COURSE SYLLABUS

Course Prefix/Number: MAS5145

Course Title: Matrix Theory

Course Credit Hours: 3

Instructor Name and Contact Information: Dr. Jaromy Kuhl
Room 327, Bldg. 04, Ext. 7702
E-mail: jkuhl@uwf.edu
Webpage: www.uwf.edu/jkuhl

Office Hours:
TR 8:30 –11:00 a.m. and by appointment

Prerequisites or Co-Requisites: MAS3105
Students should be proficient at solving systems of equations by reducing the coefficient matrix to row echelon form. Students should also review the following linear algebra concepts: subspace, linear combination, linear independence/dependence, scalar product, orthogonality, and eigenvalues/eigenvectors. Please be prepared to review a linear algebra text.

Course Description:
This course will include important facts about matrices, which are applied in areas such as theoretical and applied economics, numerical methods, statistics, and mathematical modeling. The course includes both theory and computation. However, the majority of the course will cover theory. Some important aspects of the course will be writing definitions and theorems, proving results, and solving problems that require computation by hand or by other means.

Student Learning Outcomes:
At the conclusion of the course students will:
• Demonstrate knowledge of eigenvalues and eigenvectors of matrices and their applications.
• Describe and derive properties of the following important classes of matrices: Hermitian, unitary, normal, and positive definite.
• Describe and perform algorithms that are important in matrix computations; namely QR-Factorization, LU-Factorization, Schur’s Triangularization, Gram-Schmidt methods, and Singular-Value Decomposition.
• Reduce matrices to their canonical forms.
• Describe Gersgorin’s theorem and its use in locating eigenvalues.
• Describe the Jordan canonical forms of matrices under similarity, and perform computations associated with the Jordan form.

Topics Covered:
• Eigenvalues and eigenvectors of matrices; similarity; diagonalization (Chapter 1)
• Unitary equivalence and normal matrices; Schur’s triangularization theorem; normal matrices, QR-factorization (Chapter 2)
• Hermitian and symmetric matrices (Chapter 4)
• Canonical forms; the Jordan canonical form; polynomials of matrices and the minimal polynomial (Chapter 3)
• Positive definite matrices; singular value decomposition (Chapter 7)
• Inclusion regions for eigenvalues, the Gersgorin disc theorem (chapter 6)

About the online section:
For students enrolled from remote locations, this course has an “on-line” section that uses BLACKBOARD COLLABORATE as the instructional platform. This medium provides real-time
instruction/communication, full two-way audio, and a live display of writing on the “white board”. Students who enroll in the on-line section should contact the Department of Mathematics & Statistics (474-2276) for a demonstration of BLACKBOARD COLLABORATE so that they are properly set up BEFORE classes commence.

1. Even though the section is described as “on-line”, students enrolled in this section must attend the class by logging on at the same time class is in session. This will allow students to actively participate in the class proceedings (i.e. ask and answer questions, give feedback etc.)

2. The exams are proctored. Students in the on-site section (face-to-face section) will complete exams in the class. “On-line” students must arrange (with instructor’s approval) a suitable site to take the exam in a proctored setting. There is a form that must be filled and submitted for approval of the testing site. This form can be found at http://uwf.edu/atc/Guide/Developing/DesignStandards/assessment/Proctor.cfm.

3. All students will submit assignments via the drop box in eLearning.

**Required texts:**
Matrix Analysis 2nd edition, by R.A. Horn and C.R. Johnson

**Recommended texts:**
Any introductory undergraduate linear algebra text (eg. Linear Algebra with Applications by Steve Leon)

**Grading / Evaluation:**
There will be two exams and one final exam; all three of them proctored. The course grade will be computed as follows: 16% for homework, and 28% for each exam.

The letter grade will be assigned according to the following scale:

- 90 and above A or A-
- 80-89 B+, B, or B-
- 70-79 C+, C, or C-
- 60-69 D+ or D
- 59 and below F

**Homework:**
Each week (except test weeks) there will be an assignment to complete outside of the classroom. This assignment will be due the following week. Assignments are to be completed neatly with all work shown; otherwise a zero is given. There will be approximately 8 assignments. If you need assistance, please remember that my door and e-mail is open to you.

