

COURSE OUTLINE		
TERM: Fall 2022	COURSE NO: MATH 252	
INSTRUCTOR:	COURSE TITLE: Linear Algebra and Differential Equations	
OFFICE: LOCAL: E-MAIL: @capilanou.ca	SECTION NO(S):	CREDITS: 4.0
OFFICE HOURS:		
COURSE WEBSITE:		

Capilano University acknowledges with respect the Lil'wat, Musqueam, Squamish, Sechelt, and Tseil-Waututh people on whose territories our campuses are located.

COURSE FORMAT

4.5 hours of class time (which includes 1 hour of student activity), plus an additional hour of supplemental activity delivered through on-line or other activities for a 15 week semester, which includes two weeks for final exams.

COURSE PREREQUISITES/COREQUISITES

MATH 109 as a pre- or corequisite or MATH 126 as a pre- or corequisite

CALENDAR DESCRIPTION

An introduction to lines and planes, systems of linear equations and matrices, vector spaces and linear transformations, determinants, eigenvalues and eigenvectors, diagonalization. The theory will be applied to first order linear differential equations, first order linear systems and engineering topics.

COURSE NOTES

MATH 252 is an approved Quantitative/Analytical course for baccalaureate degrees.

MATH 252 is an approved Science course.

MATH 252 is equivalent to MATH 152 and MATH 200. Duplicate credit will not be granted for this course and either MATH 152 or MATH 200.

REQUIRED TEXTS AND/OR RESOURCES

Textbook: Poole, David. *Linear Algebra: Math 152*. Toronto: Nelson, 2018. Print. Custom edition for Capilano University based on *Linear Algebra: A Modern Introduction*, 4th edition.

Supplement: Lajeunesse, Lisa. *Linear Algebra and Differential Equations: Text Supplement for Math 152*. Department of Mathematics and Statistics, Capilano University, 2015.

Calculator:

Students must have a non-symbolic graphing calculator. The Mathematics and Statistics Department recommends a T.I.-83+ or T.I.-84+ calculator with non-symbolic capabilities. Graphing calculator instruction (in the classroom or in workshops) will only be given using one of these calculators. Any student who intends to use any other calculator must have it approved by his/her instructor at the start of the semester. The use of a calculator may be restricted on tests and exams.

RECOMMENDED COURSE SUPPLEMENTS

Student Solutions

Manual: Lajeunesse, Lisa. *Solution Booklet for Linear Algebra and Differential Equations: Text Supplement Math 152*. Department of Mathematics and Statistics, Capilano University, 2015.

COURSE STUDENT LEARNING OUTCOMES

On successful completion of this course, students will be able to do the following:

- Solve problems relating to the geometry and algebra of \mathbb{R}^n ;
- Model a variety of applications of interest to engineering using linear systems and linear systems of differential equations;
- Solve systems of linear equations, both analytically and numerically;
- Apply matrix algebra operations to matrix expressions and equations;
- State and apply definitions and theorems from linear algebra;
- Construct elementary proofs of results in linear algebra;
- Identify linear transformations and represent them as matrix transformations;
- Use matrix transformations to model geometric transformations on \mathbb{R}^2 ;
- Find the eigenvalues and eigenspaces of a square matrix;
- Use eigenvalues and eigenvectors to diagonalize matrices and to solve first- and second-order systems of differential equations;
- Use the graphing calculator appropriately as a tool in problem solving; and
- Use correct mathematical notation and terminology to present solutions and results.

COURSE CONTENT

Topics	Weeks (approx.)
Vectors and Analytic Geometry	2.0
Systems of Linear Equations	1.0
Matrix Algebra	1.0
Determinants	1.0
Linear Independence and Bases in \mathbb{R}^n	1.5
Linear Transformations	1.5
Eigenvalues and Eigenvectors	2.0
Differential Equations	2.0
Tests and Quizzes	1.0
Final Exam Period	2.0

EVALUATION PROFILE

Final grades for the course will be computed based on the following schedule:

Term Work	*55%
Final Exam	*35%
Personal Evaluation	10%
TOTAL	100%

* If the percentage achieved on the Final Exam is higher than the percentage achieved on the Term Work component, then the Final Exam weight will be increased to 55% and the Term Work will be decreased to 35%.

