Toronto Metropolitan University
Faculty of Science
Department of Mathematics

Land Acknowledgement

Toronto is in the 'Dish With One Spoon Territory'. The Dish With One Spoon is a treaty between the Anishinaabe, Mississaugas and Haudenosaunee that bound them to share the territory and protect the land. Subsequent Indigenous Nations and peoples, Europeans and all newcomers have been invited into this treaty in the spirit of peace, friendship and respect.

Course Outline (Fall 2023)
MTH 312 Differential Equations and Vector Calculus

Instructor	Dr. Leul Fisseha (Sec.: 01-05) Office: VIC 703 Tel: 416-979-5000, Ext.553811 Email: lfisseha@torontomu.ca Office Hours: Mon 11-1pm Dr. Alireza Sayyidmousavi (Sec.: 06-010) Office: VIC 703 Tel: 416-979-5000, Ext.553811 Email: asayyidmousavi@torontomu@.ca Office Hours: Fri 12-1pm
Course Website	MTH 312 D2L web page. You are responsible to check D2L regularly for posted materials and administrative announcements.
Prerequisites	MTH 141 and MTH 240
Calendar Description	Second and higher order differential equations with Laplace Transforms, systems of differential equations, Fourier series and applications to electric circuits. Directional derivative. Line, surface and volume integrals. Green's theorem, Stoke's theorem and divergence theorem. Vector fields, coordinate systems.
Compulsory Textbook	*Advanced Engineering Mathematics*, 7th edition, by D. G. Zill and W. S. Wright, 2022, Jones and Bartlett Learning, ISBN-9781284206241
Course Organization	4 hours of Lecture per week for 13 weeks, 1 hour of Lab per week for 12 weeks.

Learning Objectives	At the end of the course, a successful student will be able to: 1. develop a facility with the concepts and techniques of solving Differential equations and vector calculus 2. provide a strong foundation in vector calculus in various coordinate systems as a prepararion for subsequent courses in mathematics and engineering 3. improve the students ability in analytical thinking and problem solving in their major fields.
Course Evaluation	Assignments 10 % Test I (Ch. 3.1-3.5, 4.1-4.3) 22 % Oct 06, ...(90 min) Test II(Ch. 4.4, 4.6, 3.12, 12.1-12.3) 23 % Nov 04, ...(90 min) Final exam (all topics covered) 45 % (2.5 hrs) Exam Period
Labs	Labs are in the form of tutorial; solving some of the problems from the Homework set submitted followed by a quiz on the topic covered the previous week. The homework for the next lab and the coverage for the quiz will be posted on D2L every week, in total 12. Assignments will be due **at the beginning of** your scheduled Lab section in the week of the Due Date as indicated on the Assignment. Assignments will contain a combination of textbook questions, and others. Solutions will be made available in D2L. The recommended Homework questions are not to be handed in for marking, and only some solutions/answers will be posted. Assignments must be completed individually, and the answers must be every student's own original work. You are allowed to work as teams or groups to solve the problems, and this is in fact highly encouraged. In this case, simply acknowledge your colleagues (by name) so as to avoid plagiarism issues. However, every student is required to hand in their own Assignment.
Evaluation Guidelines	• The Midterm and Final exam will be closed-book and written without calculators or any other aids. • There will be no supplimental exam. • Students are responsible for completeing all homwork in a timely fashion as the course progresses. Homeworks must be organized and legible as it may be recalled for remarking as part of the student evaluation

Evaluation Guidelines	•There is no intrinsic reason for giving a non-zero mark for an incorrect solution. Part marks (if any)are awarded entirely at the examiner's discretion. **If a test is submitted for re-marking, the whole test may be re-marked. The result may possibly be that the student receives a lower mark on any or all questions**. • Midterms written in pencil or erasable pen are ineligible for remarking. • Sharing of pencils, pens, or erasers is NOT permited and PDAs, cell phones, and pagers must be turned off and out of reach. • You must bring your TMU Photo ID to the Midterm and the Final exam. • Grades will be assigned as per the Ryerson 2016/2017 Calendar. • During any evaluation, coats, jackets and bags must be placed out of reach
Missed Evaluations	• Students are required to inform their instructors of any situation which arises during the semester which may have an adverse effect upon their academic performance, and must request any considerations and accommodations according to the relevant policies and well in advance. Failure to do so will jeopardize any academic appeals. • *Medical certificates* — If a student misses the deadline for submitting an assignment, or the date of an exam or other evaluation component because of illness, he or she must submit a Ryerson Student Medical Certificate AND an Academic Consideration form within 3 working days of the missed date. Both documents are available at www.ryerson.ca/senate/forms/medical.pdf. If you are a full-time or part-time degree student, then you submit your forms to your own program department or school. If you are a certificate or non-certificate student, then you submit your forms to the staff at the front desk of the Chang School. • *Religious observance* — If a student needs accommodation because of religious observance, he or she must submit a Request for Accommodation of Student Religious, Aboriginal and Spiritual Observance AND an Academic Consideration form within the first 2 weeks of the class or, for a final examination, within 2 weeks of the posting of the examination schedule. If the required absence occurs within the first 2 weeks of classes, or the dates are not known well in advance as they are linked to other conditions, these forms should be submitted with as much lead time as possible in advance of the required absence. Both documents are available at http://www.ryerson.ca/senate/forms/relobservforminstr.pdf. If you are a full-time or part-time degree student, then you submit the forms to your own program department or school. If you are a certificate or non-certificate student, then you submit the forms to the staff at the front desk of the Chang School. • *Students who need academic accommodation support* should register with the Academic Accommodation Support office (formerly called the Access Centre). Before the first graded work is due, registered students should inform their instructors through an "Accommodation Form for Professors" that they are registered with Academic Accommodation Support and what accommodations are required.

