Course Outline

1. COURSE INFORMATION

Session Offered	Summer 2022
Course Name	Mathematics IV
Course Code	ENG TECH 2MT3
Date(s) and Time(s) of lectures	Mon 6:30 pm - 8:20 pm Tue 6:30 pm - 9:20 pm Thu 6:30 pm - 9:20 pm
Program Name	Automotive & Vehicle Engineering Technology/ Automation Engineering Technology
Calendar Description	Continuous time signals and systems; convolution; Laplace transform, Fourier series and transform; Discrete time signals and systems.
Instructor(s)	Dr. Yotka Rickard E-Mail: yotka@mcmaster.ca Office Hours: Tue, Thu 5:30 pm - 6:30 pm

2. COURSE SPECIFICS

Course Description	Continuous and discrete signals and systems; properties of systems - input/output description of a system; properties of continuous-time (CT) linear time-invariant (LTI) systems; convolution and differential equation models; system response for complex exponential inputs; Fourier series and frequency spectra; unilateral and bilateral Laplace transform; Fourier transform and frequency response of CT LTI Systems; properties of discrete–time (DT) systems, unit step and unit impulse response; interconnecting systems.

Instruction Type

Code	Type	Hours per term
C	Classroom instruction (virtual)	28
L	Laboratory, workshop or fieldwork	
T	Tutorial	25
DE	Distance education	
	Total Hours	53

Resources

ISBN	Textbook Title & Edition	Author & Publisher
0-13-350647-9, 978-0-13-350647-1	**Signals, Systems, and Transforms, 5/E**	Charles L Phillips , John Parr , Eve Riskin; Prentice Hall

Other Supplies	Source
Problem Sets/ Assignments	**Avenue to Learn,** http://avenue.mcmaster.ca

Prerequisite(s)	Registration in Level II of Automation Engineering Technology or Automotive and Vehicle Engineering Technology; ENG TECH 1MC3, 1MT3, and 2MA3
Corequisite(s)	*N/A*
Antirequisite(s)	*N/A*
Course Specific Policies	• McMaster standard calculator (*CASIO FX991MS or MS Plus*) is the only calculator allowed during Tests and Exam. The use of other Casio or other brand calculator is strictly prohibited. • **Passing the course:** In order to pass this course, you are required to obtain overall average of at least 50% including all evaluation components.

- **Attendance and Participation:** regular attendance and active participation in all class sessions are essential for success in this course.
- **Missed Work Policy:**
- **Quizzes.** All quizzes must be written in person during the scheduled time for the class. There are <u>no re-writes</u>. If you miss a quiz because of an emergency, you must contact the professor no later than the next business day and send an MSAF, otherwise you will be assigned a grade of zero for the quiz. <u>If an MSAF has been submitted, the weight of the quiz will be added to the final exam.</u>
- **Tests.** All tests are to be written in person at the times announced unless alternative arrangements have been made previously between the student and the professor to cover exceptional circumstances. Students with special needs must inform the professor through McMaster Student Accessibility Services (SAS) office of their requirements at least <u>five days prior</u> to the test date so that alternative arrangements can be made.
- If you miss a test because of an emergency, you must contact the professor no later than the next business day and you are required to submit MSAF for missing test(s); otherwise, ZERO will be assigned to the grade. <u>After receiving your MSAF, the weight of the missing test will be added to the final examination.</u> Students who fail to send MSAF will be considered "absentees" and will be assigned a grade of zero for the test.
- Make-up test will be provided for the 2nd missed (MSAF-ed) test before the examination ban week.
- Students who fail a test will <u>not be permitted to rewrite</u> the test under any circumstances.
- Table of Transforms will be provided for Term Test 2 and Final Exam.
- **Assignments.** Assignments will be submitted through Avenue as per posted due dates. <u>A submission after the deadline or by e-mail will not be considered for marking or review.</u>
- All test/assignment/quiz marks will be posted on Avenue. It is your responsibility to report any discrepancies to your instructor **before the last day of classes**. No errors will be corrected unless reported by this time.

Reviewing a test mark
- Tests may be resubmitted to the instructor for re-mark up to one week after the test grade has been uploaded. Students must submit a detailed written description of the marking problem regarding their submission. However, the instructor has the right to remark the test in its entirety.

The educational materials developed for this course, including, but not limited to, lecture notes and slides, handout materials, examinations and assignments, and any materials posted to Avenue, are the intellectual property of the course instructor. These materials have been developed for student use only and they are not intended for wider dissemination and/or communication outside of a given course. Posting or providing unauthorized audio, video, or textual material of lecture content to third-party websites violates the instructor's intellectual property rights, and the Canadian Copyright Act. Failure to follow these instructions may be in contravention of the university's Code of Student Conduct and/or Code of Academic

