with knowledge include condensation, steam cooking, drying, pH adjustment, food additives addition, egg product preservation, and etc.

262076 安全畜產品檢驗與品管 2 選 上

本課程使學生了解安全畜產品檢驗與分析的儀器與設備之基本構造、分析方法、原理與應用範疇。主要內容包括樣品處理、儀器分析原理、精密儀器分析原理、法規及標準檢

驗法。

262076	Safe Animal Products Analysis and Quality Control	2	E		F

This course will discuss the methods, principles, and applications of analytical instruments for safe animal products. The major contents conclude handling of samples, basic theory of analytical instruments, laws and regulation of analysis of animal products.

262080	安全畜產品生產導論	2	選		上

本課程旨在探討抗生素造成之問題及取代抗菌藥物之畜產品生產。主要內容包括無藥物殘留畜產品介紹、取代抗菌藥物之物質與安全性畜產品、及無菌無污染之畜產品加工製成。

262080	Introduction to Safe Animal Production	2	E		F

Current topics in safe animal production will be discussed, with special emphasis on the problems of antibiotic residues, the various species of antibiotic replacers, and the production of free contamination safe animal products.

262081	安全畜產品生產技術	1	選		上

本課程探討生產安全性畜產品之技術，使學生能在日後生產安全性畜產品時，能應用所學相關知識。主要課程內容包括：安全性飼料生產、動物飼養管理、防疫監測、安全性加工生產及抗生素殘留檢測分析。

262081	Techniques of Safe Animal Production	1	E		F

The arrangement of this course is to let the student understand the technique about safe animal production. Specific topics including the safe feed manufacturing, feed additives, animal feeding and management, diseases control, safe animal products processing, and antibiotic residues analysis.

262082	鹿學	2	選	劉炳燦	上

本課程之討論範圍包括鹿的生物學及台灣現有鹿種之特性，營養與飼養，管理與設備，繁殖管理，疾病防治與產品利用，鹿舍規劃與市場經營，並特別強調在台灣之特殊環境下，如何經由學理與技術之應用，以調適經營及管理方法，提昇生產效率。

262082	Deer Science	2	E	B. T. Liu	F

The objective of this course is to give the students more confidence in their abilities for producing domestic deer, managing and improving deer industry. Dealing with the modern concepts in deer science, it comprises the following subjects: biology of the cervides; major breeds of the native cervides and their characteristics; principles of cervides genetics, nutrition, feeds and feeding; herd and reproductive managements; deer farm planning; disease control; preparation and marketing of the deer products, and so on. The topics being put in the priority are those factors and techniques that are capable of being used for improving the efficiency of deer production under the native conditions.

262084	畜產品在美容之應用	2	選	林美貞	下

本課程講授畜產品的特性及於美容產業之應用。課程內容包括美容產業及美容產品之介紹、畜產原料及成分之特性、乳於美容產業之應用、各種畜產副產物原料及成分之特性、特殊成分之萃取與純化、畜產副產物於美容產業之應用及相關法規。

262084	Application of Animal Products on Beauty Industry	2	E	M. J. Lin	S

This course includes properties of animal products and their application in beauty industry. The content of this course includes the introduction of beauty industry, properties of animal products and ingredients, application of milk on beauty products, properties of animal by-products, extraction and purification of special ingredients, application of animal by-products ingredients, and related regulation.

262085 寵物飼養管理 2 選 余祺 下

本課程之授課內容包括：寵物種類來源、品種、繁殖與育種、營養、飼養與管理、畜舍和保定，以及保健。本課程所提供飼養寵物之相關常識，將有助於寵物飼養技術之提升。

262085 Pet Feeding and Management 2 E C. Yu S

The purpose of this course provides the necessary information including origins, breeds, reproduction and breeding, nutrition, feeding and management, housing and handing, health care in pet animals. It is hoped that this study will serve as a guide for advanced in the field of pet feeding.

262086 禽畜廢棄物管理 2 選 下

本課程旨在協助學生熟悉畜牧廢棄物之特性，一般廢棄物處理技術與原理，三段式廢水處理場之設計及各種禽畜污染防治技術，堆肥原理與製作，脫臭原理與技術，污染之減量及處理，以達到環保法規之要求標準，方能永續發展。

262086 Poultry and Livestock Waste Management 2 E S

The purpose of this course is to assist the students to understand the characteristics of animal waste, the general principles and techniques of treatment, the design of wastewater treatment plant, composting treatment, odor control and sludge minimization in order to achieve the EPA required standards.

