MTH 418: Matrix Analysis (Spring 2017)

Instructor:	Dr. Vasilije Perovic
Email:	perovic@uri.edu (*preferred way of communication*)
Email Policy:	The **only** address that should be used for communication is the one associated with your URI account.
Office:	Lippitt Hall, 200B ☎ (401) 874–4463
Office Hours:	**Tue: 3:30pm – 4:30pm**; **Wed: 10:00am – 12:00pm**; **Thur: 3:30pm – 4:30pm**. You may also see me at other times by arrangement.
Classroom:	Beaupre Center for Chemical & Forensic Sciences, Room 215; Tue/Thur: 12:15pm – 3:15pm.
Class Website:	This course will use **SAKAI** which should be checked regularly for announcements, grades, updates, lecture notes, etc! You might also find the following website helpful `http://math.uri.edu/~perovic/Teaching/Spring2017/MTH418_Spr17.html`
Prerequisite:	MTH 215 or MTH 362 or equivalent is **required**.
Textbook:	Alan Laub, *Matrix Analysis for Scientists and Engineers*, SIAM Publications, 2005. Any supplemental material will be posted on SAKAI.

Bring the textbook to each class, since we will refer to it frequently. It is essential to read the text regularly, and read material before we cover it in class!

Additional References: These references are optional, though very good.

- *Applied Linear Algebra and Matrix Analysis*, Carl Meyer, SIAM Publications, 2000.
- *Matrix Analysis*, R. Horn and C. Johnson, Cambridge University Press, 1st or 2nd Edition.

Course Description: MTH 418 (Matrix Analysis) is a second, upper–level course in linear algebra, requiring a first course and (the admittedly vague) "mathematical maturity" as prerequisites. The target audience of the course, as nicely described in the preface in our textbook, is for "students in engineering, the sciences, mathematics, computer science, or computational science who wish to be familiar with enough matrix analysis that they are prepared to use its tools and ideas comfortably in a variety of applications."

Syllabus: We will cover *most* of the Chapters 1–9 in our textbook. Time permitting*, we will include additional material that will be posted on SAKAI.

Course Goals and Learning Outcomes: The primary aim of MTH 418 is to gain an adequate understanding of matrix theory and linear algebra so that we can use the concepts in applications. We will study determinants, vector spaces, linear transformations, singular value decompositions, least squares, linear equations, eigenvalues, canonical forms, QR decmpositions, and linear differential equations*.

Computing: MATLAB is recommended, but not required. In absence of MATLAB students are required to use its free-clone OCTAVE. Graphing calculator is not required or needed.

Video Lectures/Notes: In case our class is canceled due to inclement weather or any other reason, I might post a link on SAKAI to a video lecture (resp., handout) that you will be responsible for watching (resp., reading).

General Advice: In higher level math classes, the *concepts* are as important as the *computations*. To master the concepts, you will have to read and reread the text carefully. Effort is expected outside of class to keep up with the material. A general rule of thumb is to work at least two to three hours on the course outside the classroom for each hour of class. *You are encouraged to form study groups. Talking about mathematics, and critiquing each other's solutions is a very effective way to learn the subject.*

Attendance: Regular, on-time attendance is expected! Attendance will be taken regularly. Should you miss class, your first step should be to get notes from a reliable fellow student. You are responsible for everything that goes on in each class, present or not, including any announcements about assignments, exams, due dates, etc.

Evaluation: The course grade will be based on homework, midterm, project(s), and a final exam, weighted as follows:

Homework	30%	
Project	10%	
Midterm Exam	30%	
Final Exam	30%	**(Tuesday, May 9, 11:30am - 2:30pm)**

Letter grades for the course will be determined by considering your overall weighted percentage according to the following scale:

A: 93.00% and above		**A-**: 90.00% – 92.99%
B+: 87.00% - 89.99%	**B**: 83.00% – 86.99%	**B-**: 80.00% – 82.99%
C+: 77.00% – 79.99%	**C**: 73.00% – 76.99%	**C-**: 70.00% – 72.99%
D+: 67.00% – 69.99%	**D:** 60.00% – 66.99%	
F: 59.99% and below		

Any questions or concerns regarding your course grade should be discussed well before the final exam. Once the final exam is administered, your grade is final and no makeups or extra credit will be offered. Additionally, incompletes will not be given to students who are dissatisfied with their grades at the end of the semester, and grades of NW will not be given to students who have completed even a single assignment.

