MATH 226-04: Linear Algebra and Probability for Engineers | Spring 2022

CLASS INFORMATION:
Course Number: Math 226 section 04
Class Meeting Time: MWF 10:50 am - 12:00 pm
Class Meeting Location: RVAC 108

INSTRUCTOR INFORMATION:
Name: Dr. Viktoria Savatorova
Office Location: Marcus White 118
Office Phone: 860-832-3679
Email: viktoria.savatorova@ccsu.edu
(please include your name and Math 226 in the subject line)
Office Hours: M 8:00-9:15 am; WF: 12:10-1:10 pm or by appointment

COURSE DESCRIPTION: This course introduces the students to the fundamental concepts in linear algebra and probability, such as permutations and combinations, sample spaces, conditional probability, Bayes’ formula, discrete and continuous random variables, binomial and normal distribution, Poisson distribution, row-echelon form, linear combinations, linear transformations, matrix operations, inverse matrix, subspaces of \( \mathbb{R}^n \), dimension and rank, determinants, volumes, eigenvalues and eigenvectors, diagonalization, Markov chains. Students may be expected to use calculators in the course.

PREREQUISITES for the COURSE: MATH 221 (C- or higher)

COURSE MATERIALS:

Textbooks:
Linear Algebra and Probability for Engineers by Lay et al, Pearson, 6th edition (e-book is provided on Pearson Website together with the online HW)
Introductory Mathematical Analysis For Business, Economics, and the Life and Social Sciences by Ernest F. Haeussler, Jr., Richard S. Paul, and Richard J. Wood, 13th edition (chapters 8, 9, and 16 of the e-book will be provided on Pearson Website together with the online HW)

Blackboard Materials: This course uses the Blackboard online system to provide you with course materials including the syllabus, tentative class schedule, class announcements, studying guides, etc. Your grades will also be posted there.

MATLAB and Calculators:
The class is scheduled in the computer lab, and we will use a software (MATLAB) as a tool more sophisticated than a calculator. Previous knowledge of MATLAB may help, but it is not required. We will do very basic coding, and code templates will be provided to use and modify (under the Course Content on the Blackboard you can find the instructions how to install MATLAB on your own computer and get started).
If you want to use a graphing calculator, then the recommended calculator is TI-83, TI-83+, TI-84, TI-84+ or TI-86.
Be warned that tests and quizzes may have parts with no technology (computers, calculators, cell phones) allowed.

TOPICAL OUTLINE:
I. Linear Algebra
   Linear Equations
   • System of linear equations
   • Row reduction and echelon forms
   • Vector equations
   • Matrix equation
   • Solution sets of linear systems
• Linear independence, span, bases
• Linear transformations

**Matrix Algebra**
• Matrix operations
• The inverse of a matrix
• Invertible matrices and properties
• Subspaces, dimension, rank

**Determinants**
• Properties and different definitions
• Cramer’s rule, volume

**Eigenvalues and Eigenvectors**
• Characteristic equation
• Characteristic polynomial
• Diagonalization

**II. Probability**

**Introduction to Probability and Statistics**
• Counting principles, permutations
• Combinations
• Sample spaces, events
• Probability
• Conditional probability, stochastic processes
• Independent events
• Bayes’ Formula

**Random Variables**
• Discrete random variables
• Expected values
• Binomial distribution
• Markov chains
• Continuous random variables
• Normal distribution

**LEARNING OUTCOMES:** The major goals of this course are to gain an appreciation for the role linear algebra and probability play in engineering; use matrices, vector spaces, and probability distributions to model mathematical situations and solve problems relevant to engineering.

**EVALUATION AND GRADE ASSIGNMENT:**

<table>
<thead>
<tr>
<th>Weight</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>Online Homework (HW)</td>
</tr>
<tr>
<td>19%</td>
<td>1st Mid Term Exam (T1)</td>
</tr>
<tr>
<td>19%</td>
<td>2nd Mid Term Exam (T2)</td>
</tr>
<tr>
<td>19%</td>
<td>3rd Mid Term Exam (T3)</td>
</tr>
<tr>
<td>10%</td>
<td>Quizzes (Q)</td>
</tr>
<tr>
<td>23%</td>
<td>Cumulative Final Exam (F)</td>
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**HOW TO CALCULATE YOUR GRADE:**

\[ TOTAL = 0.19*T1+0.19*T2+0.19*T3+0.10*HW+0.10*Q+0.23*F \]

Letter grades will be assigned according to the following scale:
A 93-100, A- 90-92.9, B+ 87-89.9, B 83-86.9, B- 80-82.9, C+ 77-79.9, C 73-76.9, C- 70-72.9, D+ 67-69.9, D 63-66.9, D- 60-62.9, F below 60.

