

## Course Outline

### 1. COURSE INFORMATION

<b>Session Offered</b>	Winter 2017		
<b>Course Name</b>	Mathematics IV		
<b>Course Code</b>	ENG TECH 2MT3		
<b>Date(s) and Time(s) of lectures</b>	C01	Mo We 09:30 – 11:20	T13-106
	C02	Mo We 09:30 – 11:20	T13-105
	C03	Mo 12:30 – 14:20	T13-105
		We 11:30 – 13:20	T13-105
<b>Program Name</b>	Automotive and Vehicle Technology / Process Automation Technology		
<b>Calendar Description</b>	Continuous time signals and systems; convolution; Laplace transform, Fourier series and transform; Discrete time signals and systems.		
<b>Instructor(s)</b>	Dr. Nasim Muhammad	Phone: 905-525-9140 ext: 24425 E-Mail: nasimm@mcmaster.ca Office Hours & Location: TBA, ETB B110	
	Dr. Sessa Srinivasan	Phone: (905) 525-9140 x 20293 E-Mail: ssriniv@mcmaster.ca Office Hours & Location: - TBA	

### 2. COURSE SPECIFICS

<b>Course Description</b>	This course covers the concept of continuous time signals and systems, the Laplace Transform, Fourier Series and Transform, and discrete time signals and systems.		
<b>Instruction Type</b>	<b>Code</b>	<b>Type</b>	<b>Hours per term</b>
	C	Classroom instruction	50
	L	Laboratory, workshop or fieldwork	
	T	Tutorial	
	DE	Distance education	
	<b>Total Hours</b>		50
<b>Resources</b>	<b>ISBN</b>	<b>Textbook Title &amp; Edition</b>	<b>Author &amp; Publisher</b>
	ISBN-10 0-13-350647-9, ISBN-13 978-0-13-350647-1	Signals, Systems, and Transforms, 5/E	Charles L Phillips , John Parr , Eve Riskin; Prentice Hall
	<b>Other Supplies</b>	<b>Source</b>	
<b>Prerequisite(s)</b>	ENG TECH 1MC3, 2MA3, and 1MT3		
<b>Corequisite(s)</b>	NA		
<b>Antirequisite(s)</b>	NA		
<b>Course Specific Policies</b>	<ul style="list-style-type: none"> <li>• McMaster standard calculator (CASIO FX991MS) is the only calculator allowed during Test and Exam. The use of other Casio or other brand calculator is strictly prohibited.</li> <li>• In order to pass this course, you are required to obtain               <ol style="list-style-type: none"> <li>(1) combined average of at least 50% in tests and final exam, i.e. 40/80.</li> <li>(2) and overall average of at least 50% including all evaluation components.</li> </ol> </li> <li>• <b>Missed Work Policy:</b></li> </ul>		

	<ul style="list-style-type: none"> <li>– You are required to submit MSAF for missing test(s); otherwise ZERO will be assigned to the grade.</li> <li>– The weight of the first missing test will be added to the final.</li> <li>– MSAF test will be provided for the 2<sup>nd</sup> missing test before the examination ban week.</li> <li>• All tests/assignments 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.</li> <li>• No aids other than: <ul style="list-style-type: none"> <li>▪ approved calculators (or equivalent)</li> <li>▪ Table of Transforms</li> </ul> </li> </ul>	
<b>Departmental Policies</b>	<p>Students must maintain a GPA of 3.5/12 to continue in the program.</p> <p>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.</p> <p>Where group work is indicated in the course outline, such collaborative work is mandatory.</p> <p>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.</p> <p>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.</p> <p>Instructor has the right to submit work to software to identify plagiarism.</p>	
<b>3. SUB TOPIC(S)</b>		
Week 1	<ul style="list-style-type: none"> <li>• Introduction to Signals and Systems</li> <li>• <b><u>Continuous-Time Signals and System</u></b></li> <li>• Continuous-Time Signals and Systems</li> <li>• Amplitude and Time transformations</li> <li>• Signal characteristics</li> <li>• Unit step function, unit impulse function and ramp function</li> </ul>	Chapter 1 & 2
Week 2	<ul style="list-style-type: none"> <li>• Common signals in Engineering</li> <li>• Interconnecting and feedback systems</li> <li>• Properties of Continuous-Time systems</li> </ul>	Chapter 1 & 2
Week 3	<ul style="list-style-type: none"> <li>• <b><u>Continuous-Time Linear Time-Invariant Systems</u></b></li> <li>• Impulse representation of Continuous-Time Signals</li> <li>• Convolution of Continuous-Time Linear Time-Invariant (LTI) Systems</li> <li>• Properties of Convolution</li> </ul>	Chapter 3
Week 4	<ul style="list-style-type: none"> <li>• Properties of Continuous-Time LTI Systems</li> <li>• System response for complex exponential inputs</li> </ul>	Chapter 3
Week 5	<ul style="list-style-type: none"> <li>• Differential Equation Models</li> </ul> <p style="text-align: center;"><b><i>TERM TEST 1</i></b></p>	

