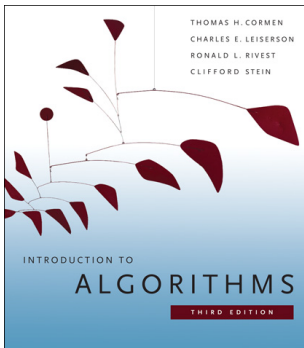


**Master of Science in Computer Science
College of Computer and Information Science**

Course Syllabus

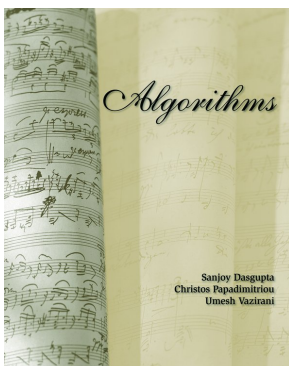
Course Number/Name: CS 5800 Algorithms (Master Level)
Term: Fall 2013, 15 week term, Hybrid
Dates: September 4, 2013 – December 14, 2013
On Campus: Wednesdays/6pm to 8pm
Credits: 4 credits
Faculty: Virgil Pavlu, Ph.D, Computer Science
Northeastern University, 472 WVH
Office Hours: Wednesdays/6pm to 8pm
E-mail: vip@ccs.neu.edu
Course website: <http://nuonline.neu.edu/>

Required Textbook:



Introduction to Algorithms, 3rd Edition
Thomas Cormen, Charles Leiserson, Ronald Rivest and Clifford Stein
Published: July 2009, MIT Press
ISBN-10: 0262033844
Format: Hardcover

Optional Text:



Algorithms
Sanjoy Dasgupta, Christos Papadimitriou, and Umesh Vazirani
Click here to access the online version of this book: [Online Version of Algorithms](#)

Course Prerequisites:

- Basic Programming
- Data Structures
- Discrete Math

Course Description:

Topics covered include Analysis of Algorithms, Divide and Conquer, Greedy, Dynamic Programming, Amortized Analysis, Graph Algorithms, Hashing, and other advanced topics.

Course Outcomes:

At the conclusion of this course the students will be able to:

- Identify the correct strategy (algorithm) for solving various problems, in particular typical problems likely to occur during software development.
- Write algorithms in pseudocode.
- Analyze algorithms for running time and required space.
- Know what algorithms are feasible and or scalable for a given concrete problem.
- Manipulate data structures.
- Be familiar with basic subroutines already packaged in most languages.

Course Rationale

Computer scientists, application developers, game programmers, business analysts, database administrators are faced daily with tasks that require a computer program. When such a program has to be written, it is necessary to formulate first a step-by-step description of the program, including the strategy independent of the programming language used, why it works, and how it relates to the input data in terms of efficiency. The choice of algorithms can make the difference between a fast, un-observable, routine and one that never finishes. The Algorithms course presents students with systematic ways to find strategies for most typical problems, but also with tools facilitating analysis of in terms of input data.

Course Methodology

Each week, you will be expected to:

- Review the week's learning objectives.
- Complete assigned readings.
- Review the lesson(s) in the weekly module.
- Participate in the discussion board (if necessary to ask/answer a question)
- Attend the on campus class meeting.
- Complete and submit assignment(s) by the due date.

Completing and Submitting Homework

Each week you may have required homework to complete and upload into Blackboard. Readings are required for each week as listed.

Please review the grading policy outlined in the course information page.

You must also write down with whom you worked on the assignment. If this changes from problem to problem, then you should write down this information separately with each problem.

Problem numbers are corresponding to the 3rd edition of Introduction to Algorithms. While the 2nd editions has similar problems with similar numbers, the actual exercises and their solutions are different, so make sure you are using the 3rd editions.

To complete a homework assignment you have two options:

1. Write in longhand and convert to a digital format, preferably a PDF;
or
2. Use one of several software programs available such as Latex and Wolfram Alfa and save file in PDF format.

To convert a longhand document into a digital format you can use the following options:

1. Scan completed homework paper using a printer with a scan function.

- Capture an image of paper using a mobile or tablet device. There are numerous applications that use camera technology to capture the image of a document. Options include but are not limited to, [TurboScan](#), [Scanner Pro](#), [DocScanner](#) for iOS and Android and [Document Scanner](#) for Android.

Once you have completed the homework, select the respective Homework Assignment link and upload the completed digital file.

Important: Save filenames as Firstname.Lastname.HWM1M2.pdf

Example: Virgil.Pavlu.HWM1M2.pdf

Grading Criteria:

The course grade will be based on:

- Assignments 30%
- Discussion/Participation 10%
- Midterm 30%
- Final 30%

Class Schedule / Topical Outline

Week	Dates	Topic	Readings/Assignments
1	9/4 – 9/10 9/4 - On Campus	Introduction to Algorithms	Reading Ch. 1, 2, 3, 4.1, 4.2 No Homework
2	9/11 - 9/17 9/11 - On Campus	Recurrences	Reading Ch. 4.3, 4.5, (4.6 optional) Homework M1M2
3	9/18 – 9/24 9/18 - On Campus	Searching and Sorting	Reading Ch. 2, Ch. 6, Ch. 8.1 Homework M3
4	9/25 – 10/1 9/25 - On Campus	Sorting and Median Stats	Reading Ch. 7 (7.3 optional), Ch 8.2, 8.3 (8.4 optional), Ch. 9 Homework M4
5	10/2 – 10/8 10/2 - On Campus	Greedy Algorithms	Reading Ch. 16 (16.3 optional) (16.4 and 16.5 not required) Homework M5
6	10/9 – 10/15 10/9 - On Campus	Dynamic Programming Part 1	Reading Ch. 15 Homework M6

7	10/16 – 10/22 10/16 - On Campus	Dynamic Programming Part 2	Reading Ch. 15 Homework M7
8	10/23 – 10/29 10/23 - On Campus	Midterm Exam	Reading Ch. 10, Ch. 12 Homework M8 Midterm Exam
9	10/30– 11/5 10/30 - On Campus	Hashing and Red-Black Trees	Reading 11.1 – 11.3, (11.4 and 11.5 optional), Ch. 13 (13.4 optional) Homework M9
10	11/6 – 11/12 11/16 - On Campus	Amortized Analysis	Ch. 17.1-17.3 (17.4 not required), Ch. 19 Homework M10
11	11/13 – 11/19 11/13 - On Campus	Graphs and Minimum Spanning Trees	Ch. 22, Ch. 23 (Ch. 21 optional) Homework M11
12	11/20 – 11/26 11/20 - On Campus	Shortest Paths	Ch. 24 (24.4 optional), Ch. 25 (25.3 optional) Homework M12
13	11/27 – 12/3 11/27- On Campus	Network Flow	Homework M13
14	12/4 – 12/10 12/4 - On Campus	Linear Programming and NP Completeness	Homework M14
15	TBD - On Campus	Final Exam	Final Exam

Academic Honesty

- All work submitted for credit must be your own.
- You may discuss the homework problems or projects with your classmates, the teaching assistant(s), and instructor. You must acknowledge the people with whom you discussed your work, and you must write up your own solutions. Any written sources used (apart from the text) must also be acknowledged; however, you may *not* consult any solutions from previous years' assignments whether they are student or faculty generated.