Syllabus: CmpSci 3130
Design and Analysis of Algorithms
Department of Mathematics and Computer Science

Semester

Fall 2018

Class meets in 218 SSB on Tu/Th: sec. 001 at 12:30 – 1:45 pm;
sec. E01 at 6:55 – 8:10 pm.

Instructor Details

Name: Galina Piatnitskaia

Office Hours: Mo/We 9:45 – 10:30 am, 2:30 – 3:00 pm and 4:30 – 5:00 pm;
Tu/Th 11:30 – 12:00 noon; 4:30 – 6:00 pm
and by appointment

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Course Details

Course Description

This course addresses the design and analysis of fundamental algorithms in computer science. Topics include basic sorting algorithms, priority queues, order statistics, search trees, and hash tables. Analysis techniques may involve time and space complexity analysis of both iterative and recursive algorithms and analysis of algorithm correctness.
Prerequisites: CMP SCI 2250, MATH 1320, and MATH 3000.

Text and Other Materials

Introduction to Algorithms by T.H.Cormen, C.E Leiserson, R.L Rivest and C. Stein; 3d edition; ISBN 978-0-262-03384-8 or ISBN 978-0-262-53305-8.

The course will cover material from Parts I – IV (chapters 1 – 13).

The list of topics:

- Principles of algorithm analysis
- Growth of functions
- Basic recurrences
- Elementary sorting methods
- Priority queues and heapsort
- Quicksort; mergesort
- Radix sort
- Elementary data structures
- Hash tables
- Binary search trees
- Red-black trees

The order of presentation may vary; the textbook will not be followed directly. Some sections from the textbook may be skipped or treated lightly. Also, some additional material may be covered if the time permits.

Policies, Submission and Communication

Current grades and all the materials for this course will be posted on the course site.

<u>Attendance:</u> Students are expected to attend every class. **Failure to appear for an exam will result in a grade 0 for this exam unless prior arrangements have been made.**

<u>Homework policy:</u> 1) Solutions to homework exercises should be submitted on paper on the due date **before** the lecture. **Absolutely NO late** papers will be accepted! Correct answers to all exercises will be available on-line after the class session. Your papers must be TYPED and STAPLED!

2) Programming assignments should be submitted electronically (submission instructions will be posted separately on the course site). Each programming project must be well documented and clearly identify its purpose, author and date. To receive a full credit, each assignment must be submitted by the due date. Up to 6 extra points may be assigned for the early submission (2 points for each day, up to 3 days). Late submissions are allowed ONLY during three days after the due date, with 10, 20, and 30% penalty, respectively. To pass the course, you must obtain at least 70% of points allotted to the programming projects. Discussion on programming exercises with other students is allowed, but outright copying of programming exercises will cause all parties involved to receive a grade of ZERO. If a student is unable to complete a programming

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project due to some unexpected reason, he/she must discuss it with an instructor **before** the deadline!

Quizzes: There will be frequent class quizzes. Dates will be announced in the class. All quizzes are **closed-books/notes**.

Exams policy: All exams will be **closed-books, open-notes.** Printouts of **any** programs are **NOT** allowed. Exams will be given around Thursday, October 11 and Thursday, November 15 (these dates may be changed).

The Final Exam (which will be comprehensive) will be given in 218 SSB on Thursday, December 13:

section 01 at 10:00 am – 12:00 noon;

section E01 at 7:45 – 9:45 pm.

Scoring

Grading scheme:
Homework assignments	→	200 points;
Programming projects	→	300 points;
Quizzes	→	50 points;
Two exams	→	300 points;
Final Exam	→	150 points.

The letter grades will be assigned as follows:

Score	<600	600 – 699	700 – 799	800 – 899	>=900
Grade	F	D	C	B	A

Sometimes +/- grades may be given at the discretion of the instructor.

University Policies and Information

http://www.umsl.edu/~webdev/mathematics/files/pdfs/cs_umsl_syllabus_university.pdf

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CS 3130	*Tentative Schedule*		*Fall 2018*

Week of	*Material.*	*Assignments.*	*Reviews, Tests.*
08/20 →	Chapter 1; sections 2.1 and 2.2.		
08/27 →	Loop invariants and correctness. Selection sort. Bubble sort.		
09/03 →	Chapter 3.	Homework #1 is due on Th, 09/06.	
09/10 →	Discussion on Project #1. Appendices B.4 and B.5. Mathematical properties of binary trees. Tree traversals.		
09/17 →	Sections 4.3 – 4.5; 2.3; 4.2.		
09/24 →	Sections 5.1 – 5.2. Chapter 7.	*Project #1 is due on Tu, 09/25.*	
10/01 →	Chapter 7 (continued). Discussion on Project #2. Chapter 6.		**Review for Test #1 (Th, 10/04).**
10/08 →	Chapter 6.	Homework #2 is due on Tu, 10/09.	*Test #1 (Th, 10/11).*
10/15 →	Discussion on Test #1. Chapter 8.		
10/22 →	Chapters 8 and 9.	*Project #2 is due on Tu, 10/23.*	
10/29 →	Chapter 10. Chapter 12.		
11/05 →	Discussion on Project #3. Insertion at the root of BST. 2-3-4 trees.	Homework #3 is due on Th, 11/08	**Review for Test #2 (Th, 11/08).**
11/12 →	2-3-4 trees. Chapter 13.		*Test #2 (Th, 11/15).*

11/19 →	****** *THANKSGIVING HOLIDAY BREAK* ******		
11/26 →	Discussion on Test #2. Chapters 13 and 11.	***Project #3 is due on Tu, 11/27.***	
12/03 →	Additional topics if time permits.	Homework #4 is due on Th, 12/06.	**Review for the Final Exam (Th, 12/06).**
12/10 →	{*Final Week; no classes*.} **Final Exam: Th, 12/13.**		

All changes to the schedule will be announced in the class and posted on the course site.

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ALL PERSONAL ELECTRONIC DEVICES MUST BE TURNED OFF IN THE CLASSROOM !!!

IF YOU EXPECT AN EMERGENCY PHONE CALL, PUT YOUR PHONE IN A SILENT MODE.

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