Applied Algebra and Probability
Department of Electrical Engineering
Thunder Bay
Fall 2024

Instructor Information

Instructor:	K. Natarajan
Office Location:	AT5003
Telephone:	807-343-8010 Ext: 8657
E-mail:	knataraj@lakeheadu.ca
Office Hours:	Every Friday 10:30 am to 12:30 pm Tentative. This will be revised as needed online as per request(s) and mutual convenience.

Teaching Assistant (TA) Information: There is no TA for this course.

Course Identification

Course Number:	EELE 5011
Course Name	Applied Algebra & Probability (3-0 hours lectures - tutorials/week)
Course Location:	RB1045
Class Times:	Lec – 10 AM to 11:30 AM Tues & Thurs, Tutorials: If needed, can be organized at mutually convenient and agreed upon time.
Prerequisites:	Four Year Undergraduate Degree in Electrical or Electrical and Computer Engineering or Software Engineering or equivalent.

Course Resources

Required Course Text(s) and software resources

- No Textbook covers the topics of this course fully or the depths vary significantly to be recommended as a text. Online resources are plenty. Library has a lot of material on these topics. **Additional online or classroom meets (tutorials) (voluntary attendance) with the instructor can be arranged to facilitate the learning of this course and to answer questions etc. besides the stated office hours.** Besides **a set of typed lecture notes of the instructor posted at the D2L site**, the instructor will provide any class notes which amplify the posted material (written in class, scanned in .pdf format) at the D2L site for this course **after each class**. Attendance in lectures and tutorials is required for success in this course.

- Octave and/or wxMaxima are good computational resources and are available for download with appropriate GNU licenses. Instructor will use them in class lectures as appropriate and is necessary for the exams of the courses.

Course Schedule/Outline

Date	Tentative Topic
Weeks 1-5 (Sep 3, 2024 – Oct 4)	Topics in Groups, Rings, Fields, Vector Spaces, Linear Transformations & Matrices, Eigenvectors and Eigenvalues, Orthogonalization with some engineering applications
Week 6-10 (Oct 7 – Nov 15)	Probability, Random variables, Moments, Chernoff bounds, Markov Chains with some applications.
Weeks 11-12 (Nov 18 – Nov 29, 2024)	Some Applications of Algebra and Probability with topics from randomized algorithms/queuing theory.

Note: Fall Study break Oct. 14 – Oct. 18 - No Classes.

The above is a plan and the instructor reserves the right to adjust this schedule as needed based on class progress.

Last day to drop the course: Friday Nov 8, 2024.

Evaluations

Item	Date(s)	Value
Assignment 1	Oct 10, 2024	20%
Mid-Term Test	Oct 22, 2024	25%
Assignment 2	Nov 29, 2024	20%
Final Examination	Scheduled during exam period	35%
Total		100%

Test and Final Exam are time-bound, in class and computer aided. The question paper is individualized at random for each student. Multiple sessions may be scheduled based on class size. Please see course policy below.

The two Assignments can be done in groups of a max of 3 to 4 students (and can be done individually as well). **Instructor reserves the right to ask for an individual (each student in group) oral quiz by zoom or in person if needed on these assignments. If the quiz performance is unsatisfactory, the marks for the assignments will be downgraded significantly. Such invitation for quizzes will happen particularly if marks in assignments significantly diverge from marks in midterm and final for a student.**

Course Policy

- Attendance in lectures and tutorials is required to ensure your success for this course. The instructor is available for help but you need to ask questions in class or at tutorials and as needed in voluntary online sessions that the instructor is prepared to organize. Polite emails to instructors are fine and the instructor will try his best to answer within 24 hours.

- Group work/collaboration during studying for the course is encouraged and as indicated above, the instructor is willing to be available at reasonable mutually convenient hours to facilitate such group study on a voluntary as needed basis by prior scheduling.

- Test and exam are individual with individualized question paper and the following academic integrity statement must be followed by each student and clearly acknowledged in the question paper of test/exam submitted with student signature.

Academic Integrity Statement

I understand and agree that:

(1) Unless otherwise allowed by the course instructor by email, I have not accessed any sources or materials (in print, online, or in any other way) to complete this test/exam other than the following: For this course I was permitted to use Octave/Matlab (No Toolboxes), WxMaxima, as computational resources besides my calculator in all tests/exams and was allowed to consult instructor's notes from D2L site or my own from class, with my comments and annotations for methods etc. and Google online for additional information on spec-sheets etc. If I used any formulae or method(s) from the internet or some textbooks (online or otherwise) for solving any problem in this test/exam which were not derived in class, I have attached a logical clear derivation of the formulae/method(s) and explained its relevance to answering the question in my answer(s) for proper credit. I have also provided the Internet URL or reference(s) to the textbook(s) from where I got the formulae/method(s). I recognize the importance of doing due diligence and documenting it for any formulae or method(s) from the internet or textbook(s) in the context of being a future engineer in training.

(2) I have not sought solutions to the problems in this Question Paper (or in assignments) through Internet Sites such as chegg.com or other similar offshore or other online sites.

(3) The work reported in the answers for this test/exam is solely my own without any discussion or assistance from live online sources -- human, chats or emails.

(4) I have not shared my work by any means whatsoever with anyone else during the course of this test/exam from start time to final submission and finish time for this test/exam.

I further understand and agree that, if any violation of these rules is/are detected and/or I provide any false or misleading information about my completion of this test/exam, I may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviors that support the University's academic values.

Signed:

Print Name:

Date:

Copyright

Students should be aware that all instructional, reference, and administrative materials prepared for this course are protected in their entirety by copyright. Students are expected to comply with this copyright by only accessing and using the course materials for personal educational use related to the course, and that the materials cannot be shared in any way, without the written authorization of the course instructor. If this copyright is infringed in anyway, students may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviors that support the University's academic values.

Class Recordings

In this course, in the context of instruction and participation, if video and audio recordings of class activities are made to ensure students' and instructors' easy and comprehensive access to those activities, the recordings are confidential and are intended *__only__* for the use of the course students and instructors. They may otherwise *__not__* be used, disclosed or published. During recording, to protect others' privacy, each student should ensure that no one else is present in the location where they are being recorded without that non-student's consent. The recordings are made under the authority of Sections 3 and 14 of The Lakehead University Act, 1965.

Regulations

It is the responsibility of each student registered at Lakehead University to be familiar with, and comply with all the terms, requirements, regulations, policies and conditions in the Lakehead University Academic Calendar. This includes, but is not limited to, Academic Program Requirements, Academic Schedule of Dates, University and Faculty/School Policies and Regulations and the Fees and Refund Policies and Schedules (Lakehead University Regulations webpage, 2023-24).

Academic Integrity
A breach of Academic Integrity is a serious offence. The principle of Academic Integrity, particularly of doing one's own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle in university study. Students should view the Student Code of Conduct - Academic Integrity for a full description of academic offences, procedures when Academic Integrity breaches are suspected and sanctions for breaches of Academic Integrity.
Supports for Students – there are many resources available to support students. These include but are not limited to:

- Health and Wellness
- Student Success Centre
- Student Accessibility Centre
- Library
- Lakehead International
- Indigenous Initiatives

Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities and/or medical conditions to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please contact Student Accessibility Services (SC0003, 343-8047 or sas@lakeheadu.ca)