Incomplete Grade: University of Rhode Island regulations concerning incomplete grades will be strictly followed (see University Manual sections 8.53.20 – 8.53.21 for details). Note that a student must be passing the course before an incomplete is even an option.

Exams: We'll have two exams, a midterm exam about halfway through the semester and a cumulative final exam. I'll give plenty of notice of topics to be covered as exam time approaches. **Makeup exams** will be permitted *only* in those cases when a student documents a *genuine medical or personal emergency*. In such a case you must notify instructor of your emergency within 24 hours of the day of the exam.

Project: There will be one *group* project that will culminate in a *written report* and an *in-class presentation*. Project topics will depend on students' interest and so more details will be provided within the first few weeks of the class.

Homework:

- The homework assignments for this course will be the bulk of the work that you need to do for this course. Working through them is the most important part of the course, and best prepares you to use the concepts of matrix theory as needed in the future.
- I will grade typically a subset of the problems on any given assignment. I expect that all problems on each assignment will be completed, or at least reasonably attempted.
- There will be plenty of time to complete the assignments, provided you begin working on them right away. Don't leave them to the last minute! Late assignments (accepted at my discretion) will receive penalties.
- Starting with the second homework assignment, at least two problems per assignment will need to be typed. LaTeX is an excellent choice for typesetting mathematics and my recommendation (I used it to write all homeworks and exams, and even this syllabus), but Word, Mathematica, and others are available as well. I have posted several LaTeX resources on SAKAI to get you started. By the end of the semester, it will be easy to have your entire homework typeset.

- Each problem should be written/typed on a separate sheet. Multiple pages should be stapled.
- Mathematics is much more than a bunch of scribbled equations with a circled number at the end. The narrative of your solution is very important. Solutions should always contain complete sentences narrating the solution.
- You are welcome (and encouraged) to work together on these assignments, provided that your solutions are yours alone. That is, discuss the problems and solutions with your classmates, but write them out individually to be handed in. Don't write solutions together, or look at another person's solutions as you write yours! If you discuss the problems with another student, indicate this on the assignment when you hand it in, e.g., I worked with Terence Tao on problems 3 and 5 and with Andrew Wiles on problems 1 and 2. Handing in identical homework assignments will result in zeros for all such copies.
- You are also welcome (and encouraged) to come and discuss the problems with me. While I won't solve the problem for you (or tell you if the solution you have is correct), I can discuss your ideas with you.
- Avoid using the internet for homework help. Information found on the internet is of questionable origin and correctness, and this is particularly true for mathematical proofs. No one stops people from proudly posting incorrect or vague proofs. Handing in a verbatim copy from the internet will result in a zero.
- Occasionally, homework assignments might require use of MATLAB or OCTAVE. You should start familiarizing with those programs as soon as possible.

Important Dates: Please pay close attention to the following dates:

February 13 – Last day to DROP courses with NO TRANSCRIPT DESIGNATION.
March 6 – Last day for students to DROP course with "W" designation.
March 13 – 19 – Spring break (classes do not meet).
April 27 – Last day of instruction *for this class* !
May 9 – Final exam *for this class* !

Accommodations: Any student with a documented disability (e.g., physical, learning, vision, hearing, etc.) who needs to arrange reasonable accommodations should contact me as soon as possible. At the beginning of the semester students should contact Disability Services for Students Office at 330 Memorial Union, (401) 874-2098, `http://www.uri.edu/disability/dss/`.

Academic Integrity: You are responsible for making yourself aware of and understanding the policies and procedures in the University Manual that pertain to Academic Honesty. These policies include cheating, fabrication, falsification and forgery, multiple submission, plagiarism, complicity and computer misuse. Further information can be found in the UNIVERSITY MANUAL sections on Plagiarism and Cheating at

`http://web.uri.edu/manual/chapter-8/chapter-8-2/`

If there is reason to believe you have been involved in academic dishonesty, you will be referred to the Office of Student Conduct. You should consult with me if you are uncertain about an issue of academic honesty prior to the submission of an assignment or test. Violations of the academic honesty policies can result in failing grades for the assignment and the course. Additional penalties can be imposed by the University.