Term work will consist of tests, quizzes, projects and/or assignments. While the weighting of individual tests, etc. is at the discretion of the instructor, no single test will exceed 25% of the final total. The weight of the different components comprising term work will be announced in class in advance.

Specific dates and details regarding the Evaluation Component will be provided by the instructor.

PERSONAL EVALUATION

In the absence of exceptional circumstances, which are determined at the instructor's discretion, the personal evaluation component of the final grade will be pro-rated to the rest of the grade. For example, a 10% personal evaluation component would be determined by dividing the remaining mark out of 90 by 9. The most common circumstance justifying an increased personal evaluation mark is a student's improved performance in the final examination relative to the term work, which the instructor feels justifies an elevated letter grade.

SUPPLEMENTAL 4TH HOUR ACTIVITY

Each section has, in addition to the scheduled classroom time per week, a supplemental activity. This activity might be a scheduled tutorial or lab, an on-line activity, a group meeting, or some other activity as indicated by the instructor. Students are expected to participate in this additional activity. If this is not possible, students should consult their instructor to determine how this missed activity can be completed. It is in the student's best interest to ensure that any missed course activity is completed.

GRADING PROFILE

Letter grades will be assigned according to the following guidelines:

A+ 90 - 100%	B+ 77 - 79%	C+ 67 - 69%	D 50 - 59%
A 85 - 89%	B 73 - 76%	C 63 - 66%	F 0 - 49%
A- 80 - 84%	B- 70 - 72%	C- 60 - 62%	

Students should refer to the University Calendar for the effect of the above grades on grade point average.

TESTS

Dates for tests will be announced beforehand in class.

HOMEWORK

It is expected that students spend at least 8 hours per week doing course work outside of class time.

ASSIGNMENTS

Assignments are due at the beginning of class, unless otherwise announced. Late assignments may receive a grade of zero.

INCOMPLETE GRADES

Grades of Incomplete "I" are assigned only in exceptional circumstances when a student requests extra time to complete their coursework. Such agreements are made only at the request of the student, who is responsible to determine from the instructor the outstanding requirements of the course.

MISSED EXAMS/QUIZZES/LABS

A score of zero will be assigned unless the student meets all of the following conditions:

1. Circumstances clearly beyond the control of the student caused the exam, test, quiz, lab, etc. to be missed. Such circumstances include serious illness or injury, or death of close family member. They do not include forgetting about the test, lack of preparation for the test, work-related or social obligations.
2. The student has notified the instructor (or the School of STEM office staff, if the instructor is not available) that they will miss the exam, test, quiz, lab, etc. Such notification must occur in advance, if possible, or at the latest, on the day of the exam, test, quiz, lab, etc.
3. Proof of the circumstances may be required.
4. The student has been fully participating in the course up until the circumstances that prevented the writing of the exam, test, quiz, lab, etc. Fully participating means attending almost all of the classes and turning in almost all assignments in the course.

The options for making up any missed grades offered to the student who meets the four conditions are decided by the instructor. They will not necessarily meet the convenience of the student.

Make-up exams, quizzes and/or tests are given at the discretion of the instructor. They are generally given only in medical emergencies or severe personal crises. Some missed labs or other activities may not be able to be accommodated. Please consult with your instructor.

FINAL EXAM PERIOD

Students should note that the final exam period is from **date to date** (*including Saturday, date*), and that they can expect to write exams at any time during this period. Individual exam times will not normally be rescheduled because of holidays, work, or other commitments. While efforts are made to spread exams throughout the exam period, an individual's particular course combination may result in exams being scheduled close together, or spread widely through the entire exam period.

ATTENDANCE

Regular attendance is essential. If classes are missed, it is the student's responsibility to become aware of all information given out in the classes or tutorials, including times of examinations and assignment deadlines.

ENGLISH USAGE

Students are expected to use correct standard English in their written and oral assignments, exams, presentations and discussions. Failure to do so may result in reduced grades in any part of the Evaluation Profile. Please refer to the guidelines provided in the Capilano Guide to Writing Assignments (available from the University Bookstore).