COURSE SCHEDULE: The (tentative) weekly schedule is posted on the Blackboard

CLASS POLICIES:

ATTENDANCE:
Attendance of is a mandatory component of all on-campus classes, and it will be taken daily. It may not count directly in the computation of your grade. However, it may count via quizzes and other assignments, given during the class time.

HOMEWORK:

Online Homework will be assigned and graded using Pearson MyLab & Mastering. Online homework is due each Monday at 11:45 pm. You are required to do all these problems before the due date/time to avoid 10% penalty. No credit will be given for any work completed after the final exam. The necessary account information is included with new textbooks. Students who purchase used textbooks may purchase an Access Code at www.pearson.com/mylab. The course ID is savatorova42719. Further information will be provided on the first day of class and posted on the Blackboard.

MAKE-UP POLICY:
If you miss a class for any reason, you are responsible for all material covered, announcements made in your absence, and acquiring materials that may have been distributed in class. Make up work will not be accepted and will result in a recorded grade of zero, no matter the circumstances. Missing an examination is a very serious matter. If you know in advance that you will have to miss an examination, you MUST inform your instructor at least two weeks before the examination. In that case, you will normally be offered an alternate time for the examination. If you miss an examination because of emergency, you need to contact your instructor either in person or by email within 24 hours of the beginning of the examination. Do not wait until the next class to contact your instructor!

QUizzes: quizzes will mostly be given during the class time, some of them may be take home (it will be announced in advance).

TESTING:

TEST 1: Wednesday, February 16
TEST 2: Wednesday, March 23
TEST 3: Monday, April 25
Final EXAM: Wednesday, May 11, 10:30 am – 12:30 pm
On exam day, please arrive on time, and minimize the amount of clutter you bring into the classroom. Leave all electronic devices in your home or automobile; if it is necessary to carry them for emergency purposes, they should be turned OFF before the assessment begins. If you create a disturbance with an electronic item (even in vibrate mode) you may receive a zero on that assessment. You may NOT use notes, formula cards, or textbooks. Exams may have parts with no calculators allowed.

ATTENTION: the last date to withdraw without approval is the 19th of April.

RESOURCES AVAILABLE:
1. If you need help, take advantage of your instructor’s office hours. (Do not wait until just before the first test to do so.)
2. Form a study group with other students in your class. Explaining solutions to homework problems to each other is a good way to learn.
3. The Learning Center is located in Room D 316, Willard-DiLoreto Hall. Free tutoring is available.
4. A list of private tutors for hire is available in the math department office, Room 128 Marcus White, (860) 832-2835.

GUIDELINES FOR COURTESY AND RESPECT:
I would like to welcome all students into an environment that creates a sense of community pride, courtesy, and respect; we are here to work cooperatively and to learn together. In order to create a smooth and harmonious learning community, please make every attempt to come to all class sessions, to come to class on time, and to stay until the end of the meeting. There may be a time when you are unavoidably late for class. In that case, please come into the room quietly and choose a seat closest to the entrance. Once the class session has begun, please do not leave the room and then re-enter unless it is an emergency. It is important that we are all able to stay focused on the class lecture/discussion. For this reason, only one person at a time in the class should be speaking. Side conversations are distracting for surrounding students and for the professor. All electronic devices should be turned off before entering the room. You must have instructor permission for use of a laptop, and it is only to be used for instructional purposes. As you can see, simple norms of courtesy should be sufficient to have our class run in the best interests of all. Any student considered to be a distraction to the learning environment may be asked to leave the classroom at any time. Thank you in advance for your cooperation.

