Bachelor of Technology Partnership

Course Outline

1. COURSE INFORMATION

Session Offered	Fall 2017	
Course Name	Electricity & Electronics 2	
Course Code	Proc Tech 2EE3	
Date(s) and Time(s) of lectures	Tue, Thu 4:30 – 6:20	
Program Name	Process Automation Technology	
Calendar Description	This second course in electricity and electronic science will be presented through lectures and labs. The course content covers: filters and frequency response, ideal transformers, AC circuit analysis, transistor circuitry, and amplifiers.	
Instructor(s)	Lectures: Yaser M. Haddara Labs: Mehdi Alimardani Hassanain Awadh	 yaser@mcmaster.ca Office Hours & Location ITB-A223 By appointment ETB-121B alimarm@mcmaster.ca ETB-219 hawadh@mcmaster.ca

2. COURSE SPECIFICS

Course Description

Instruction Type

Code	Type	Hours per term
C	Classroom instruction	50
L	Laboratory, workshop or fieldwork	36
T	Tutorial	
DE	Distance education	
	Total Hours	86

Resources

ISBN	Textbook Title & Edition	Author & Publisher
1. 978-0-19-542524-6	Fundamentals of Electric Circuits, 7th ed.	David Bell. Oxford University Press.
2. 978-0-19-543036-3	Accompanying Lab Manual	
3. 978-0-19-542523-9	Fundamentals of Electronic Devices and Circuits, 5th ed	

Other Supplies	Source
Lab kit	Campus Store

Prerequisite(s)	Eng Tech 1EL3, 1MC3
Corequisite(s)	None
Antirequisite(s)	None

Course Specific Policies	• Only McMaster standard scientific calculators (**check the registrar's policy**) are allowed in exams • Exams are comprehensive • All tests are closed book with a formula sheet provided by the instructor • **The instructor reserves the right to choose the format of any deferred midterms or final exams (format may be written or oral)** • Communication from the instructor to all students will be either posted on Avenue as an update or emailed from Mosaic to the class list; students need to update their email address on Mosaic and to check emails regularly. In particular, this will be the way that I will communicate any emergency class cancelation or reschedule. • Communication to the instructor **must** be directed to the **yaser@mcmaster.ca** email address and **must** contain the tag [2EE3] in the subject line. Emails sent to my Avenue inbox or not containing the appropriate tag in the subject line may be ignored.
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 Sep. 5-7	**CHAPTERS 17-22** REVIEW of AC Circuit Analysis
Week 2 Sep. 12-14	**CHAPTER 24** **FILTERS AND THE BODE PLOT** 24.1 Basic Filter Types 24.2 Power Measurement in Decibels 24.3 RC Low-Pass Filters
Week 3 Sep. 19-21	24.4 RC High-Pass Filters 24.5 Filter Frequency Response Graphs 24.6 RL Low-Pass and High-Pass Filters 24.7 Bandpass Filters 24.8 Notch Filters
Week 4 Sep. 26-28	**CHAPTER 25** **TRANSFORMERS AND COUPLED CIRCUITS** 25.1 Principle of Transformer Operation 25.2 EMF Equation 25.3 Transformer on No-Load 25.4 Transformer on Load 25.5 Referred Resistance and Reactance

Week 5 Oct. 3-5	**Electronic Devices Section** **CHAPTER 1** **BASIC SEMICONDUCTOR AND PN-JUNCTION THEORY** 1.1 Atomic Theory 1.2 Conduction in Solids 1.3 Conductors, Semiconductors, and Insulators 1.4 n-Type and p-Type Semiconductors 1.5 The pn-Junction 1.6 Biased Junctions
Mid-term recess (Monday, October 9 to Sunday, October 15)	
Week 6 Oct. 17-19	**CHAPTER 14** **IC OPERATIONAL AMPLIFIERS AND BASIC OP-AMP CIRCUITS** 14.1 Integrated Circuit Operational Amplifiers 14.2 Biasing Operational Amplifiers 14.3 Voltage Follower Circuits 14.4 Non-Inverting Amplifiers 14.5 Inverting Amplifiers **CHAPTER 2** **SEMICONDUCTOR DIODES** 2.1 pn-Junction Diodes 2.2 Characteristics and Parameters **TERM TEST 1**
Week 7 Oct. 24-26	2.3 Diode Approximations 2.4 DC Load Line Analysis 2.9 Zener Diodes **CHAPTER 3** **DIODE APPLICATIONS** 3.1 Half-Wave Rectification 3.2 Full-Wave Rectification 3.4 Full-Wave Rectifier Power Supply 3.6 Power Supply Performance and Testing 3.7 Zener Diode Voltage Regulators
Week 8 Oct. 31 – Nov. 2	**CHAPTER 4** **BIPOLAR JUNCTION TRANSISTORS (BJTs)** 4.1 BJT Operation 4.2 BJT Voltages and Currents 4.3 BJT Amplification 4.4 BJT Switching 4.6 Common-Emitter Characteristics **CHAPTER 5** **BJT BIASING** 5.1 DC Load Line and Bias Point 5.2 Base Bias 5.4 Voltage-Divider Bias 5.5 Comparison of Basic Bias Circuits
Week 9 Nov. 7-9	5.6 Troubleshooting BJT Bias Circuits 5.7 Bias Circuit Design **CHAPTER 6** **AC ANALYSIS OF BJT CIRCUITS** 6.1 Coupling and Bypassing Capacitors 6.3 Transistor Models and Parameters 6.4 Common-Emitter Circuit Analysis

