DePAUL UNIVERSITY
COLLEGE OF COMPUTING AND DIGITAL MEDIA

CSC412-701/710
TOOLS AND TECHNIQUES FOR COMPUTATIONAL ANALYSIS

SYLLABUS

Quarter: Fall, 2018/19
Class time: M 5:45 – 9:00
Location: Lewis 1515
Instructor: Vladimir Lepetic
Office: 1650 Lewis, LC; **Phone:** (312) 362-6250
e-mail: vlepetic@depaul.edu
Office Hours: MW 11:00 – 11:50; M 5:00 – 5:45

TEXTS: Shores, Thomas S. Applied Linear Algebra and Matrix Analysis, Springer 2007.
Ayres, Mendelson, Calculus, Calculus, 6th ed. 2013

Additional/Supplemental reading that students may find helpful:

Lipschutz, S., Lipson, M., *Linear Algebra*, 5th ed. McGraw-Hill, 2012
Lepetic, V. *Principles of Mathematics - A Primer*, Wiley, 2016
Axler, S. *Linear Algebra Done Right*, Springer 2014.
Lang, S. *A First Course in Calculus*, 5th. Ed. Springer 1998
Larson, R. Edwards, B., *Calculus*, 10th ed. Cengage, 2013.
Friedberg, S., Insel, A., *Linear Algebra*, 5th ed. Pearson, 2002

PREREQUISITES:

None, however the assumption is that students have knowledge of basic college level algebra and trigonometry

SUMMARY:

CSC412 is intended to provide a solid foundation for further study of mathematics and computer science. In particular the use of mathematical software to explore basic concepts in linear algebra and calculus. Emphasis is on applications in computer science, finance, data mining, and computer vision

CONTENTS

O   Introduction. Motivation and General Idea. Prerequisites

LINEAR ALGEBRA (Shores: Ch. 2 – 6)

1.   Matrix Algebra (Shores: Ch. 2.1 – 2.6)

2.   Vector Spaces (Shores: 3.1 – 3.6)

3.   Geometrical Aspects of Standard Spaces (Shores: 4.1 – 4.3)

4.   The Eigenvalue Problem (Shores: 5.1 – 5.2)

5.   Geometrical Aspects of Abstract Spaces (Shores: 6.1 – 6.4)[1]

CALCULUS (Ayres, Mendelson: Ch. 6 – 47)

6.   Functions (Ayres, Mendelson: Ch. 6)

7.   Limits (Ayres, Mendelson: Ch. 7)

8.   Continuity (Ayres, Mendelson: Ch. 8)

9.   The Derivative (Ayres, Mendelson: Ch. 9; Ch. 10 - 15; Ch. 25 - 27)

10. Infinite Sequences; Infinite Series (Ayres, Mendelson: Ch. 42 –43; 46 - 47) [2]

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[1] Optional and/or time permitting
[2] Optional and/or time permitting

This is a fast-paced course that requires you to set aside adequate time for practice. **It is highly recommended** that you practice three or more times per week. Doing well in this course usually requires at least **6-10** hours per week of practice, depending on your current skill level. If you start to fall behind, for whatever reason, you should contact me as soon as possible to determine what can be done to rectify matters. Usually, something can be done to help you if you give me enough advance notice.

If you need additional (online) help/support you may want to consult the following:

For Matlab:

- University of Edinburgh interactice Matlab Tutorial
- University of British Columbia Guide to Matlab
- DePaul (Dr. Raicu's) Matlab Tutorials
- Matlab dictionary (Matlab for class)
- Virtual lab access to Matlab (and other statistics software)

For Calculus:

- Mendelson, Beginning Calculus, 3rd edition, 2008 (a more leisurely introduction than our textbook).
- Ayres, Mendelson, Calculus, 6th Edition, 2013 (out textbook).
- Wrede, Spiegel, Advanced Calculus, 3rd edition,2010 (covers everything we need, and then some, but at faster speed).
- Larry Gonick, The Cartoon Guide to Calculus, HarperCollins, 2013. (Entertaining.)
- William Dunham, The Calculus Gallery: Masterpieces from Newton to Lebesgue, Princeton UP, 2008. (Very difficult, unless you have good calculus background already.)
- Calculus applets

For Matrices and Linear Algebra:

- Shores, Applied Linear Algebra and Matrix Analysis, Springer, 2007.
- Singh. Linear Algebra, step by step. OUP, 2014.
- Lipschutz and Lipson, Linear Algebra, 5th edition, 2013.
- Bronson, Matrix Operations, 1st edition, 2011.
- Jim Hefferson, Linear Algebra, free ebook.