OTHER INSTRUCTOR POLICIES: Check Blackboard and your official CCSU email account regularly. You are responsible for any information I post on Blackboard or send via email. If you have a question, do not hesitate to ask before, after or during the class. I encourage you to attend my office hours to get individual help. If your schedule does not permit you to come to the announced office hours, send me an e-mail and we will set up an appointment.

UNIVERSITY POLICIES:
1. You must take the final examination at the time specified by CCSU’s final exam schedule: Monday, May 11, 10:30 am – 12:30 pm.
2. In the event of a weather emergency which requires curtailment or cancellation of classes, listen to WTIC (1080 AM) or call (860) 832-3333 for the “general snow message.” Even quicker – check the CCSU website!
3. Course Accommodations Policy
Please contact me privately to discuss your specific needs if you believe you need course accommodations based on the impact of a disability, medical condition, or if you have emergency medical information to share. I will need a copy of the accommodation letter from Student Disability Services in order to arrange your class accommodations. Contact Student Disability Services at (860)-832-1952 if you are not already registered with them. Student Disability Services maintains the confidential documentation of your disability and assist you in coordinating reasonable accommodations with your professors.
4. Academic Integrity: All students are expected to demonstrate integrity in the completion of their coursework. Academic integrity means doing one's own work and giving proper credit to the work and ideas of others. It is the responsibility of each student to become familiar with what constitutes academic dishonesty and plagiarism and to avoid all forms of cheating and plagiarism. Students who engage in plagiarism and other forms of academic misconduct will face academic and possibly disciplinary consequences. Academic sanctions can range from a reduced grade for the assignment to a failing grade for the course. From a disciplinary standpoint, an Academic Misconduct Report may be filed and a Faculty Hearing Board may impose sanctions such as probation, suspension or expulsion. The Department of Mathematical Sciences rigorously enforces this policy. For further information on academic misconduct and its consequences, please consult the Student Code of Conduct (http://www.ccsu.edu/StudentConduct/codeofconduct.asp) and the Academic Misconduct Policy(http://www.ccsu.edu/AcademicIntegrity/)
5. The last day to drop this course without approval is **April 19**. Before this date, approvals for withdrawal are not required; however, it is strongly recommended that students consult with their academic advisors prior to deciding to withdraw. Cessation of attendance, notice to the instructor, or telephone calls to the Enrollment Center are not considered official notice of a student’s intention to drop the course. After **April 19**, withdrawals are allowed only under extenuating circumstances and require approval of the course instructor and of the Chair of the Department of Mathematical Sciences. Poor academic performance is not considered an extenuating circumstance.

6. **Statement on Discrimination and Harassment**

Central Connecticut State University strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment based upon age; ancestry, color; gender identity and expression; intellectual disability; learning disability; mental disorder; physical disability; marital status, national origin; race; religious creed; sex, (including pregnancy, transgender status, sexual harassment and sexual assault); sexual orientation; or any other status protected by federal or state laws. Any student who has concerns should contact the Office of Diversity and Equity (ODE) at 860-832-0178, Student Affairs at 860-832-1601, or his/her faculty member. The ODE is located on the main floor of Davidson Hall, Room 102.

7. **Sexual Misconduct, Intimate Partner Violence and Stalking**

Central Connecticut State University (CCSU) will not tolerate sexual misconduct against students, staff, faculty, or visitors in any form, including but not limited to: sexual assault, sexual exploitation, sexual harassment or stalking, as defined in CCSU policies. For additional information, please consult the CCSU policies at http://www.ccsu.edu/diversity/policies/index.html.

**To file a report, contact:** Diversity and Equity (860-832-0178); Student Affairs (860-832-1601); Student Conduct (860-832-1667); or the University Police (860-832-2375).

**For support and advocacy contact:** Office of Victim Advocacy & Violence Prevention (Diloretto Hall 305) at 860-832-3795 to speak with Joanna Flanagan (jflanagan@ccsu.edu); Student Wellness Services at 860-832-1925 (confidential), the Women’s Center at 860-832-1655, the local YWCA’s Sexual Assault Crisis Services Hotline at 860-223-1787 (confidential) and Prudence Crandall Center for Domestic Violence (confidential) at 888-774-2900 (24-hour hotline).

GOOD LUCK IN YOUR STUDIES!