课程名称/英文名称	算法设计与分析Algorithm Design and Analysis	**课程代码**	CS240
课程类型	本研一体	**学分/学时**	4/64
主要面向专业	CS	**授课语言(双语/中文/全英文授课)**	全英文
先修课程		**建议先修说明**	CS101
开课单位	信息科学与技术学院	**课程负责人**	范睿

课程简介

This course covers important algorithm design techniques including greedy algorithms, divide and conquer, dynamic programming, network flow, heuristic algorithms, randomized algorithms and approximation algorithms, as well as different measures of algorithmic complexity and the limits of efficient computation. The algorithmic techniques are illustrated using a range of algorithms for important problems.

课程教学目标

The goal of the course is to have students develop a thorough understanding of key algorithmic design principles and techniques, to build a theoretical foundation on which to analyze algorithm correctness and complexity, to gain experience with a diverse range of algorithms encountered in practical usage, and finally to practice implementing algorithms and achieving high real world performance.

课程教学方法

The coursework consists of problem sets, a midterm and final exam, and a course project. The project requires students to design algorithms for a number of practical problems, analyze their correctness, and produce efficient implementations of the algorithms. Instruction is conducted using lectures, Blackboard, Piazza and Gradescope.
The instructor will hold weekly office hours. TAs will hold tutorials and recitations.

课程教学内容与安排

Chapter	Teaching Contents	Week	Hours	Teaching Modes
1	Analysis of complexity	1	2	
2	Greedy algorithms	1-2	4	Lectures, HW
3	Divide and conquer	2-3	4	Lectures, HW
4	Dynamic programming	3-4	4	Lectures, HW
5	Network flow	4-5	4	Lectures, HW
6	P, NP, PSPACE	5-6	6	Lectures, HW
7	Lower bounds	7	2	Lectures, HW, lab
8	Algorithms for NP problems	7	2	Lectures, HW
9	Midterm exam	8	2	
10	Randomized algorithms	8-10	10	Lectures, HW, lab
11	Approximation algorithms	11-12	6	Lectures, HW, lab
12	Amortized analysis	12	2	Lectures, HW, lab

考核方式和成绩评定方法

Problem sets 20%
Project 20%
Midterm 30%
Final exam 30%

推荐教材

教材名称	教材作者	教材译者	ISBN	教材出版社	出版日期	教材版次
Algorithm Design	Kleinberg, Tardos		9780321295354	Pearson	2006-12	2

参考书目

教材名称	教材作者	教材译者	ISBN	教材出版社	出版日期	教材版次
Introduction to Algorithms	Cormen, Leiserson, Rivest, Stein		9780070131514	MIT Press	2009-12	3

学术诚信教育	本课程高度重视学术诚信，严禁抄袭、作弊等行为。“在学习、科研、实习实践等活动中，学生应恪守学术道德，坚守学术诚信，保护知识产权，坚持勇于创新、求真务实的科学精神，努力培养自己严谨求实、诚实自律、真诚协作的科学态度，成为良好学术风气的维护者、严谨治学的力行者、优良学术道德的传承者。”(具体请参见《上海科技大学学生学术诚信规范与管理办法（试行）》文件要求，如果教师有更具体的要求，请详细列出。） Students are allowed to discuss problem sets and projects. All submitted work must be done individually.
其他说明（可选）	

Course Name	Algorithm Design and Analysis	**Course Code**	CS240
Course Level	undergraduate/graduate	**Credit/Contact Hour**	4/64
Major	CS	**Teaching Language**	English
Prerequisite		**Prerequisite suggestion**	CS101
School/Institute	School of Information Science and Technology	**Instructor**	范睿

2.Course Introduction

This course covers important algorithm design techniques including greedy algorithms, divide and conquer, dynamic programming, network flow, heuristic algorithms, randomized algorithms and approximation algorithms, as well as different measures of algorithmic complexity and the limits of efficient computation. The algorithmic techniques are illustrated using a range of algorithms for important problems.

3.Learning Goal

The goal of the course is to have students develop a thorough understanding of key algorithmic design principles and techniques, to build a theoretical foundation on which to analyze algorithm correctness and complexity, to gain experience with a diverse range of algorithms encountered in practical usage, and finally to practice implementing algorithms and achieving high real world performance.

4.Recommended Reading

Book Title	Author	Translator	ISBN	Pubulisher	Pubulished Date	Edition
Algorithm Design	Kleinberg, Tardos		9780321295354	Pearson	2006-12	2

4.Textbook

Book Title	Author	Translator	ISBN	Pubulisher	Pubulished Date	Edition
Introduction to Algorithms	Cormen, Leiserson, Rivest, Stein		9780070131514	MIT Press	2009-12	3

5.Grading Policy

Problem sets	20%
Project	20%
Midterm	30%
Final exam	30%

6.Instructional Pedagogy

The coursework consists of problem sets, a midterm and final exam, and a course project. The project requires students to design algorithms for a number of practical problems, analyze their correctness, and produce efficient implementations of the algorithms.
Instruction is conducted using lectures, Blackboard, Piazza and Gradescope.
The instructor will hold weekly office hours. TAs will hold tutorials and recitations.

7.Course Structure

Chapter	Teaching Contents	Week	Hours	Teaching Modes
1	Analysis of complexity	1	2	
2	Greedy algorithms	1-2	4	Lectures, HW
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	11	Approximation algorithms	11-12	6	Lectures, HW, lab
	12	Amortized analysis	12	2	Lectures, HW, lab
8.Academic Integrity	This course highly values academic integrity. Behaviors such as plagiarism and cheating are strictly prohibited. Please list more if you have more specific requirements. Students are allowed to discuss problem sets and projects. All submitted work must be done individually.				
9.Other Information (Optional)					