長庚大學生物醫學研究所博士班必選修科目表（一0七學年度入學學生適用)2018.04 修訂
Graduate Program Ph.D Curriculum (2017~2018)

本所博士班畢業學分數至少需達 18 學分(不含論文 6 學分)；生化暨細胞分生組組訂必修為 20 學分；微生物學組組訂必修為 18 學分；生理暨藥理學組組訂必修為 18 學分；生物技術組組訂必修為 13 學分；天然藥物組組訂必修為 14 學分。書報討論課程於修滿四學分且提前通過學位考試者可免修，但仍需補足畢業學分。列於本所必選修科目表之課程皆可納入畢業學分核算。經指導老師同意，亦可選修本校其他博士班課程以達畢業總學分數要求，唯非本所課程之總學分數不可超過畢業學分數中選修總學分數之百分之五十。直攻博士班之學生，畢業時需達 30 學分(不含論文 6 學分)。

Students pursuing a PhD degree must fulfill a minimum 18 credits in course work and 6 credits for the PhD thesis. Minimum compulsory credits for students in different divisions are: Biochemistry and Cell Molecular Biology, 16 credits; Microbiology, 14 credits; Physiology and Pharmacology, 14 credits; Biotechnology, 9 credits. Seminar is a required course for students in the third year or beyond (8 credits maximum). All courses listed above as well as other approved courses offered by the Clinical Medicine Graduate Program Division of Clinical Medicine can be taken to fulfill the requirements for elective courses. Students with direct admission to the PhD program should fulfill a graduation requirement of 30 credits (plus 6 credits for the dissertation), respectively.

二、博士“論文”學分(6)於學位口試通過後給予。

The 6 credits for the “PhD Dissertation” are given only after completion and passing of the thesis defense.

三、生物技術組課程完全以英文授課，故認可選修其他組以英文為授課方式之科目為博士班畢業學分。逕讀博士班生物技術組，則認可生醫所及生技系碩士班之碩博課程 ~~6~~12 學分(含必修高等生物技術學 2 學分)

All courses in the Biotechnology division are offered in English. When choosing elective courses offered by other divisions, only those taught in English can fulfill PhD graduation requirement. For students with direct admission to the PhD program, up to 12 credits of courses (including 2 credits of the Advanced Biotechnology required course) can count towards graduation.

四、本所外籍博士生畢業要求為 18 學分(不含論文 6 學分)，必修科目為書報討論課程 8 學分（一～四年上下學期，1 學分/學期）， 其餘可在指導教授協助規劃下選擇本表單上的相關科目。

For international students in the Ph.D. program, the 18-credits requirement can be fulfilled by any courses in the above list, plus the seminar courses (8 credits total) and 6 credits of the “PhD Thesis”. Course selection should be consulted with and approved by the research adviser.

領域／組別 Divisions	必/選修 Required (R) or Elective (E)	科目名稱 Course Title	學分 Credit	開課年級 Year	上學期 Fall	下學期 Spring	備註 Note
共同必修科目 **General Required Courses**	R	書報討論 Seminar (*)	8	1~4	8		一～四年級必修，共八學分。如提前完成學位考試及畢業手續，該學期及之後學分得免修。一～四年級間，若至其他研究機構或業界研習，學生須提出申請，經生醫所核定，該學期可免修。
	R	醫學新知導論 Current Topics in Biomedical Sciences	2	1	2		左列科目為博士班核心課程，為必修三選一。99 學年度起適用。Core courses for the Ph.D. program. Completion of at least one course is required (starting in 2010).
	R	科學研究方法 Scientific Methods	2	1		2	
	R	科學倫理與論文寫作 (*) Scientific Integrity and Scientific Writing (*)	2	2		2	
生化暨細胞分生學組 **Division of Biochemistry and Cellular Molecular Biology**	R	高等生化學 Advanced Biochemistry	3	1	3		左列必修科目，於碩士班期間曾經修習並通過，可於錄取後至開學前一週申請免修，但需附成績單及經指導教授、授課教師及所長同意。且需補足畢業學分數。 Required courses for PhD program. Students may be exempted from required course if the student has acquired these credits from previous program. The deadline for exemption applications is a week before the start of the semester. Application will have to be approved by the advisor, lecturer, and chairman, provided with the transcript. Besides, student still needs to fulfill the graduation credits.
	R	細胞生物學 Cell Biology	3	1	3		
	R	分子生物學 Molecular Biology	4	1		4	
微生物學組 **Division of Microbiology**	R	微生物學-細菌學 Microbiology-Bacteriology	2	1	2		
	R	微生物學-寄生蟲學 Microbiology-Parasitology	2	1	2		
	R	微生物學-病毒學 Microbiology-Virology	2	1		2	
	R	免疫學 Immunology	2	1		2	