Week 6	<u><b>The Laplace Transform</b></u> <ul style="list-style-type: none"> <li>• Definitions of Laplace Transforms</li> <li>• Laplace Transforms of functions</li> <li>• Properties of Laplace Transforms</li> </ul>	Chapter 7
Week 7	<ul style="list-style-type: none"> <li>• Inverse Laplace Transform</li> <li>• Response of LTI Systems</li> <li>• LTI Systems characteristics</li> </ul>	Chapter 7
Mid-term Recess: Monday, February 20 to Sunday, February 26, 2017		
Week 8	<ul style="list-style-type: none"> <li>• Bilateral Laplace Transform</li> <li>• Inverse Bilateral Laplace Transform</li> <li>• Applications of Laplace Transform</li> </ul>	Chapter 7
Week 9	<u><b>Fourier Series and Transform</b></u> <ul style="list-style-type: none"> <li>• Fourier Series Representation of Periodic Signals</li> </ul> <p style="text-align: center;"><b>TERM TEST 2</b></p>	Chapter 4 & 5
Week 10	<ul style="list-style-type: none"> <li>• Fourier Series and Frequency Spectra</li> <li>• The Fourier Transform</li> </ul>	Chapter 4 & 5
Week 11	<ul style="list-style-type: none"> <li>• Properties of the Continuous-Time Fourier Transform</li> <li>• The Frequency Response of CTLTI Systems</li> <li>• Application of the Fourier Transform</li> </ul>	Chapter 5 Chapter 6 (some parts)
Week 12	<u><b>Discrete-Time Signals and Systems</b></u> <ul style="list-style-type: none"> <li>• Discrete Time Signals and Systems</li> <li>• Unit step and unit impulse functions</li> <li>• Time and amplitude transformations</li> <li>• Characteristics of Discrete-Time Systems</li> </ul>	Chapter 9
Week 13	<ul style="list-style-type: none"> <li>• Common Discrete-Time signals</li> <li>• Interconnecting Systems</li> <li>• Properties of Discrete –Time Systems</li> </ul> <p>Review (if time permits)</p>	Chapter 9
Classes end: Thursday, April 6, 2017 Final examination period: Tuesday, April 11 to Thursday, April 27, 2016 All examinations MUST be written during the scheduled examination period.		
<p>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.</p>		
<b>4. ASSESSMENT OF LEARNING *including dates*</b>		<b>Weight</b>
2 Term Tests		<b>40%</b>
Assignments		<b>20%</b>
Final Exam		<b>40%</b>
<b>TOTAL</b>		<b>100%</b>
Percentage grades will be converted to letter grades and grade points per the University calendar.		
<b>5. LEARNING OUTCOMES</b>		
1. Analyze and utilize the basic mathematical representation of continuous and discrete signals.		
2. Describe the properties of a system using input/out 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. POLICIES

### 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](http://www.mcmaster.ca/policy/General/HR/Discrimination%20Harassment%20Sexual%20Harassment-Prevention&Response.pdf)

### Academic Integrity

You are required to exhibit honestly and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

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.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, located at: <http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicIntegrity.pdf>.