262087 禽畜廢棄物管理實習 1 選 下

本課程旨在協助學生熟悉畜牧廢水或排放水之一般分析，其中包括實驗室之安全注意事項，品保與品管，廢水之取樣與保存，QC，COD、BOD、TS、SS、VSS、N、P、PH，杯皿試驗，導電度，透視度與沈降性試驗與堆肥腐熟度與有機質分析。

262087 Practice of Poultry and Livestock Waste Management 1 E S

The purpose of this Course to is assist the students to understand the analysis and sampling procedure of wastewater and discharge water including the QA and QC of laboratory, COD, BOD, TS, SS, VSS, N, P, PH, jar test, conductivity, transparency test and SV30 test, compost maturity and organic matter analysis.

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 E 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.

262089 生物資訊學概論 2 選 劉世華 下

本課程目的在訓練學生使用網路上的軟體程式去分析網路上的生物資料庫，並從中解讀或汲取有用的生物資訊。課程內容包括生物資料庫簡介、DNA 與蛋白質序列比對、蛋白質與 RNA 苷結構預測、單核酸多態型(SNPs)分析、演化樹建構以及生物傳導路徑等。修課學生須至少預修過生物化學、遺傳學或分子生物學(任一門皆可)。

262089 Essential Bioinformatics 2 E S. H. Liu S

The multidisciplinary course attempts to train students using web-based programs to analyze and retrive useful biological information from web-based database. Topics including: biological databases, sequence alignments, structure prediction on macromolecules, single nucleotide polymorphisms (SNPs), constructure of phylogenies, molecular interaction of biopathway. Students are required to have taken at least one of the following classes: biochemistry, genetics, or molecular biology in advance.

262090 現代動物育種技術 2 選 張秀鑾 下

本課程內容主要分兩部份：第一部份講授現代分子生物學分析技術與傳統動物育種基本相關知識，第二部份為兩者結合後對現代家畜禽育種所造成之效應與影響。授課內容包括遺傳標記育種技術(如 RFLP、微衛星、SNPs 及 QTLs)、連鎖分析、遺傳輿圖分析及基因體定序解讀等，以及成功案例之解說。

262090 Modern Animal Breeding Technology 2 E H. L. Chang S

The introductory course will instruct students in basic knowledge of both modern molecular biology techniques and traditional breeding methods, and will show students how the interaction of these techniques and methods profoundly changes economical traits in farm animals. The contents of this course include mark-assisted breeding techniques (RFLP, minisatellite DNA, single nucleotide polymorphisms or SNPs, quantitative trait loci or QTLs), linkage analysis, genetic mapping, and genome sequencing. Several successful examples in animal breeding using such strategy will be also included during the lecture.

262092 加工廠經營管理導論 2 選 陳志銘 下

本課程主要討論食品加工廠經營管理的基本意義、目的與策略。主要內容包括：生產管理、物料管理、品質管理、行銷管理、財務管理、人事管理、危機與客訴管理及衛生安全管理等。

262092 Introduction to Food Processing Plant Management 2 E C.M.Chen S

This course will discuss the meaning, purpose and strategy of food processing plants. The major chapter contents processing management, materials management, quality management, marketing management, financial management, personnel management, and etc.

262093 兔學 2 選 劉炳燦 下

本課程之討論範圍包括兔的生物學及各品種特性，營養與飼養，管理與設備，遺傳育種與繁殖技術，疾病防治與產品利用，兔舍規劃與市場經營等主題，並特別強調在本省地區之特殊環境下，如何經由學理與技術之應用，以調適經營及管理方法，提昇生產效率。

262093 Rabbit Science 2 E B. T. Liu S

The objective of this course is to give the students more confidence in their abilities for producing rabbits, managing and improving rabbit industry. Dealing with the modern concepts in rabbit science, it comprises the following subjects: biology of the rabbits; major breeds of the domestic rabbit and their characteristics; principles of rabbit genetics, nutrition, feeds and feeding; herd and reproductive managements; reproductive techniques; disease control; preparation of rabbit meat, fur and wool; marketing the rabbit products; and so on. The topics being put in the priority are those factors and techniques that are capable of being used for improving the efficiency of rabbit production under the adverse environmental conditions.