	6.6 Common-Collector Circuit Analysis 6.8 Comparison of CE, CC, and CB Circuits
Week 10 Nov. 14-16	**CHAPTER 9** **FIELD EFFECT TRANSISTORS** 9.1 Junction Field Effect Transistors 9.2 JFET Characteristics 9.3 JFET Data Sheets and Characteristics 9.4 JFET Amplification and Switching 9.5 MOSFETs **CHAPTER 10** **FET BIASING** 10.1 DC Load Line and Bias Point 10.4 Voltage-Divider Bias 10.10 MOSFET Biasing **TERM TEST 2**
Week 11 Nov. 21-23	**CHAPTER 11** **AC ANALYSIS OF FET CIRCUITS** 11.2 FET Models and Parameters 11.3 Common-Source Circuit Analysis 11.7 Comparison of FET and BJT Circuits
Week 12 Nov. 28-30	**REVIEW**
Week 13 Dec. 5	**REVIEW**
Classes end – Wednesday December 6, 2017 Final examination period: Wednesday December, 8, 2017 to Thursday, December 21, 2017 All examinations MUST BE written during the scheduled examination period.	
List of experiments	
Lab 1	#15: Oscilloscope (Review) #17: AC RC circuit (Review)
Lab 2	#21: Series Resonance #22: parallel Resonance
Lab 3	#23: Low Pass and High Pass Filter
Lab 4	Band Pass Filter (Instructions will be provided)
Lab 5	Single Phase Transformer (Instructions will be provided)
Mid-term recess (Monday, October 9 to Sunday, October 15)	
Lab 6	Lab Test #1
Lab 7	#25: Op-Amp Biasing and Parameters (Instructions will be provided) #26: Op-Amp Voltage followers and Non-Inverting Amplifiers (Instructions will be provided)
Lab 8	Active filters (Instructions will be provided)

Lab 9	Diode Characteristics (Instructions will be provided) Diode Rectifier Circuits (Instructions will be provided) Rectifier DC Power Supplies (Instructions will be provided)
Lab 10	BJTs (Instructions will be provided)
Lab 11	BJT Amplifiers (Instructions will be provided)
Lab 12	Lab Test #2
Week 13	Make-up labs

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*	**Points**
Weekly quiz	100
Class participation	100
Review Test (Tuesday Sept. 19)	100
2 Term Tests	200
Final Exam	200
Lab Reports	200
2 Lab Tests	200
TOTAL	**1100**

The course is graded on a basis of 1100 points. A percentage mark is calculated by dividing the total by 10, with a maximum of 100%. This builds in flexibility for the student to manage his/her learning by prioritizing activities that result in better mastery of the material.
Percentage grades will be converted to letter grades and grade points per the University calendar.

5. LEARNING OUTCOMES

1. Classify filter circuits according to their frequency response
2. Explain operation of transformer circuits and their performance parameters
3. Explain principles of operation of semiconductor devices
4. Compare characteristics and specifications of diodes, transistors, and amplifiers
5. Design filter circuits, transformer circuits, power supply regulation circuits, and transistor amplifier circuits to meet specifications and design constraints
6. Check the performance of microelectronic circuits against real world application requirements

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/Anti-Discrimination%20policy.pdf

Academic Integrity

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

Academic dishonesty is to knowingly act of 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 a self-reporting tool for **Undergraduate Students** to report absences that last up to 3 days and provides the ability to request accommodation for any missed academic work. Please note, this tool cannot be used during any final examination period.

You may submit a maximum of 1 Academic Work Missed requests per term. It is YOUR responsibility to follow up with your Instructor immediately regarding the nature of the accommodation.

If you are absent more than 3 days or exceed 1 request per term you MUST visit your Associate Dean's Office (Faculty Office). You may be required to provide supporting documentation.

This form should be filled out immediately when you are about to return to class after your absence. http://www.mcmaster.ca/msaf/

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. 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://judicialaffairs.mcmaster.ca/pdf/SCC.pdf