Course Content	**Linear Differential Equations (8 hrs): Ch. 3, Sections: 3.1-3.5)** Theory. General solution. Homogeneous linear differential equations with constant coefficients. Repeated real roots and complex roots. Non-homogeneous equations. General approach. Method of undetermined coefficients. General solution to higher order differential equations. Reduction of order.Variations of parameters. Applications to electric circuits and other applications. **The Laplace Transform (8 hrs): Ch. 4, Sections 4.1-4.4** Definition. Inverse Transforms. Transforms of Derivative. Translation Theorems. Additional Operational Properties. **System of Linear Differential Equations (4 hrs)**: (Sections: 3.12, 4.6) Solving of System of Linear Equations. System of Linear Differential Equations. **Fourier Series (4 hours)** :(Chapter 12, Sections: 12.1, 12.2, 12.3) orthogonal Functions. Fourier Series. **Vector Calculus (24 hours)**: (Chapter 9, Sections: 9.1, 9.5 - 9.16) Vectors and coordinate systems (cartesian). Differential length, area and volume. Directional derivative, gradient. Divergence. Curl. Line Integrals. Double integrals. Triple integrals. Green's theorem. Stoke's theorem. Divergence theorem. **All chapter references are to the course text.** (Not all parts of all sections will be covered. See the Recommended Homework Questions, Assignments, Labs and Lecture Notes.)
Academic Policies	*a. TMU Policies of Interest* TMU Senate Policies - http://www.torontomu.ca/senate/policies/ TMU Academic Integrity - http://www.torontomu.ca/academicintegrity/ Policy 46 - Undergraduate Grading, Promotion and Academic Standing Policy 60 - Student Code of Academic Conduct Policy 61 - Student Code of Non-academic Conduct Policy 134 - Undergraduate Academic Consideration and Appeals Policy 135 - Examination Policy Policy 150 - Accommodation of Student Religious Observance Obligations Policy 157 - Student Email Accounts for Official University Communication *b. Obligations* — Students need to inform faculty of any situation arising during the semester which may have an adverse effect upon their academic performance; they must request any necessary considerations (e.g. medical or compassionate), or accommodations [e.g. religious observance, disability (should be registered with the Access Center), etc.] according to policies and well in advance. Failure to do so will jeopardize any academic appeals. *c. Re-grading and Re-calculation* — Must be requested within 10 working days of the return of the graded assignment to the class.

Academic Conduct	http://www.torontomu.ca/academicintegrity/ In order to create an environment conducive to learning and respectful of others' rights, phones and pagers must be silenced during lectures, lab sessions and evaluations. Students should refrain from disrupting the lectures by arriving late and/or leaving the classroom before the lecture is finished.
Academic Misconduct	According to the Toronto Metropolitan policy 60 (http://www.torontomu.ca/content/dam/senate/policies/pol60.pdf), academic misconduct includes, but is not limited to: • Plagiarism which is the claiming of words, ideas, artistry, drawings or data of another person. This also includes submitting your own work in whole or in part for credit in two or more courses. • Cheating • Misrepresentation of personal identity or performance • Submission of false information • Contributing to academic misconduct • Damaging, tampering, or interfering with the scholarly environment • Unauthorized copying or use of copyrighted materials • Violations of departmental policies or professional behavior • Violations of specific departmental or course requirements *Committing academic misconduct will trigger academic penalties, including: course-grade reduction greater than a grade of "zero" (0) on course work, failing grades, suspension and possibly expulsion from the University. As a TMU student, you are responsible for familiarizing yourself with TMU conduct policies.*
Non-Academic Conduct	MTU's Student Code of Non-academic Conduct is described in Senate Policy 61: http://www.torontomu.ca/content/dam/senate/policies/pol61.pdf Among many other infractions, the code specifically refers to the following as a violation: "Disruption of Learning and Teaching - Students shall not behave in disruptive ways that obstruct the learning and teaching environment".
Changes	Any changes to, and clarifications of, the details in this course management form (such as room numbers, topics covered, tentative dates, etc.) will be announced in class.
Communication with students	Toronto Metroplitan's email policy http://www.torontomu.ca/content/dam/senate/policies/pol157.pdf states that only torontomu e-mail accounts are to be used for communication with students. All students, including continuing education students, have access to Ryerson email through their my.ryerson.ca site, and this is the official way in which they receive communication. All students are required to register for and maintain this account. **Emails sent from other accounts may not be answered!**