生理暨藥理學組 **Division of Physiology and Pharmacology**	R	生理學 Physiology	4	1		4	Offered jointly with the School of Medicine and School of Traditional Chinese Medicine 若五年內曾通過同課程、同學分數者，經指導教授、授課教師及所長同意後，得申請免修，仍需補足畢業學分數。 Course may be exempted for a student that has successfully completed an identical or equivalent course(es) within 5 years. Application will have to be approved by the advisor, lecturer, and chairman. Besides, student still needs to fulfill the graduation credits.
	R	藥理學 Pharmacology	4	1	4	4	
	R	人體生理學(*) Human Physiology	4	1	4		Offered for international students in the Ph.D.
	R	醫學藥理學(*) Medicinal Pharmacology	4	1		4	
生物技術組 **Division of Biotechnology**	R	系統生物學之先進技術 (*) Advanced Technologies in Systems Biology (*)	3	1	3		
	R	科學倫理與論文寫作 (*) Scientific Integrity and Scientific Writing (*)	2	1		2	
天然藥物組 **Division of National Product**	R	高等藥物生物技術特論 Special Topics in Pharmaceutical Biotechnology	2	1	2		
	R	高等天然藥物學特論 Special Topics in Natural Products	2	1		2	
選修課程 **Elective courses**	E	基因調控特論 Special Topics in Gene Regulation	2	1	2		
	E	專題討論-生化暨細胞分生（一）(*) Special Topics in Biochemistry, Cell & Molecular Biology (1) (*)	2	1	2		
	E	分子流行病學 Molecular Epidemiology	2	1	2		
	E	體學時代的生物技術與生物標誌 Biotechnology and Biomarkers in the 'Omic Era'	1	1	1		暑期開課,上限 60 人 summer course, class limit: up to 60 students
	E	質譜定量蛋白質體學 (實作) Mass Spectrometry-based Quantitative Proteomics (Hands-on)	1	1	1		暑期開課,上限 30 人 summer course, class limit: up to 30 students
	E	轉錄體學與數據分析 Transcriptomics (Hands-on)	1	1	1		暑期開課,上限 20 人 summer course, class limit: up to 20 students
	E	蛋白質體學與質譜分析 (實作) Proteomics and Mass Spectrometry (Hands-on)	1	1	1		暑期開課,上限 30 人 summer course, class limit: up to 30 students per class
	E	生技產業校外實習 Practical Training in Biotechnology Industry	1	1	1		實習課程，暑期開課 practice course (summer only)
	E	抗體備製與純化 (實作) Antibodies: Production and Purification (Hands-on)	1	1		1	
	E	膜轉運與胞吐特論 Special Topics in Membrane Trafficking and Exocytosis	2	1		2	
	E	專題討論-生化暨細胞分生（二）(*) Special Topics in Biochemistry, Cell & Molecular Biology (2) (*)	2	1		2	
	E	論文與計畫寫作 Writing theses and research proposals	2	1	2		
	E	生物資訊分析課程 Bioinformatics	2	1	2		

