State University of New York Polytechnic Institute
CS 477: Algorithms

Instructor:	Dr. Chen-Fu Chiang
Semester:	Spring 2020
Time:	MW 2:00 pm - 3:50 pm
Location:	Kunsela C212
Office Hours:	MWF: 12:00 pm - 1:30 pm | F: 3:00pm - 4:00pm | by appointment
Office:	Kunsela C225
Email:	chiangc@sunyit.edu
Phone:	315-792-7379

TA:	TBA
Office Hours:	TBA
Location:	Kunsela C122
Email:	TBA

References

1. Introduction to Algorithms, 3rd edition, T. Cormen, C. Leiserson, R. Rivest and C. Stein, The MIT Press 2009 (ISBN-13: 978-0262033848)
2. Algorithms, 4th edition, R. Sedgewick, K. Wayne, Pearson Education Inc. (ISBN-13: 978-0321573513)

Course Description

The course is designed for computer science students and is intended to introduce them to the standard-techniques used in analyzing algorithms. If time allows, wewill go further with techniques needed toanalyze algorithms, greedy algorithms, dynamic programming, advanced data structures, vector and matrixmanip-ulation, sorting networks, number-theoretic algorithms and NP-completeness. This course is designedfor graduate students in computer science and is intended tointroduce them to the standard techniquesused in analyzing algorithms. Examples from a variety of computer science sub-disciplines will be presented.The relationships between these sub-disciplines will be shown through the study of NP- completeness.

Course Structure

This course is a combination of lecture, discussion, and outside work. Students are encouraged to raise questions at any time. The basic course material is covered in the text; additional material will be introduced via handouts, and will be posted on the Blackboard course site. At the college level students should spend about two hours outside the classroom working on a course (a combination of reading, studying, and homework) for each hour of class meeting time. This means that students should expect to spend about eight hours per week outside the classroom working on CS 477.

Student Learning Outcomes

- Analyze algorithms with respect to both their time complexity and space complexity
- Compare algorithms using established analysis techniques
- Understand the notions of class P and class NP problems

Topics

- Foundation
  - The Roles of Algorithms in ComputingInsertion Sort
  - Growth of Function
  - Recurrences
- Sorting and Order Statistics
  - Heapsort
  - Quicksort
  - Sorting in Linear Time
- Data Structures
  - Hash Tables
- Graph Algorithms
  - Elementary Graph Algorithms
  - Minimum Spanning Trees
  - Single-Source Shortest Paths
  - All-Pairs Shortest Paths
- If time allows, we will explore topics such as (a) sorting network (b) Fast Fourier Transform and (c) NP-Completeness.

Grading (Tentative)
The lecture format will be the basic mechanism used in the course. Computer demonstrations in the classroom will be used whenever appropriate. Assessment of student performance will use a criterion-referenced model which will include written assignments, programming assignments and quizzes (40%), regular examinations (midterms 40%), a presentation on the latest development of algorithms of interest (20%). Late homework will not be accepted unless you have made prior arrangements with me. The acceptable format of your solution will be specified in the assignment. All examinations are closed-book. A typical grading scale will be as follows:

Percent	Grade
97 - 100	A+
93 - 96	A
90 - 92	A-
87 - 89	B+
83 - 86	B
80 - 82	B-
77 - 79	C+
73 - 76	C
70 - 72	C-
65 - 69	D+
60 - 64	D
Below 60	F

Students are expected to produce professional quality programs adhering to the following criteria:

- The problem must be completely solved. The sophistication of the solution will be considered in determining the grade. The program must demonstrate mastery of the topics and techniques being covered at that point in the course even if there are better solutions using other techniques. All paths through the program must produce correct results (or the program is unacceptable). Assignments that are returned because they are unacceptable will be penalized per returned submission.

- The documentation must be complete and the program layout must be visually appealing. Each program and each function must contain a statement of purpose, name of author, date of creation, revision number (if any), date of last revision, language, compiler used and citation of sources. Intra-code commenting of obscure code is expected. Variable names must be rational. The use of correct grammar and spelling in user prompts is assumed; the penalty for sloppy English will be harsh.

- Programs must be crash-proof (commensurate with the level of sophistication of the assignment). User prompts (if any) must be clear, precise, grammatically correct, and correctly spelled. In the absence of warnings any user input is fair game. You should not expect the user to remember a complex series of instructions; programs should be user friendly. Programs should be able to recover from illegal data entry.

- Assignments should be submitted on-time; this will help students stay "up-to-date" with the course-work. Due dates may be adjusted if the lecture schedule falls behind. Programs will not be graded prior to the due date. It is in the student's best interest to submit problem set solutions on time.

Attendance Policy
Attendance and active class participation are required. Be prepared to participate by asking and answering questions during class meetings. Please send me an email if you know you have to miss a class.

Academic Integrity/Policy
Plagiarism and Cheating of any kind on an examination, quiz, or assignment will result at least in an F for that assignment (and may, depending on the severity of the case, lead to an F for the entire course). I will assume for this course that you will adhere to the academic creed of this University and will maintain the highest standards of academic integrity. In other words, do not cheat by giving answers to others or taking them from anyone else. The code of academic conduct is detailed on the SUNY Poly student handbook. Make-ups are only given under extreme circumstances. I will also adhere to the highest standards of academic integrity, so please do not ask me to change (or expect me to change) your grade illegitimately or to bend or break rules for one person that will not apply to everyone.

Plagiarism Warning
The work you submit must be your own. You will not receive credit for work which is not your own. You may ask others (classmates/friends/instructors) for advice or help regarding the subject matter of a problem set. However, your answers and the actual design, coding, entry, and running of your programs must represent your own work. All sources of ideas that are used in any way (quoted, paraphrased, or summarized), including ideas taken from the text, must be acknowledged in problem set program documentation. Failure to provide proper attribution constitutes academic dishonesty, and it will result in a failing course grade. Substantially identical program submissions by multiple students, even with attribution, may result in a failing course grade to all who submit the same program. Submitting a program written by someone else, even with attribution, is strictly prohibited and will result in a failing course grade. Students are further reminded that it is their responsibility to take reasonable precautions to prevent copying of their work by other students and that there are now criminal penalties for computer trespass and computer tampering. Note: Selective enforcement of plagiarism does not constitute a valid defense.

Academic Adjustments for Students with Disabilities

In compliance with the Americans with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act, SUNY Polytechnic Institute is committed to ensuring comprehensive educational access and accommodations for all registered students seeking access to meet course requirements and fully participate in programs and activities. Students with documented disabilities or medical conditions are encouraged to request these services by registering with the Office of Disability Services. For information related to these services or to schedule an appointment, please contact the Office of Disability Services using the information provided below.

Evelyn Lester, Director
Office of Disability Services
lestere@sunypoly.edu
(315) 792-7170

Utica Campus
Peter J. Cayan Library, L145

Albany Campus
Suite 309, Students Services Office
NanoFab South