262097 牧場實習 1 選 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：一、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。

262097 Practice of Livestock Farm 1 E 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 breeder 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.

262098 加工廠實習 1 選 上

本課程目的在，讓學生於校內學習後，對畜產加工產業的運作有初步的認識與瞭解後。進而實際投入加工廠的運作，更進一步讓學理與實際的生產配合，更能充分瞭解的全程實際運作，時所遇到的問題與解決方法的訂定。作為日後投入畜產加工業界的基礎訓練。

262098 Practice of Food Processing Plant Management 1 E F

This course aims to enable students to learn in school, the livestock processing industry for the operation after the initial knowledge and understanding. Then the actual input processing operation further to the production of theoretical and practical cooperation, better understanding of the full actual operation of the encountered problems and solutions of the set. Livestock processing industry as a future investment in basic training.

262100 動物飼養管理實習 1 選 下

本課程之目的在使學生在動物飼養管理實務實習中，將所學理論與實際配合，在操作中學習。課程內容包括，畜牧之現在及未來之展望、牧場工作簡介、乳牛實習、牧草管理及榨乳管理。

262100 Practice of Animal Feeding and Management 1 E S

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 future and past of animal production, introduction of animal farm, practice of feeder production, practice of dairy cattle production and management of grassland.

262102 牧場經營實習 1 選 下

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。課程內容包括，畜牧之現在及未來之展望、牧場工作簡介及動物飼養管理。

262102 Practice of Livestock Production 1 E S

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 future and past of animal production, introduction of animal farm, practice of feeder production, and practice of management of domestic animals.

土壤與水工程國際碩士學位學程

International Master's Degree Program in Soil and Water Engineering

必修科目 Compulsory Courses

001 專題討論　4　必　待聘，一上、一下、二上、二下

本課程將指導學生進行專題研究，報告題目由學生自行選擇。本課程主要訓練學生彙集文獻資料、撰寫摘要、製作海報及口頭報告用的輔助投影片、及上台報告技巧。同學們將輪流在課堂上報告整理的結果，並參與討論其他同學們的題目。最後學生將模擬研討會，上台以口頭方式發表所選的研究結果。

001 Seminar　4　R　待聘, 1st F, 1st S, 2nd F, 2nd S

In this course each student will select their own research subject; they will collect and summarize literature concerning the chosen subject, write abstracts, design posters for conferences, as well as the power-points slides for oral presentation. All students will participate in the discussion and acquire skills for an effective oral presentation. During the last sessions of the course, the students will simulate a conference situation, where each one will present their research work on stage.

002 碩士論文　6　必　二上、二下

利用完整執行之試驗、觀察或實務操作，使學生能徹底了解並應用修課之知識、練習口頭報告、與科學論文之寫作。老師則藉由討論，提供改進之意見。

002 Thesis　6　R　2nd F, 2nd S

After a well-designed project being properly conducted by students, he/she will be asked to give a oral presentation and summit the thesis before a deadline. Knowledge acquired during the study should be made use of sufficiently in the preparation of the thesis. Frequent and intensive discussions among teachers and students will be arranged to improve the quality of his/her research.

003 土木科技英文(1)　0　必　待聘，一上

本課程有系統的介紹英文論文的寫作格式，利用例子與練習，輔以實際寫作練習與錯誤訂正，輔助學生學習英文論文寫作之技巧，正確組織文章的各個片段，同時強調學生文章撰寫經驗之累積，以完整學術文章之撰寫為課程目標，使能更有效率的利用英文寫出科技論文之佳作。

003English in Civil Engineering Technology (1)　0　R　, 1st F

Scientific and technical writing must be written for a specific audience. Graduate students often find it difficult to write for the specific audience and identify problems in their writing and frequently lack tools to deal with them effectively. This course will provide instructions in the strategies and tactics for effective scientific writing and suggestions as well based on the common problems in manuscripts people easily make.

