課程流水號 Serial Number	24036
課號 Course Number	LS6066
班次 Class	*
科目名稱(中文) Course Title(in Chinese)	專題研究：生物分子運算法
科目名稱(外文) Course Title(In English or other languages)	Special Topics in Bio-Molecule Computing
授課老師(中文) Instructor(in Chinese)	吳少傑
授課老師(外文) Instructor(In English or other languages)	Shaw-Jye Wu
辦公時間(中文) Office Hour(in Chinese)	Thursday 17:00-19:00
辦公時間(外文) Office Hour(In English or other languages)	Tuesday 17:00~19:00
課程目標(中文) Course Objective(in Chinese)	電腦已與人類的生活息息相關，密不可分。電腦的功能也是日新月異，一躍千里。然而，當碰上某些組合性問題時，即令是超級電腦，有著極快速的運算能力，也得耗時經年，方能解出答案。在尋找替代運算方法的努力過程中，DNA 序列的多樣性和專一性，以及其相關之分子生物技術，已被展現出具有解決該困境的潛力。本課程即在介紹此一新領域的發展起由，已知成果，還有未來方向。
課程目標(外文) Course Objective(In English or other languages)	Biology has advanced to an era that requires a multi-disciplinary approach to explore the secret of life. Meanwhile, the knowledge derived from the study of biology can be applied by other filed of sciences as well. This course therefore is meant to be a bridge for the students to connect biology with other categories, e.g., computation, of scineces.
授課內容(中文) Course Description(in Chinese)	週次, 內容 1. What is computing? What is an algorithm? 2. How algorithm affects computing time 3. Questions without efficient computing time 4. Hamiltonian path and the first DNA computing 5. Traveling sale's path and DNA computing 6. Traveling sale's cycle and DAN computing – weighted cycle problem 7. DNA turing machines 8. Programmable molecular computing machine 9. DNA computer machine with input and output 10. DNA computer for diagnosing cancer 11. Enzyme-based AND/OR logic gate 12. DNA simulates AND/OR/NOT logic system

13. DNA arithmetic machine
14. DNAzymes
15. Toehold exchange
16. Algorithmic self-assembly
17. Pro and con of DNA computing
18. Round table discussion

授課內容(外文) Course Description(In English or other languages)	Week, Contents 1. What is computing? What is an algorithm? 2. How algorithm affects computing time 3. Questions without efficient computing time 4. Hamiltonian path and the first DNA computing 5. Traveling sale's path and DNA computing 6. Traveling sale's cycle and DAN computing – weighted cycle problem 7. DNA turing machines 8. Programmable molecular computing machine 9. DNA computer machine with input and output 10. DNA computer for diagnosing cancer 11. Enzyme-based AND/OR logic gate 12. DNA simulates AND/OR/NOT logic system 13. DNA arithmetic machine 14. DNAzymes 15. Toehold exchange 16. Algorithmic self-assembly 17. Pro and con of DNA computing 18. Round table discussion
教科書/參考書(中文) Textbook/References(in Chinese)	教材：講義及科學論文 授課對象：研究所及大學部高年級同學
教科書/參考書(外文) Textbook/References(In English or other languages)	papers from periodic journals
自編教材比例 Self-compiled Textbook/References Proportion	100%
授課方式 Requirements	研討Seminar　　個別指導Individual Discussion
評量配分比重(中文) Grading(in Chinese)	課後作業及隨堂報告各佔50%
評量配分比重(外文) Grading(In English or other languages)	Take home works (50%) and in class presentation (50%)
課程所屬學制 Educational System	博士班(Doctoral Programme)
課程領域 Course Domain	進階學科
跨系課程領域 Cross Department Course Domain	

系所核心能力 Core Competencies of Department / 強度指數 Overall Rating	0 不具備 Zero	1 非常低 Very Low	2 低 Low	3 普通 Medium	4 高 High	5 非常高 Very High	評量方式 Corresponding Assessments
高等生物專業知識 Advanced Biological Sciences	○	○	○	○	○	○	☐ 紙筆測驗/會考 (Test/Exam) ☐ 作業練習(Assignments) ☑ 口頭報告/口試 (Presentation/Oral Exam) ☐ 專題研究報告(書面) (Research Report(printed on paper)) ☐ 實作/實驗 (Practices/Experiments) ☑ 出席/課堂表現 (Attendance/Performance) ☐ 學習檔案評量(Portfolios Assessment) ☐ 自我評量/同儕互評(Self Assessment/ Peer Assessment) ☐ 作品/創作展演 (Products/Creative Performance) ☐ 其他(Others) ☐ 無(No assessment)
創新及整合研究 Innovative and integrative research	○	○	○	○	○	○	☐ 紙筆測驗/會考 (Test/Exam) ☐ 作業練習(Assignments) ☑ 口頭報告/口試 (Presentation/Oral Exam) ☐ 專題研究報告(書面) (Research Report(printed on paper)) ☐ 實作/實驗 (Practices/Experiments) ☑ 出席/課堂表現 (Attendance/Performance) ☐ 學習檔案評量(Portfolios Assessment) ☐ 自我評量/同儕互評(Self Assessment/ Peer Assessment) ☐ 作品/創作展演 (Products/Creative Performance) ☐ 其他(Others) ☐ 無(No assessment)

系所核心能力 Core Competencies of Department / 強度指數 Overall Rating	0 不具備 Zero	1 非常低 Very Low	2 低 Low	3 普通 Medium	4 高 High	5 非常高 Very High	評量方式 Corresponding Assessments
專業寫作與表達 Professional writing and presentation	○	○	○	○	○	○	☐ 紙筆測驗/會考 (Test/Exam) ☐ 作業練習(Assignments) ☑ 口頭報告/口試 (Presentation/Oral Exam) ☐ 專題研究報告(書面) (Research Report(printed on paper)) ☐ 實作/實驗 (Practices/Experiments) ☑ 出席/課堂表現 (Attendance/Performance) ☐ 學習檔案評量(Portfolios Assessment) ☐ 自我評量/同儕互評(Self Assessment/ Peer Assessment) ☐ 作品/創作展演 (Products/Creative Performance) ☐ 其他(Others) ☐ 無(No assessment)
國際觀 International vision	○	○	○	○	○	○	☐ 紙筆測驗/會考 (Test/Exam) ☐ 作業練習(Assignments) ☑ 口頭報告/口試 (Presentation/Oral Exam) ☐ 專題研究報告(書面) (Research Report(printed on paper)) ☐ 實作/實驗 (Practices/Experiments) ☑ 出席/課堂表現 (Attendance/Performance) ☐ 學習檔案評量(Portfolios Assessment) ☐ 自我評量/同儕互評(Self Assessment/ Peer Assessment) ☐ 作品/創作展演 (Products/Creative Performance) ☐ 其他(Others) ☐ 無(No assessment)