*No late assignments will be accepted.*

**Exams:**
There will be 3 exams including the final exam. Exam dates will be announced in class. Students should not miss an exam unless there are necessary extenuating circumstances. Only under these circumstances will students be allowed to use the final exam score to replace the missed exam. Each exam will count 100 points towards your final grade.

**Special Technology Utilized by Students:** E-learning is used to post supplementary notes, problem sets, assignments, and discussions. Calculators are permitted (unless stated to the contrary), but all work must be shown and all reasons and justifications given.

**Expectations:**
I strongly recommend that students DO NOT miss class. Students who miss class miss the explanations of the text, as well as worked problems, which are crucial to performing well on tests. However, if missing class is necessary, students will find all lecture notes and recordings in eLearning. If students require help with missed notes, please see me during my office hours.

Other expectations are:

1. Please arrive to class on time (including distant students).
2. Please do not walk in and out of class while class is in session.
3. Please do not talk while I am talking.
4. Please look like you’re paying attention, i.e. no newspapers, sleeping, or other textbooks.
5. Always use a pencil.
6. Cell phones should be silenced.
7. Absolutely no texting.

**Attitude:**
UWF respects the right of instructors to teach and students to learn. The Student Code of Conduct sets forth the rules, regulations and expected behavior of students enrolled at the University of West Florida. Violations of any rules, regulations, or behavioral expectations may result in a charge of violating the Student Code of Conduct. It is the student’s responsibility to read the Student Code of Conduct and conduct themselves accordingly. You may access the current Student Code of Conduct at [http://www.uwf.edu/judicialaffairs](http://www.uwf.edu/judicialaffairs).

**Expectations for Academic Conduct/Plagiarism Policy:**
As members of the University of West Florida, we commit ourselves to honesty. As we strive for excellence in performance, integrity—personal and institutional—is our most precious asset. Honesty in our academic work is vital, and we will not knowingly act in ways that erode that integrity. Accordingly, we pledge not to cheat, nor to tolerate cheating, nor to plagiarize the work of others. We pledge to share community resources in ways that are responsible and that comply with established policies of fairness. Cooperation and competition are means to high achievement and are encouraged. Indeed, cooperation is expected unless our directive is to individual performance. We will compete constructively and professionally for the purpose of stimulating high performance standards. Finally, we accept adherence to this set of expectations for academic conduct as a condition of membership in the UWF academic community.

**Withdrawal deadlines:**
1. Withdrawal deadline for **all courses for the term** with partial refund and grade of WR is September 20, 2013.
2. Withdrawal deadline for **individual or all courses for the term** with an automatic W is November 1, 2013.
3. Withdrawal deadline for **all courses for the term** with grade of W or WF at the instructor’s discretion is December 6, 2013.

Students who are requesting a late withdraw from class (November 1) must have the approval from their advisor, instructor, and department chairperson (in that order) and finally, by the Academic Appeals committee. Requests for late withdraws may be approved only for the following reasons (which must be documented):

1. A death in the immediate family.
2. Serious illness of the student or an immediate family member.
3. A situation deemed similar to categories 1 and 2 by all in the approval process.
4. Withdrawal due to Military Service (Florida Statute 1004.07)
5. National Guard Troops Ordered into Active Service (Florida Statute 250.482)

Requests without documentation will not be accepted. Requests for late withdrawal simply for not succeeding in a course do not meet the criteria above and will not be approved.

**Assistance:**
Students with special needs who require specific examination-related or other course-related accommodations should contact Barbara Fitzpatrick, Director of Disabled Student Services (DSS), dss@uwf.edu, (850) 474-2387. DSS will provide the student with a letter for the instructor that will specify any recommended accommodations.

**Weather Emergency Information:**
In the case of severe weather or other emergency, the campus might be closed and classes cancelled. Official closures and delays are announced on the UWF website and broadcast on WUWF-FM.

• WUWF-FM (88.1MHz) is the official information source for the university. Any pertinent information regarding closings, cancellations, and the re-opening of campus will be broadcast.
• In the event that hurricane preparation procedures are initiated, the UWF Home Web Page and Argus will both provide current information regarding hurricane preparation procedures, the status of classes and the closing of the university.

Emergency plans for the University of West Florida related to inclement weather are available on the following UWF web pages:

Information about hurricane preparedness plans is available on the UWF web site: http://uwfemergency.org/hurricaneprep.cfm

Information about other emergency procedures is available on the UWF web site: http://uwfemergency.org/