004 土木科技英文(2)　　0　　必　　待聘，一下

本課程有系統的介紹英文論文的寫作格式，利用例子與練習，輔以實際寫作練習與錯誤訂正，輔助學生學習英文論文寫作之技巧，正確組織文章的各個片段，同時強調學生文章撰寫經驗之累積，以完整學術文章之撰寫為課程目標，使能更有效率的利用英文寫出科技論文之佳作。

004English in Civil Engineering Technology (2)　　0　　R　　, 1st S

Scientific and technical writing must be written for a specific audience. Graduate students often find it difficult to write for the specific audience and identify problems in their writing and frequently lack tools to deal with them effectively. This course will provide instructions in the strategies and tactics for effective scientific writing and suggestions as well based on the common problems in manuscripts people easily make.

005 土木科技英文(3)　　0　　必　　待聘，二上

本課程有系統的介紹英文論文的寫作格式，利用例子與練習，輔以實際寫作練習與錯誤訂正，輔助學生學習英文論文寫作之技巧，正確組織文章的各個片段，同時強調學生文章撰寫經驗之累積，以完整學術文章之撰寫為課程目標，使能更有效率的利用英文寫出科技論文之佳作。

005 English in Civil Engineering Technology (3)　　0　　R　　, 2nd F

Scientific and technical writing must be written for a specific audience. Graduate students often find it difficult to write for the specific audience and identify problems in their writing and frequently lack tools to deal with them effectively. This course will provide instructions in the strategies and tactics for effective scientific writing and suggestions as well based on the common problems in manuscripts people easily make.

選修科目 Optional Courses

006 水文統計　　3　　選　　待聘，一上

本課程主要在介紹機率概念及統計分析之理論便學生獲得正確的方法處理資料與分析結果，授課的主要內容包括機率概念之介紹，隨機變數，機率分佈函數，統計樣本之研究，t-分佈與 F-分佈之檢驗，平均值與變異數檢驗，迴歸與相關分析變異數分析。

006 Statistical Hydrology　　3　　E　　, 1st F

The objective of this course are prepared for the student in learning the concept of probability and the method of statistical analysis, which can used as a tool to help the student to analyze the data and make the inferences of the result. The major contains include the probability concept, random variables, probability distribution, statistical sampling study, statistical estimation, t-distribution, F-distribution, Hypothesis testing, Regression and correlation analysis, Analysis of Variance

007 土壤力學行為　　3　　選　　待聘，一上

本課程將深入探討土壤力學行為與應用分析相關課題，探討課題包括土壤之剪力行為、特性、與分析、土壤之動態行為與分析、土壤地質改良

技術與應用注意事項。

007 Behavior of Soil Mechanics **3** **E** **, 1st F**

This course covers the background, engineering behavior and properties, analysis, and the applications of soil shear strength. The dynamic behavior of different soils, their related problems, and methods of analysis will also be discussed. Ground improvement techniques and their related problems for different ground conditions are also the subjects for the course.

008 作物需水量專題 3 選 待聘，一上

完成本課程，將具備:1.現代節水灌溉方法。2.解釋噴灌和滴灌系統。3.噴水與滴灌系統的發展及設計。

008 Special Topic on Crop Water Requirement **3** **E** **, 1st F**

On completion of this course, the studentss will be able: 1.to explain about the necessity in adopting water saving modern irrigation methods 2.to explain about the principles of sprinkler and drip irrigation system 3.to develop skills in layout and design of sprinkler and drip irrigation systems

009 永續發展趨勢 3 選 待聘，一上

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

009 Trends in Sustainable Development **3** **E** **Recruiting, 1st F**

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

010 排水專題 3 選 待聘，一上

本課程主要授課內容包括：排水之意義與目的，機械排水，排水之效果，排水系統維護與管理，排水規劃所需資料，效益評估與經濟分析，排水原理與計算公式，排水法規與制度，滲透率觀測。

010 Special Topic on Drainage **3** **E** **, 1st F**

This course contain the following subjects：Types of drainage problems and drainage enterprises; Difference in drainage in humid and arid areas; Design criteria; Required capacities and design procedure; Methods of determining infiltration; Pumping drainage; Construction, maintain and operation; Economy studies for drainage works and cost allocation; Drainage laws and codes.

011 灌溉專題 3 選 待聘，一上

完成本課程，將具備:1.現代節水灌溉方法。2.解釋噴灌和滴灌系統。

3.噴水與滴灌系統的發展及設計。4.以發展灑水和滴灌系統。

011 Special Topic on Irrigation **3** **E** **, 1st F**

On completion of this course, the studentss will be able: 1.to explain about the necessity in adopting water saving modern irrigation methods 2.to explain about the principles of sprinkler and drip irrigation system 3.to develop skills in layout and design of sprinkler and drip irrigation systems 4.to develop skills in the evaluation of sprinkler and drip irrigation system.