	Conduct, and will result in appropriate penalties. Participation in this course constitutes an agreement by all parties to abide by the relevant University Policies, and to respect the intellectual property of others during and after their association with McMaster University and Mohawk College.	
Departmental Policies	Students must maintain a GPA of 3.5/12 to continue in the program.	
	In order to achieve the required learning objectives, on average, B.Tech. students can expect to do at least 3 hours of "out-of-class" work for every scheduled hour in class. "Out-of-class" work includes reading, research, assignments and preparation for tests and examinations.	
	Where group work is indicated in the course outline, such collaborative work is mandatory.	
	The use of cell phones, iPods, laptops and other personal electronic devices are prohibited from the classroom during the class time, unless the instructor makes an explicit exception.	
	Announcements made in class or placed on Avenue are considered to have been communicated to all students including those individuals that are not in class.	
	Instructor has the right to submit work to software to identify plagiarism.	
3. SUB TOPIC(S)		
Week 1 Jun 20 - 24	• Introduction to Signals and Systems **Continuous-Time Signals and Systems** • Continuous-Time Signals and Systems • Amplitude and Time transformations • Signal characteristics • Unit step function, unit impulse function and ramp function • Common signals in Engineering • Interconnecting and feedback systems • Properties of Continuous-Time systems	Chapters 1&2
Week 2 Jun 27 - Jul 1	**Continuous-Time Linear Time-Invariant Systems** • Impulse representation of Continuous-Time Signals • Convolution of Continuous-Time Linear Time-Invariant (LTI) Systems • Properties of Convolution • Properties of Continuous-Time LTI Systems • System response for complex exponential inputs • Differential Equation Models	Chapter 3
Week 3 Jul 4 - 8	**The Laplace Transform** • Definitions of Laplace Transforms • Laplace Transforms of functions • Properties of Laplace Transforms • Inverse Laplace Transform • Response of LTI Systems • LTI Systems characteristics **Term Test 1: Test covers all the topics listed in Weeks 1 -2**	Chapter 7
Week 4	• Bilateral Laplace Transform	Chapter 7

Jul 11 - 15	• Inverse Bilateral Laplace Transform • Applications of Laplace Transform **Fourier Series and Transform** • Fourier Series Representation of Periodic Signals • Fourier Series and Frequency Spectra • Fourier Transform	Chapters 4&5
Week 5 Jul 18 - 22	• Properties of the Continuous-Time Fourier Transform • The Frequency Response of CT LTI Systems • Application of the Fourier Transform **Term Test 2: Test covers all the topics listed in Weeks 3 - 4**	Chapter 5 Chapter 6 (some parts)
Week 6 Jul 25 - 29	**Discrete-Time Signals and Systems** • Discrete Time Signals and Systems • Unit step and unit impulse functions • Time and amplitude transformations • Characteristics of Discrete-Time Systems • Common Discrete-Time signals • Interconnecting Systems • Properties of Discrete –Time Systems	Chapter 9
Week 7 Aug 1 - 5	• Review, if time permits	

Classes end: Friday, August 5
Final examination: Thursday, August 4, 6:30 pm - 9:00 pm
All examinations MUST be written during the scheduled examination time.

Note that this structure represents a plan and is subject to adjustment term by term.

The instructor and the University reserve the right to modify elements of the course during the term. The University may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes.

4. ASSESSMENT OF LEARNING *including dates*	Weight
Assignments	10%
Quizzes	10%
2 Mid-term tests (each 20%)	40%
Final examination (tests cumulative knowledge)	40%
TOTAL	**100%**

Percentage grades will be converted to letter grades and grade points per the University calendar.

5. LEARNING OUTCOMES

1.   Analyze and utilize the basic mathematical representation of continuous and discrete signals.
2. Describe the properties of a system using input/output description of a system.
3. Apply the techniques of convolution, and differential equations to analyze Linear Time-Invariant (LTI) systems.
4. Use defining equations to find the Laplace Transform of a time signal.
5. Use Laplace and Fourier representations to analyze distinct signal class frequency response of LTI systems.
6. Evaluate the FS and FT representations of time signals using the defining equations.

7. Utilize Laplace and Fourier representations across signal class boundaries to sample and reconstruct continuous-time signals.
8. Compute application solutions related to signal representation and system analysis for control systems.

6. COURSE OUTLINE – APPROVED ADVISORY STATEMENTS

ANTI-DISCRIMINATION

The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible.

http://www.mcmaster.ca/policy/General/HR/Discrimination_Harassment_Sexual_Harassment-Prevention&Response.pdf

ACADEMIC INTEGRITY

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. It is your responsibility to understand what constitutes academic dishonesty.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/

The following illustrates only three forms of academic dishonesty: The following illustrates only three forms of academic dishonesty:
- plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

AUTHENTICITY / PLAGIARISM DETECTION

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

COURSES WITH AN ON-LINE ELEMENT

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

ONLINE PROCTORING

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

COMMUNICATIONS

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their @mcmaster.ca alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.
- Check the McMaster/Avenue email and course websites on a regular basis during the term.

CONDUCT EXPECTATIONS

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the Code of Student Rights & Responsibilities (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, whether in person or online.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University's Academic Accommodation of Students with Disabilities policy.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK

McMaster Student Absence Form (MSAF): In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work".

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests. http://www.mcmaster.ca/policy/Students-AcademicStudies/Studentcode.pdf

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COPYRIGHT AND RECORDING

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, including lectures by University instructors

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

EXTREME CIRCUMSTANCES

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.