HOMEWORK:

Four sets of homework problems "Self-Tests" will be given and will be solved in class a week after the assignment during regular problem sessions. However, **students are strongly urged to attempt problems by themselves and ask about or discuss those they couldn't do, in class or in private.**

EXAMS:

There will be two in class exams – a mid-term and the final – and one take-home exam. The grade will be calculated as follows: mid-term: 35%, take-home: 30%, and final 35%.. In order to get full credit for exam problems, students have to show **ALL WORK!** Make-up exams **will not be given.**

Schedule of Exams:

Midterm: October 8, at 5:45.

Take-home will be handed out on November 12 and it's due on November 19, at 5:45pm.

Final Exam: November 19, at 5:45pm

Grade scale: 90-100% (A), 90-80% (B), 70-80% (C), 60-70% (D), below 60% (F)

Course Policies

Changes to Syllabus
This syllabus is subject to change as necessary during the quarter. If a change occurs, it will be thoroughly addressed during class, posted under Announcements in D2L and sent via email.

Online Course Evaluations
Evaluations are a way for students to provide valuable feedback regarding their instructor and the course. Detailed feedback will enable the instructor to continuously tailor teaching methods and course content to meet the learning goals of the course and the academic needs of the students. They are a requirement of the course and are key to continue to provide you with the highest quality of teaching. The evaluations are anonymous; the instructor and administration do not track who entered what responses. A program is used to check if the student completed the evaluations, but the evaluation is completely separate from the student's identity. Since 100% participation is our goal, students are sent periodic reminders over three weeks. Students do not receive reminders once they complete the evaluation. Please see https://resources.depaul.edu/teaching-commons/teaching/Pages/online-teaching-evaluations.aspx for additional information.

Academic Integrity and Plagiarism

This course will be subject to the university's academic integrity policy. More information can be found at https://offices.depaul.edu/oaa/faculty-resources/teaching/academic-integrity/Pages/default.aspx.

Academic Policies
All students are required to manage their class schedules each term in accordance with the deadlines for enrolling and withdrawing as indicated in the University Academic Calendar. Information on enrollment, withdrawal, grading and incompletes can be found at:
http://www.cdm.depaul.edu/Current%20Students/Pages/PoliciesandProcedures.aspx

Incomplete Grades
An incomplete grade is a special, temporary grade that may be assigned by an instructor when unforeseeable circumstances prevent a student from completing course requirements by the end of the term and when otherwise the student had a record of satisfactory progress in the course. All incomplete requests must be approved by the instructor of the course and a CDM Associate Dean. Only exceptions cases will receive such approval. Information about the Incomplete Grades policy can be found at
http://www.cdm.depaul.edu/Current%20Students/Pages/Grading-Policies.aspx

Students with Disabilities
DePaul University is committed to ensuring equal access to its educational and extracurricular opportunities for students with disabilities. The Center for Students with Disabilities (CSD) offers reasonable academic accommodations and services to support our students. We also serve as a resource to the many university departments that have a responsibility to accommodate students.
Please see https://offices.depaul.edu/student-affairs/about/departments/Pages/csd.aspx for Services and Contact Information.

Proctored exams for OL courses (if applicable)
If you are an online learning student living in the Chicagoland area (within 30 miles of Chicago), you will need to come to one of DePaul's campuses to take an exam. Online learning students outside of the Chicagoland area are required to locate a proctor at a local library, college or university. You will need to take the exam within the window your instructor gives. Students should examine the course syllabus to find exam dates and the instructor's policy on make-up exams. Detailed information on proctored exams for online learning students can be found at
http://www.cdm.depaul.edu/onlinelearning/Pages/Exams.aspx