012 輸砂研究 3 選 待聘，一上

本課程旨在介紹天然河川之泥砂運動機制，討論泥砂生產及運移之力學理論。其內容包含懸移質及推移質輸砂理論，並由河相學之理論以宏觀現象討論泥砂之形狀變化及輸砂量之改變，使學生具備集水區治理之泥砂量估算能力。

012 Sediment transport **Study** **3** **E** **, 1st F**

This course focuses on the mechanism of sediment transportation in a watershed to investigate the sediment yield and its transport. The subject includes theories of suspended load and bed load transportation. In addition, the theory of river morphology is used to discuss too. This course will make the students possess the basic ability to evaluate the sediment quantity in a watershed.

013 科技英文寫作 2 選 待聘，一下

本課程有系統的介紹英文論文的寫作格式，利用例子與練習，輔以實際寫作練習與錯誤訂正，輔助學生學習英文論文寫作之技巧，正確組織文章的各個片段，同時強調學生文章撰寫經驗之累積，以完整學術文章之撰寫為課程目標，使能更有效率的利用英文寫出科技論文之佳作。

013 Technology English Writing **2** **E** **, 1st S**

Scientific and technical writing must be written for a specific audience. Graduate students often find it difficult to write for the specific audience and identify problems in their writing and frequently lack tools to deal with them effectively. This course will provide instructions in the strategies and tactics for effective scientific writing and suggestions as well based on the common problems in manuscripts people easily make..

014 專題研究(1) 3 選 待聘，一下

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。

014 Special Study (1) **3** **E** **, 1st 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.

015 土壤沖蝕 3 選 待聘，一下

本課程先介紹土壤沖蝕的過程、現象與種類及影響土壤沖蝕之各因素

後，再從實際與理論觀點分別詳細討論降雨與風所造成土壤沖蝕之原理，並教導學生如何應用通用土壤流失公式，進行土壤流失量的估算。除此之外，本課程亦簡單介紹目前國際間有關土壤沖蝕研究與數值模擬程式發展的現況，使學生與國際動態接軌。

015 Soil Erosion **3** **E** **, 1st S**

The theme of the course covers the brief introduction of erosion processes, phenomena, and affecting factors; followed by the discussion of water and wind erosion mechanics. The application of Universal Soil-Loss Equation is an important topic taught in this course so that students are able to estimate amount of soil loss. In order to facility students with international perspective, the latest development worldwide in the profession of erosion research as well as numerical simulation models is also covered in the course.

016 最佳化應用 **3** **選** **待聘，一下**

本課程之主要目的在於介紹如何應用最佳化方法，分析各種產業中的實務問題、建立適當的數學規劃模型及應用各種工具求解。

016 Optimization Application **3** **E** **, 1st S**

This course introduces the application of optimization methods to the analysis of practical industrial problems, formulation of appropriate mathematical models and various solution approaches.

017 地理資訊系統 **3** **選** **待聘，一下**

本課程主要目的為協助學生瞭解地理資訊系統概念，課程內容包含：1) 課程介紹, 2) ArcGIS Desktop 圖資管理與建置, 3) ArcMap 基本操作, 4) 編修功能, 5) 資料分析與轉換, 6) 3D 資料的呈現, 與 7) Web GIS. 每位學生都必須學習製作投影片並練習口頭報告，此外，學生將透過分組方式，運用 GIS 解決土木工程所面臨的問題。

017 Geographic Information System **3** **E** **, 1st S**

The objective of this course is to help students understand the basic concepts of Geographic Information System (GIS). Content of the course includes 1) Introductory, 2) ArcGIS Desktop, 3) ArcMap, 4) Editing, 5) Data analysis and transform, 6) 3Ddata representation, and 7) Web GIS. Oral presentations are necessary for completing this course. In addition, students have to apply GIS to solve one of problems faced in civil engineering.

018 專題研究 (2) **3** **選** **待聘，二上**

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、討論及實驗設計，並將研究結果撰寫報告。

018 Special Study (2) **3** **E** **, 2nd F**

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.