教师网上录入课堂信息

课程编号	30231133	课程名：	数据与算法（英）
总学时：	104	总学分：	3

课程内容简介：

数据是客观世界的抽象描述，是信息和知识的载体； 算法是处理数据的系统，帮助我们获取数据中的信息和知识； 本课程介绍数据的表示、存储、访问方式，以及针对不同数据类型的各种算法的实现、评价和设计策略。课程内容主要包括非数值数据类型（表、树、图），数值数据类型（整数、浮点数），非数值算法（查找、排序、搜索），数值算法（插值、拟合），算法的分析方法（时间、空间复杂度）以及基本的算法设计策略（分治、动态规划）等。数据与算法之间的相互作用是课程的核心思想和主要线索。 课程旨在帮助同学们提升用现代计算方法解决现实世界实际问题的能力，为后续的课程以及未来的研究、工作奠定基础。本课程为电子系核心课程，学生将掌握数据结构、算法设计与分析的核心概念，同时为未来科研阅读打下坚实的英文基础。推荐希望了解AI相关技术的同学选课。 授课教师为电子系助理教授。电子系“因材施教-AI+系统”2022级班主任老师，专业方向为机器学习。2023年SRT特等奖指导教师、2024挑战杯特等奖指导教师。

Course Description

Data is an abstract description of the objective world and the carrier of information and knowledge; algorithms are systems that process data, helping us to extract information and knowledge from it. This course introduces the representation, storage, and access methods of data, as well as the implementation, evaluation, and design strategies of various algorithms for different data types. The course content mainly includes non-numeric data types (tables, trees, graphs), numeric data types (integers, floating-point numbers), non-numeric algorithms (searching, sorting, searching), numeric algorithms (interpolation, fitting), methods of algorithm analysis (time, space complexity), and basic algorithm design strategies (divide and conquer, dynamic programming), etc. The interaction between data and algorithms is the core idea and main thread of the course. The course aims to help students enhance their ability to solve real-world practical problems with modern computational methods, laying the foundation for subsequent courses and future research and work. This course is a core course of the electronic series, where students will master the core concepts of data structures, algorithm design, and analysis, while also laying a solid foundation in English for future scientific research reading. It is recommended for students who wish to understand AI-related technologies.

进度安排：

Lectures: 48 class hours, totally 15 lectures
Hands-on Experiments (OJ) 10 times / Homework 5 times.:They will be issued with the progress of the course.
Exercise class will be arranged depends on the feedbacks of OJ and homework.

Week	Teaching Schedule Content
1	Introduction Data, Model, and Algorithm
2	Basic Data Structures: Linear Structure Binary Relations and Abstract Data Types, Linear List
3	Basic Data Structures: Linear Structure Stack and Recursion, Queue
4	Basic Data Structures: Linear Structure Queue, String, String Matching Algorithms
5	Basic Data Structures: Tree Tree and Binary Tree
6	Basic Data Structures: Tree Binary Search Tree, Priority Queue
7	Basic Data Structures: Tree Graph and Classical Graph Algorithms
8	Nonnumerical Algorithms Search and Sort
9	Numerical Algorithms Concepts and Error
10	Numerical Algorithms Linear Equations
11	Numerical Algorithms Fitting and Interpolation
12	Numerical Algorithms Non-linear Equations and Optimizations
13	Algorithm Design Brute Force, Divide Conquer, Search Algorithm, and Greedy Algorithm
14	Algorithm Design Dynamic Programming, and Randomize Algorithm
15	Algorithm Optimization Computational Complexity Theory and Course Recap
--	Final Exam

考核方式：	作业 10%：5次 编程 40%：10次 期末考试 50%	教材及参考书：	课件为主 主要参考教材： - 吴及，陈健生，白铂，《数据与算法》，清华大学出版社 其他： - 朱明方、吴及，《数据结构与算法》，清华大学出版社 - 张威等译，《科学计算导论(第2版)》，清华大学出版社 - 徐士良，《数值方法与计算机实现》，清华大学出版社
主教材：			
参考书：			
合开教师：		选课指导：	1.希望掌握数据结构和算法知识的二年级及以上学生 2.有一定英语基础，愿意提升专业英语能力的学生 3.想后续继续学习AI相关课程，参与AI方向项目的学生
先修要求：	先修“C/C++编程、线性代数、微积分”课程	教师教学特色：	1.讲解详细：算法可视化设计，分步骤讲解 2.反馈式授课：关注反馈，开设单独习题课，提供习题、编程辅导 3.英文教学：英文PPT授课，英文讲解，提供术语中英对照 4.铺路AI：为将来AI学习做铺垫
Office Hour：	上课当天（周二）下午 2.00-3.00PM	成绩评定标准：	作业 10%：5次 编程（OJ） 40%：10次 期末考试 50%
教学日历：	查看教学日历		