CSC 555/655 – Algorithm Analysis and Design

Course Syllabus, Fall 2017

COURSE INFORMATION

For Whom Planned: Upper undergraduate and graduate students
Credits: 3
Prerequisite: grade of at least C in CSC 330
Meeting Times: TR 9:30am-10:45am
Location: Petty 223

INSTRUCTOR INFORMATION

Instructor: Dr. Lixin Fu
Office: Petty 162
Office hours: TR 10:45am-12:00pm or by appointment
Tel.: (336) 402-9601
Home page: http://www.uncg.edu/~l_fu
E-mail: lfu@uncg.edu

COURSE OBJECTIVES AND TOPICS

Sequential algorithm design and complexity analysis. Dynamic programming. Greedy algorithms. Graph algorithms. Selected advanced topics from NP-completeness; approximation, randomized, parallel, number-theoretic algorithms; computational geometry; string matching.

Upon successful completion of this course, a student should be able to

1. understand how recursion works

2. know how to design dividing and conquer algorithms using three steps and apply to merge sort, quick sort, Strassen's matrix multiplication

3. understand big-O notations, and analyze common algorithms using them

4. use greedy strategy to solve some graph problems such as MST, Shortest path

5. apply dynamic programming to matrix train, LCS, and graph algorithms

6. understand NP-completeness and why it is important

7. prove some problems e.g. CLIQUE, VC, subset sum etc are NP-complete

The topics that we will cover during the course of the semester include:

Preliminaries (asymptotic notations, data structures)

Randomized algorithms

Divide and conquer

Greedy algorithms

Dynamic programming

Graph algorithms

NP-completeness and approximation algorithms

TEXTBOOK

Required textbook:
Thomas H. Cormen et al., Introduction to Algorithms, Third Edition, MIT Press, 2009. ISBN (MIT Press):978-0-262-033848-8 or 978-0-262-53305-8.

EVALUATION METHODS AND GUIDELINES FOR ASSIGNMENTS

1. **Exams**
There will be three closed exams. No books or notes are used as references during the exams.
The exams mainly focus on the material covered since the last exam (except the first one).

2. **Homework**
Five homework assignments are designed to help you better understand the material covered in class.
The submissions are preferably typed (e.g. using Microsoft WORD). Handwriting must be legible and neat.
No late homework is accepted. Each student should complete the assignments independently.

3. **Grading Scheme**

Please notice that the grading schemes for graduate students and undergraduate students are **different.**

For undergraduate students:

Exam I: 20%
Exam II: 25%
Exam III: 25%
Homework: 30% (each assignment 6%)

For graduate students:

Graduate students who register in this course must write an additional term paper investigating a research topic in computer algorithms. The weight for this work is 20%, bringing the total for graduate students to 120%, which will be prorated to 100% to determine the grade. List of topics, resources, and guidelines for term papers will be provided in class. Students for CSC 655 will similarly submit a term paper with more work (than CSC 555).

The letter grade you will receive depends on the numerical scores in the exams and assignments, and your overall performance in this course.

ATTENDANCE POLICY
Class attendance is required. If you will be absent for an exam due to extreme cases such as severe physical conditions,
let me know in advance so that we can arrange a make-up test.

ACADEMIC HONOR CODE
The instructor will deal strictly with any violations of academic honesty and integrity in this course. Refer to Academic Integrity Policy or UNCG Undergraduate Bulletin for more details.

Please read the related textbook sections listed in the class schedule before class, attend all the lectures, and start on homework early.
If you have any questions or need assistance, please feel free to see me during my office hours, email me, or make an appointment.
I am more than happy to help you.