The following illustrates only three forms of academic dishonesty:

1. Plagiarism. E.g. the submission of work that is not own or for which other credit has been obtained
2. Improper collaboration in group work
3. Copying or using unauthorized aids in tests and examinations.

### Requests for Relief for Missed Academic Term Work (Assignments, Mid-Terms, etc.)

The McMaster Student Absence Form is an on-line self-reporting tool for **Undergraduate Students** to report absences for:

- 1) Relief for missed academic work worth less than 25% of the final grade resulting from medical or personal situations lasting up to three calendar days:
  - Students may submit a maximum of one academic work missed request per term. It is the responsibility of the student to follow up with instructors immediately (within the 3 day period that is specified in the MSAF) regarding the nature of the accommodation. All work due in that time period however can be covered by one MSAF.
  - MSAF cannot be used to meet religious obligation or celebration of an important religious holiday, for that has already been completed or attempted or to apply for relief for any final examination or its equivalent.
- 2) For medical or personal situations lasting more than three calendar days, and/or for missed academic work worth 25% or more of the final grade, and/or for any request for relief in a term where the MSAF has not been used previously in that term:
  - Students must visit their Associate Dean's Office (Faculty Office) and provide supporting documentation.

### E-Learning Policy

Consistent with the Bachelor of Technology's policy to utilize e-learning as a complement to traditional classroom instruction, students are expected to obtain appropriate passwords and accounts to access Avenue To Learn for this course. Materials will be posted by class for student download. It is expected that students will avail themselves of these materials prior to class. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail account, and program affiliation may become apparent to all other students in the course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about this disclosure please discuss this with the course instructor. Avenue can be accessed via <http://avenue.mcmaster.ca>.

### **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.

### **Turnitin (Optional)**

This course will be using a web-based service (Turnitin.com) to reveal plagiarism. Students submit their assignment/work electronically to Turnitin.com where it is checked against the internet, published works and Turnitin's database for similar or identical work. If Turnitin finds similar or identical work that has not been properly cited, a report is sent to the instructor showing the student's work and the original source. The instructor reviews what Turnitin has found and then determines if he/she thinks there is a problem with the work. Students who do not wish to submit their work to Turnitin.com must still submit a copy to the instructor. No penalty will be assigned to a student who does not submit work to Turnitin.com. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, etc.). To see the Turnitin.com Policy, please go to

<http://www.mcmaster.ca/academicintegrity/turnitin/students/>

### **Protection of Privacy Act (FIPPA)**

The Freedom of Information and Protection of Privacy Act (FIPPA) applies to universities. Instructors should take care to protect student names, student numbers, grades and all other personal information at all times. For example, the submission and return of assignments and posting of grades must be done in a manner that ensures confidentiality.

<http://www.mcmaster.ca/univsec/fippa/fippa.cfm>

### **Academic Accommodation of Students with Disabilities Policy**

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail [sas@mcmaster.ca](mailto:sas@mcmaster.ca). For further information consult McMaster's policy for Academic Accommodation of Students with Disabilities

<http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf>

Students must forward a copy of the SAS accommodation to the instructor of each course and to the Program Administrator of the B.Tech. Program immediately upon receipt. If a student with a disability chooses NOT to take advantage of a SAS accommodation and chooses to sit for a regular exam, a petition for relief may not be filed after the examination is complete. <http://sas.mcmaster.ca>

### **Student Code of Conduct**

The Student Code of Conduct (SCC) exists to promote the safety and security of all the students in the McMaster community and to encourage respect for others, their property and the laws of the land. McMaster University is a community which values mutual respect for the rights, responsibilities, dignity and well-being of others. The purpose of the Student Code of Conduct is to outline accepted standards of behavior that are harmonious with the goals and the well-being of the University community, and to define the procedures to be followed when students fail to meet the accepted standards of behavior. All students have the responsibility to familiarize themselves with the University regulations and the conduct expected of them while studying at McMaster University.

[http://studentconduct.mcmaster.ca/student\\_code\\_of\\_conduct.html](http://studentconduct.mcmaster.ca/student_code_of_conduct.html)