CpSc 3120 Syllabus — Fall 2022

Course URL: http://www.cs.clemson.edu/~srimani/3120_F22/index.html

Instructor: Pradip K Srimani 121 McAdams Hall 656-5886, srimani@clemson.edu	**Teaching Assistant**: TBD	**Office Hours**: 9 am – 11 am TTh (Instructor) Or by appointments

Motivation: We live in an exciting era thanks to ever-increasing advancements in communication and computing technologies. Consider, for example, how big data mining and DNA analysis have affected modern medicine, or smart search algorithms have made instantaneous availability of accurate information possible, or how cell phones, twitter, social networks have influenced political and social events.

An Interesting Simple Quiz: Compute median of 5 arbitrary distinct integers using less than or equal to 6 comparisons

Course Objectives: The objective in this class is for students to become familiar with Algorithms Design and Analysis concepts. The student who completes this course:

- shall understand the concepts and design techniques for algorithms used in diverse applications.
- shall get familiar with techniques of analyzing different algorithms theoretically as well as in real life settings of diverse application domains.
- shall be able to implement algorithms using a programming language and evaluate their comparative performance.
- shall get an understanding of how algorithms form a powerful lens through which to view problem solving in general.

Course Specific Information:

a. **Catalog Description**: Introduction to algorithm design and analysis. Topics include advanced data structures, amortized analysis, dynamic programming, graph algorithms, intractability, and applications.
b. **Prerequisite:** CPSC 2120
c. **Co-requisite**: None
d. **Course Type**: Selected Elective

Suggested Textbooks:

(1) Éva Tardös and Jon Kleinberg, "Algorithm Design", Addison-Wesley**; OR (2)** Michael T. Goodrich **and** Roberto Tamassia**,"**Algorithm Design and Applications**",** Wiley; **OR (3)** Thomas H. Cormen,

Charles E. Leiserson, Ronald L. Rivest, Clifford Stein**,** "Introduction to Algorithms", The MIT Press.
[Note: Any of these three books is more than enough to cover the materials of this course; we will not follow any textbook in class.**]**

Tentative Outline of Topics:

1. Design techniques: Greedy approach, Divide-and-conquer, Dynamic programming
2. Applications: Sorting, Long Integer Multiplication, Activity Selection (Interval Scheduling), Knapsack, Huffman Coding, Offline Caching, Matrix Chain Multiplication, Longest Common Subsequence, Sequence Alignment, Convex Hull
3. Analysis Tools: Recurrence relations, Average case analysis, Amortization, Lower bounds
4. Advanced Data structures: Balanced Trees, Heap and search tree variations, Union-Find, Hash tables
5. Graph Algorithms: Shortest Path, Minimal Spanning Tree (Kruskal & Prim),
6. NP completeness and approximation algorithms (Time permitting)

Tentative Grading (subject to change):

The final grade for the course will be computed based upon the following distribution **(tentative)**:

- HomeWorks – 30%
- 2 Tests – 40%
- Comprehensive Final Exam – 30%

Note: Homework may include programming assignments.

Class Policy on submission: You cannot turn in work that you have already turned in for credit in another course.

Grade Appeal Policy

Any grade challenges regarding exams, quizzes, exercises, or programs must be emailed to the instructor, with detailed justifications, within one week of the date the grades are available. No exceptions.

Email Policy:

Ask questions as often as you need. The subject header of your email must mention CpSc 3120 along with a brief heading. **Do not use chain emails; do not reply to group emails**. I'll respond as quickly as possible

Attendance

Attendance is expected, but not required*. We may cover material in an order different from any textbook. You are responsible for any material covered in lectures. You are responsible for any announcements, assignments or assignment modifications that are announced in lectures whether you are present or not.*

Deadlines

Work is due at the specified deadline. **Late work will not be accepted**. If a project (homework, programming assignment, etc.) is only partially completed you should submit what you have by the deadline. You should expect very little to no credit for programming assignments that still generate syntax errors.

Cancellation of Class: If classes are cancelled by the university on the day of a scheduled test, we will reschedule the test.

Academic Integrity

As members of the Clemson University Community, we have inherited Thomas Green Clemson's vision of this institution as a "high seminary of learning". Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. Read the university academic integrity statement (along with other important information). Unless otherwise specified in an assignment, you are expected to work independently on projects, assignments, tests and labs. ***If you are in doubt about the type of help you may give or receive on a project: ASK!***

University Accessibility Statement:

Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the professor know, and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848, by emailing mailto:studentaccess@lists.clemson.edu, or by visiting Suite 239 in the Academic Success Center building. Appointments are strongly encouraged – drop-ins will be seen if possible, but there could be a significant wait due to scheduled appointments. Students who receive Academic Access Letters are strongly encouraged to request, obtain, and present these to their professors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student's responsibility to follow this process each semester. You can access further information here: http://www.clemson.edu/campus-life/campus-services/sds/.

The Clemson University Title IX (Sexual Harassment) Statement

Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at http://www.clemson.edu/campus-life/campus-services/access/title-ix/. Mr. Jerry Knighton is the Clemson University Title IX Coordinator. He also is the Director of Access and Equity. His office is located at 110 Holtzendorff Hall, 864.656.3184 (voice) or 864.656.0899 (TDD).

Academic Calendar Fall 2022

Aug 22, Mon - Aug 23, Tue Late enrollment
Aug 22, Mon University Convocation
Aug 24, Wed Classes begin
Aug 30, Tue Last day to register or add a class or declare Audit
Sep 6, Tue Last day to drop a class or withdraw from the University without a W grade
Sep 13, Tue Last day to apply for December graduation
Oct 14, Fri Last day for instructors to issue midterm evaluations
Oct 28, Fri Last day to drop a class or withdraw from the University without final grades
Nov 7, Mon - Nov 8, Tue Fall break
Nov 9, Wed Registration for spring term begins
Nov 23, Wed - Nov 25, Fri Thanksgiving holidays
Dec 8, Thu - Dec 9, Fri Classes meet; exams permitted in labs and one-hour courses only
Dec 12, Mon - Dec 16, Fri Examinations
Dec 19, Mon 9:00 A.M.--Deadline to submit candidate grades
Dec 21, Wed 9:00 A.M.--Deadline to submit other grades
Dec 21, Wed Candidates for graduation may access grades
Dec 21, Wed Doctoral Hooding
Dec 22, Thu Graduation