**第二專長學分班課程教學大綱**

**Syllabus**

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| **課程資訊** | | |
| 學年  Academic Year | 108學年 | 2019-2020 |
| 課程名稱  Course Name | 演算法 | Algorithms |
| 授課教師  Instructor | 張景堯  張經略 | Jiing-Yao Chang |
| 選課人數  Maximum Number of Students |  |  |
| 學分數  No. of Credits |  |  |
| 修別  Required / Elective |  |  |
| 先修科目  Prerequisite(s) |  |  |
| 上課時間  Course Time |  |  |
| **課程簡介**Course Description | | |
| The aim of this course is to provide students with solid foundations to deal with a wide variety of computational problems, and to provide a thorough knowledge of the most common algorithms In this course, we will work to develop your skills in the design, implementation, analysis, and verification of algorithms. By the end of the course, students will be able to: (1) apply knowledge of computing and mathematics to algorithm design; (2) analyze a problem and identify the algorithm appropriate for its solution; (3) to design, implement, and evaluate an algorithm to meet desired needs (4) ability to compare and analyze different algorithms and their usage | | |
| **課程目標與學習成效**Goals & Learning Outcomes | | |
| Upon completing this course, students should be able to:   * Analyze worst-case running times of algorithms using asymptotic analysis. * Recite algorithms that employ data structures and how their performance depends on the choice of data structure. * Understand the divide-and-conquer strategy for problem solving. * Explain the major algorithms for sorting/hashing. * Explain the major graph algorithms and their analyses. * Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. * Formulate real-world problems rigorously. * Learn the skills to solve problems and design algorithms. * Acquire analytical techniques required to determine the computational complexity of your solution. * Characterize the efficiency of algorithms using mathematical notation and by measuring execution empirically * Reduce real-world problem specifications to subproblems that can be solved using the appropriate algorithmic technique | | |
| **課程進度與作業要求**Course Schedule & Requirements | | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **日期**  **Date** | **課程主題**  **Topic** | **課程內容與指定閱讀**  **Content and Reading Assignment** | **教學活動與作業**  **Teaching Activities and Homework** | **學習投入時間**  **Student workload expectation** | | | **課堂講授**  **In-class Hours** | **課程前後**  **Outside-of-class Hours** | | 3/29 | Introduction, Preliminaries, Data Structures | Course introduction, Introduction to algorithms, Asymptotic notation, Logarithms and more, Elementary data structures | Find counterexamples, Estimation & Big Oh Exercises, Reverse digits & Valid Parentheses | 9 | 8 | | 4/12 | Hashing, Sorting I | Binary Search Trees, Hashing, Applications of Sorting, Heapsort/Priority Queues, Counting sort/Bucketsort | Valid Anagram & Largest Perimeter Triangle | 9 | 10 | | 4/18 | Sorting II, Divide-and-Conquer | Mergesort, Quicksort, Binsearch, divide-and-conquer | Merge two sorted arrays & Maximum Subarray | 4.5 | 5 | | 4/26 | Dynamic Programming |  |  | 9 | 10 | | 5/24 | Greedy Algorithms |  |  | 9 | 10 | | 5/31 | Graph Algorithms |  |  | 9 | 10 | | 6/6 | Final Exam | Final Exam | Final Exam | 4.5 | 12 | | | |
| **授課方式**Teaching Approach | | |
| 講述Lecture： 60 %；討論Discussion： 20 %；小組活動Group Activity： %；  數位學習E-learning： %；其他Others： Exercise 20 %。 | | |
| **評量工具與策略、評分標準**Evaluation Criteria  **【明列評量項目與給分標準】** | | |
| ● Class Participation**平時成績**40%  ● Exercise**平時作業**30%  ● Final Exam**統一期末考**30% | | |
| **課程進行中，可否使用手機等智慧行動裝置**To Use Smart Devices During the Class | | |
| 🞏是Yes  🞏否No  ◼需經教師同意始得使用Approval required  🞏其他Others: | | |
| **授課教師**Office Hours及**地點**Office Location | | |
| By appointment | | |
| **教學助理基本資料**Teaching Assistant Information | | |
| TBA | | |
| **指定／參考書目**Textbook & References  **【為維護智慧財產權，請務必使用正版書籍】** | | |
| Day01~03 Textbook:  Steven S. Skiena. The Algorithm Design Manual. 2nd ed. Springer-Verlag, 2008. ISBN: 9781848000698 | | |
| **課程相關連結**Course Related Links | | |
| http://zuvio.com.tw  https://leetcode.com/problemset/algorithms/ | | |
| **課程附件**Course Attachments | | |
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