	E	高等免疫學(*) Advanced Immunology (*)	3	1	3		具有免疫基礎之研究生 for students with background knowledge in Immunology.
	E	熱帶醫學 Tropical Medicine	2	1	2		自 102 學年度起,隔年開設 offered bi-annually, starting in 2006
	E	微生物與人類歷史 Microbes and Human History	2	1	2		自 105 學年度開始，隔年開設。offered bi-annually, starting in 2016 上限 30 人 class limit: up to 30 students
	E	分子微生物學 Molecular Microbiology	4	1		4	
	E	細菌致病分子學 Bacterial Pathogenesis	2	1		2	自 91 年始,隔年開設 offered bi-annually, starting in 2002
	E	病毒--寄主互動特論 Special Topics in Virus-Host Interactions	2	1		2	自 91 學年度起，隔年開設;需修過微生物學。offered bi-annually, starting in 2002; prerequisite: Microbiology
	E	EB 病毒特論 Special Topics in Epstein-Barr Virus and associated diseases	2	1		2	自 92 學年度起,隔年開設 offered bi-annually, starting in 2003
	E	肝炎病毒特論 Special Topics in Hepatitis Viruses	2	1		2	
	E	高通量定序分析 High-Throughput Sequencing Analysis	2	1		2	
	E	訊號傳遞 Signal Transduction	2	1	2		
	E	呼吸系統特論 Special Topics in Respiratory System	2	1	2		
	E	循環系統特論 Special Topics in Circulation	3	1	3		
	E	神經科學 Neuroscience	2	1	2		
	E	神經化學 Neurochemistry	2	1	2		
	E	高級生物統計學 Advanced Biostatistics	2	1	2		
	E	內分泌學 Endocrinology	2	1	2		
	E	老化特論 Special Topics in Aging.	2	1		2	
	E	分子神經生物學 Molecular Neurobiology	2	1		2	
	E	藥理學特論 Special Topics in Pharmacology	2	1		2	自 100 學年度始，隔年開設 offered bi-annually, starting in 2011
	E	內分泌學特論 Special Topics in Endocrinology	2	1		2	
	E	星型膠細胞生理病理學 Astrocytes in the Pathophysiology of the Nervous System	2	1		2	
	E	神經生物學 Neurobiology	2	1		2	(與醫學系同修) offered jointly with School of Medicine
	E	分子影像 (*) Molecular Imaging (*)	3	1	3		兩年開一次：96 學年度起開課 offeredbi-annually, starting in 2007
	E	疫苗研發 (*) Vaccine Development (*)	3	1	3		兩年開一次：97 學年度起開課 offered bi-annually, starting in 2008
	E	新興病毒特論 (*) Special Topics in Emerging Viruses (*)	2	1	2		
	E	RNA 病毒特論 (*) Special Topics in RNA Viruses (*)	2	1	2		
	E	自由基生物醫學(*) Free Radical Biology and Medicine	2	1	2		104 年新增
	E	轉譯癌症醫學 (*) Translational Cancer Medicine (*)	2	1		2	碩博合開，且須修過「細胞生物學」或「分子生物學」
	E	高等細菌學(*) Advanced Bacteriology (*)	2	1		2	

	E	高等級生物安全實驗室設計及操作(*) Specific topics of Biosecurity Practice for High Security Level Labs(*)	2	1		2		
	E	學術英語寫作實務訓練(*) Practical training in English as an academic Language	2	3		2	博士班三年級以上選修	
	E	高等劑型設計特論 Special Topics in Dosage form Design	2	1	2			
	E	天然物與血栓平衡 Natural Products and The Balance of Thrombosis	2	1	2			
	E	藥效學特論 Special Topics in Pharmacodynamics	2	1		2	碩博合開	
	E	製藥生技學特論 Special Topics in Industrial Pharmaceutical Biotechnology	2	1		2	碩博合開	
	E	二維核磁共振光譜學 Two-dimensional Nuclear Magnetic Resonance Spectrometry	2	1		2		
	E	發炎藥理學特論 Special Topics in Inflammopharmacology	2	1	2			
	E	藥廠與專利申請實務特論 Special Topics in The Pharmaceutical Factory and Patent Application	2	2	2		碩博合開	
	E	中藥資訊研究 Information Studies of Traditional Chinese Medicine	2	2	2		碩博合開	
	E	高等藥物化學特論 Special Topics in Advanced Medicinal Chemistry	2	2	2			
	E	高等基因藥理學特論 Special Topics in Pharmacogenomics	2	2		2		
	E	表觀遺傳學特論 Special Topics in Epigenetics	2	2		2		
	E	中草藥產業技術開發 Industrial Development of Chinese Medicine and Herbal Drugs	2	2		2	碩博合開	
	E	轉譯醫學暨體學特論 Special Topics in Translational Medicine and Omics	2	2		2		
	E	生化暨分子生物學(*) Biochemistry and Molecular Biology (*)	2	1	2			與分醫碩士學位學程合開 Graduate Program in Molecular Medicine
	E	生物資訊與生物統計學(*) Bioinformatics & BioStatistics (*)	2	1	2			
	E	分子醫學特論(*) Topics in Molecular Medicine (*)	2	2		2		
	E	細胞生理與訊號傳遞(*) Cellular Physiology & Signal Transduction (*)	2	1	2			
	E	基因發育/線蟲模型(*) Molecular Genetics / Model Organisms I (*)	2	1	2			
	E	細胞生物學(*) Advanced Cell Biology (*)	2	1		2		
	E	癌症生物學特論(*) Advanced Cancer Biology (*)	2	1		2		
	E	高等微生物學(*) Advances in Microbiology (*)	2	1		2		
	E	高等免疫新知 Advances in Immunology(*)	2	1		2		
	E	細胞生長與細胞凋亡(*) Cell growth and apoptosis (*)	2	1		2		

註： 1、打(*)者為英文授課。

Notes: An asterisk (*) indicates a course taught in English.

2、學生所選欲修習之科目，需經過指導老師之同意及簽名。

Course selection and registration should be approved and signed by the thesis mentor.

所長：_____ 課程委員會：_____