MATHEMATICAL LANGUAGE

Use of proper Mathematical terminology and notation is an important component of Mathematics. Marks may be deducted for improper usage. For full details, please refer to your instructor.

MATHEMATICS LEARNING CENTRE (MLC)

Instructional help and reference texts are available to students in the Learning Commons located in the Library in LB126.

ON-LINE COMMUNICATION

Outside of the classroom, instructors will (if necessary) communicate with students using either their official Capilano University email or eLearn; please check both regularly. Official communication between Capilano University and students is delivered to students' Capilano University email addresses only.

UNIVERSITY OPERATIONAL DETAILS:**Tools for Success**

Many services are available to support student success for Capilano University students. A central navigation point for all services can be found at: <https://www.capilanou.ca/student-life/>

Capilano University Security: download the [CapU Mobile Safety App](#)

Policy Statement (S2009-06)

Capilano University has policies on Academic Appeals (including appeal of final grade), Student Conduct, Cheating and Plagiarism, Academic Probation and other educational issues. These and other policies are available on the University website.

Academic Integrity (S2017-05)

Any instance of academic dishonesty or breach of the standards of academic integrity is serious and students will be held accountable for their actions, whether acting alone or in a group. See policy S2017-05 for more information: <https://www.capilanou.ca/about-capu/governance/policies/>

Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances, are prohibited and will be handled in accordance with the Student Academic Integrity Procedures.

Academic dishonesty is any act that breaches one or more of the principles of academic integrity. Acts of academic dishonesty may include but are not limited to the following types:

Cheating: Using or providing unauthorized aids, assistance or materials while preparing or completing assessments, or when completing practical work (in clinical, practicum, or lab settings), including but not limited to the following:

- Copying or attempting to copy the work of another during an assessment;
- Communicating work to another student during an examination;
- Using unauthorized aids, notes, or electronic devices or means during an examination;
- Unauthorized possession of an assessment or answer key; and/or,
- Submitting of a substantially similar assessment by two or more students, except in the case where such submission is specifically authorized by the instructor.

Fraud: Creation or use of falsified documents.

Misuse or misrepresentation of sources: Presenting source material in such a way as to distort its original purpose or implication(s); misattributing words, ideas, etc. to someone other than the original source; misrepresenting or manipulating research findings or data; and/or suppressing aspects of findings or data in order to present conclusions in a light other than the research, taken as a whole, would support.

Plagiarism: Presenting or submitting, as one's own work, the research, words, ideas, artistic imagery, arguments, calculations, illustrations, or diagrams of another person or persons without explicit or accurate citation or credit.

Self-Plagiarism: Submitting one's own work for credit in more than one course without the permission of the instructors, or re-submitting work, in whole or in part, for which credit has already been granted.

Prohibited Conduct: The following are examples of other conduct specifically prohibited:

- Taking unauthorized possession of the work of another student (for example, intercepting and removing such work from a photocopier or printer, or collecting the graded work of another student from a stack of papers);
- Falsifying one's own and/or other students' attendance in a course;
- Impersonating or allowing the impersonation of an individual;
- Modifying a graded assessment then submitting it for re-grading; or,
- Assisting or attempting to assist another person to commit any breach of academic integrity.

Sexual Violence and Misconduct

All Members of the University Community have the right to work, teach and study in an environment that is free from all forms of sexual violence and misconduct. Policy B401 defines sexual assault as follows:

Sexual assault is any form of sexual contact that occurs without ongoing and freely given consent, including the threat of sexual contact without consent. Sexual assault can be committed by a stranger, someone known to the survivor or an intimate partner.

Safety and security at the University are a priority and any form of sexual violence and misconduct will not be tolerated or condoned. The University expects all Students and Members of the University Community to abide by all laws and University policies, including B.401 Sexual Violence and Misconduct Policy and B.401.1 Sexual Violence and Misconduct Procedure (found on Policy page <https://www.capilanou.ca/about-capu/governance/policies/>)

Emergency Procedures

Students are expected to familiarise themselves with the emergency policies where appropriate and the emergency procedures posted on the wall of the classroom.