

## 课程详述

### COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	<b>课程名称 Course Title</b>	数据结构与金融应用 <b>Data Structure and Financial Applications</b>
2.	<b>授课院系 Originating Department</b>	金融系 Department of Finance
3.	<b>课程编号 Course Code</b>	FET206
4.	<b>课程学分 Credit Value</b>	3
5.	<b>课程类别 Course Type</b>	专业基础课 Major Foundational Courses
6.	<b>授课学期 Semester</b>	春季 Spring
7.	<b>授课语言 Teaching Language</b>	中英双语 English & Chinese
8.	<b>授课教师、所属学系、联系方式 (如属团队授课, 请列明其他授课教师) Instructor(s), Affiliation &amp; Contact (For team teaching, please list all instructors)</b>	王新杰, 助理教授, 金融系 慧园 3 栋 320 室 xinjie.wang@sustc.edu.cn 0755-8801-8602 WANG, Xinjie, Assistant Professor, Department of Finance Rm.320, Block 3 Wisdom Valley.
9.	<b>实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact</b>	待公布 To be announced
10.	<b>选课人数限额(可不填) Maximum Enrolment (Optional)</b>	40

11. 授课方式 Delivery Method	讲授	习题/辅导/讨论	实验/实习	其它(请具体注明)	总学时
	Lectures	Tutorials	Lab/Practical	Other (Please specify)	Total
学时数 Credit Hours	48				48

12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	
14. 其它要求修读本课程的学系 Cross-listing Dept.	

### 教学大纲及教学日历 SYLLABUS

#### 15. 教学目标 Course Objectives

通过本课程的学习，学生将基本掌握数据结构和算法基础知识，能够提高程序设计的质量；根据问题的性质，能够选择合理的数据结构，并对时间复杂性进行必要的控制，培养解决实际问题的能力。

By taking this course, students will be able understand the fundamentals of data structure and algorithm, and improve the quality of program design. Students can choose suitable data structures for a particular problem, control for time complexity and the ability to solve problems.

#### 16. 预达学习成果 Learning Outcomes

完成该课程之后，学生应该了解能够根据算法的实际操作需求，选择、设计合理地数据结构,学习并掌握基本数据结构和算法。

After completing this course, students should master basic data structures and algorithms. In addition, they should be also to choose reasonable data structures according to practical demand of algorithms.

#### 17. 课程内容及教学日历（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人） Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)

**Lecture 1 (2 hours) Introduction to the foundations and history of data structure**（了解数据结构的基本概念、研究对象以及数据结构课程的发展历史，对数据结构与算法课程有一个宏观的认识）

**Lecture 2 (2 hours) Introduction of the concept of Abstract Data Types, operations and storage on lists**（线性表的逻辑结构特性和抽象数据类型 (ADT) 的设计，线性表的顺序存储结构和链式存储结构）

**Lecture 3 (2 hours) creation, search, insertion and deletion of List**（链式存储实现中单链表的创建、查找、插入和删除等基本操作及相关算法）

**Lecture 4 (2 hours) Definition, characteristics of Stack and queues**（栈与队列的定义、特点和性质；栈与队列的设计、实现以及基本操作和相关算法）

**Lecture 5 (2 hours) Applications of stack and queues in evaluation of expression, match, and numeric conversion**（栈和队列在表达式求值、括号匹配、数制转换）

**Lecture 6 (2 hours) Definitions, characteristics, storage and traversals of binary tree**（二叉树的定义、

性质、存储结构、遍历、线索化)

**Lecture 7 (2 hours) AVL tree, Splay trees and B-trees** (AVL 树, Splay 树和 B 树, 定义和实现)

**Lecture 8 (2 hours) Hash: general idea, Hash function and separate Chaining** (哈希的基本概念, 函数和单独链接)

**Lecture 9 (2 hours) Open addressing, linear probing, quadratic probing and double hashing** (开放式寻址, 线性探索, 双重哈希)

**Lecture 10 (2 hours) Priority queues: model, simple implementation** (优先队列的模型, 简单实现)

**Lecture 11 (2 hours) Applications of priority queues: the selection problem and event simulation** (优先队列的应用: 选择问题和事件的模拟)

**Lecture 12 (2 hours) d-Heaps, Leftist Heaps, Skew Heaps and Binomial Queues** (d 堆, 左堆, 斜堆, 二项队列)

**Lecture 13 (2 hours) Insertion Sort: algorithm and analysis** (插入排序: 算法和分析)

**Lecture 14 (2 hours) Shellsort: algorithm and analysis** (希尔排序法: 算法和分析)

**Lecture 15 (2 hours) Quicksort: algorithm and analysis** (快速排序: 算法和分析)

**Lecture 16 (2 hours) Mid-term review and exercise** (期中的复习和练习)

**Lecture 17 (2 hours) Graph Algorithms: definition, terms and data structure** (图的概念和相关术语, 图的常用存储结构)

**Lecture 18 (2 hours) Two search algorithms for graph** (图两种搜索算法与连通性, 应用算法)

**Lecture 19 (2 hours) Search tree structure: general idea and algorithm** (在树结构和散列结构上进行查找: 基本思想和方法)

**Lecture 20 (2 hours) File, external sort and data structure for external storage** (文件与外部排序, 存储在外存上的数据结构)

**Lecture 21 (2 hours) Recursion and backtracking: general idea and algorithm** (递归与回溯: 基本思想和算法)

**Lecture 22 (2 hours) Applications in Finance I: Blockchain** (金融应用 I: 区块链)

**Lecture 23 (2 hours) Applications in Finance II: artificial intelligence** (金融应用 II: 人工智能)

**Lecture 24 (2 hours) Final review and presentation** (期末复习和报告)

18. 教材及其它参考资料 Textbook and Supplementary Readings

指定教材:

Date Structures and Algorithm Analysis in C (英文影印版·第2版) ISBN: 9787111312802. 机械工业出版社

课程评估 ASSESSMENT

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance		10%		
课堂表现 Class Performance		10%		
小测验 Quiz				
课程项目 Projects		40%		
平时作业 Assignments				
期中考试 Mid-Term Test				
期末考试 Final Exam		40%		
期末报告 Final Presentation				
其它（可根据需要 改写以上评估方 式） Others (The above may be modified as necessary)				

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20. 记分方式 GRADING SYSTEM

A. 十三级等级制 Letter Grading

B. 二级记分制（通过/不通过） Pass/Fail Grading

课程审批 REVIEW AND APPROVAL

21. 本课程设置已经过以下责任人/委员会审议通过  
This Course has been approved by the following person or committee of authority

SUSTech

