中正大學課程大綱

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| 課程名稱(中文)： | 生醫影像處理系統 | 開課單位： | 資訊工程研究所(Graduate Institute of Computer Science and Information Engineering) |
| 課程名稱(英文) | Biomedical Image Processing Systems | 課程代碼 | 4458008\_01 |
| 授課教師： | 劉偉名 | 學分數 | 3 |
| 必/選修 | 選修 | 開課年級 | 研究所, 開放大三大四 |
| 先修科目或先備能力： | Basic physics, Image processing, Programming. |
| 課程概述： | Through this course, students will gain a fundamental understanding of the imaging principles and applications of mainstream medical imaging systems, as well as the formats of medical images and the methods for interpreting and analyzing image data. The course then uses ultrasound imaging, thermal imagers, nail-fold microscopes, polarization cameras, ultraviolet cameras, and other equipment as examples to introduce their clinical applications and related image processing techniques, and guides students to operate these modalities and implement image processing algorithms. |
| 學習目標： | 1. Fundamental knowledge about mainstream medical imaging technologies2. Image acquisition and data analysis3. Knowledge about medical applications of optical imaging technologies |
| 教科書： | “An Introduction to the Principles of Medical Imaging”, Chris Guy and Dominic ffytche, Imperial College Press, 2005“Medical Image Processing, Reconstruction and Restoration: Concepts and Methods”, Jiri Jan, CRC Press, 2005“Digital image processing for medical applications”Geoff Dougherty, Cambridge Univ. press, 2011 |

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| 課程大綱 | 分配時數 | 核心能力 | 備註 |
| 單元主題 | 內容綱要 | 講授 | 示範 | 隨堂作業 | 其他 |
| Fundamental of medical imaging | 基礎醫學影像科技與資料分析 | 9 |  |  |  | 12345678 |  |
| Anatomy | 解剖學 | 3 |  |  |  | 12345678 |  |
| Ultrasound imaging | 超音波影像原理與分析 | 9 |  | 3 |  | 12345678 |  |
| Infrared imaging | 紅外線影像原理及能量醫學 | 6 |  | 2 |  | 12345678 |  |
| Multispectral imaging | 多頻譜影像與皮膚創傷評估 | 3 |  | 1 |  | 12345678 |  |
| Polarizing imaging | 偏極化可見光造影與體表血流量觀測 | 3 |  | 1 |  | 12345678 |  |
| Conjunctiva microcirculation / Nailfold microscopy | 球結膜與甲襞微循環影像及其應用 | 3 |  | 1 |  | 12345678 |  |
| Retina imaging | 數位眼底鏡與視網膜血管影像 | 6 |  | 2 |  | 12345678 |  |
| Ultraviolet imaging | 紫外線造影 | 3 |  |  |  | 12345678 |  |
| Sensing and image acquisition | 感測原理設計探討 | 2 |  |  |  | 12345678 |  |

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| 教育目標 |
| 1.具獨立從事學術研究或產品創新研發之人才 |
| 2.具團隊合作精神及科技整合能力，並在團隊中扮演領導、規劃、管理之角色 |
| 3.具自我挑戰與終身學習能力之人才 |
| 4.具有學術倫理、工程倫理、國際觀之人才 |
| 核心能力 |
| 1.具有資訊工程與科學領域之專業知識(Competence in computer science and computer engineering.) |
| 2.具有創新思考、問題解決、獨立研究之能力(Be creative and be able to solve problems and to perform independent research.) |
| 3.具有撰寫中英文專業論文及簡報之能力(Demonstrate good written, oral, and communication skills, in both Chinese and English.) |
| 4.具策劃及執行專題研究之能力(Be able to plan and execute projects.) |
| 5.具有溝通、協調、整合及進行跨領域團隊合作之能力(Have communication, coordination, integration skills and teamwork in multi-disciplinary settings.) |
| 6.具有終身學習與因應資訊科技快速變遷之能力(Recognize the need for, and have the ability to engage in independent and life-long learning.) |
| 7.認識並遵循學術與工程倫理(Understand and commit to academic and professional ethics.) |
| 8.具國際觀及科技前瞻視野(Have international view and vision of future technology.) |
| 請尊重智慧財產權，不得非法影印教師指定之教科書籍 |

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| 教學要點概述： |
| 1. 教材編選(可複選)：自編簡報(ppt)教科書作者提供 |
| 2. 教學方法(可複選)：講述板書講述 |
| 3. 評量工具(可複選)：上課點名 0%, 隨堂測驗0%, 隨堂作業20.00%, 程式實作60.00%, 實習報告0.00%,                       專案報告0%, 期中考0%, 期末考20.00%, 期末報告0%, 其他0%, |
| 4. 教學資源：課程網站 教材電子檔供下載 實習網站 |
| 5. 教學相關配合事項： |

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| 課程目標與教育核心能力相關性         |
| 請勾選：12345678 |
| 1 | **具有資訊工程與科學領域之專業知識(Competence in computer science and computer engineering.)** |
| 為何有關：Students will learn image processing from both hardware and software aspects. They will also learn the basic physiology, physics, and design of image acquistion. |
| 達成指標：Students will learn image processing from both hardware and software aspects. They will also learn the basic physiology, physics, and design of image acquistion. |
| 評量工具(可複選)：Expected final grade: Level 5: 90 and above; Level 4：80-89; Level 3：70-79; Level 2：60-69; Level 1：below 60; |
| 2 | **具有創新思考、問題解決、獨立研究之能力(Be creative and be able to solve problems and to perform independent research.)** |
| 為何有關：The assignments and programming homework in this class will challenge what they have learned in the past, stimulate their thinking, and challenge them to search for possible answers. |
| 達成指標：Come up with a well-defined solution and write a complete report to document their findings during the study. |
| 評量工具(可複選)：Expected grade from the assignments and class participation: Level 5: 90 and above; Level 4：80-89; Level 3：70-79; Level 2：60-69; Level 1：below 60; |
| 7 | **認識並遵循學術與工程倫理(Understand and commit to academic and professional ethics.)** |
| 為何有關：1. Some of the medical imaging equipment introduced in the course has harmful radiation, and the risk should be evaluated when considering using this type of equipment.2. Plagiarism is prohibited in all assignments in this course. And the attendees are requested to follow the correct way of citing. |
| 達成指標：The attendee should submit well-written reports in all assignments. |
| 評量工具(可複選)：Expected grade from the assignments and class participation: Level 5: 90 and above; Level 4：80-89; Level 3：70-79; Level 2：60-69; Level 1：below 60; |
| 8 | **具國際觀及科技前瞻視野(Have international view and vision of future technology.)** |
| 為何有關：The course introduces up-to-date medical imaging technologies. Through the hospital visiting and talks given by outside experts, students will know the current problems and the trend of the latest research. |
| 達成指標：Students equip with the knowledge about current medical imaging devices, and are aware of the research problems to be solved. |
| 評量工具(可複選)：Expected grade from class participation and term paper: Level 5: 90 and above; Level 4：80-89; Level 3：70-79; Level 2：60-69; Level 1：below 60; |

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