Bachelor of Technology Partnership

Course Outline

1. COURSE INFORMATION

Session Offered	Winter 2022	
Course Name	Power Distribution	
Course Code	ENR TECH 3PD3	
Date(s) and Time(s) of lectures	Tuesdays, 6:30pm – 9:30pm, January 10 to April 12	
Program Name	Power and Energy Engineering Technology	
Calendar Description	Principal concepts and theories of power distribution. Skills required to work at an industrial environment and/or power utilities (generation, transmission, distribution). Based on Ontario Hydro system, a power flow computer program will be introduced.	
Instructor(s)	Dr. Mohammed E. Nassar	E-Mail: nassam1@mcmaster.ca

2. COURSE SPECIFICS

Course Description

Instruction Type

Code	Type	Hours per term
C	Classroom instruction	39
L	Laboratory, workshop or fieldwork	
T	Tutorial	
DE	Distance education	
	Total Hours	39

Resources

ISBN	Textbook Title & Edition	Author & Publisher
ISBN-10: 1111425779 ISBN-13: 978-1111425777	Power System Analysis and Design, 5th edition	J. Duncan Glover, Mulukutla S. Sarma, Thomas Overbye, CENGAGE Learning

Other Supplies	Source
PSSE Operation and Application Guides	Siemens website

Prerequisite(s)	ENRTECH 3EP3, 3MI3
Corequisite(s)	
Antirequisite(s)	
Course Specific Policies	All students must have completed WHMIS 1A00 prior to participating in any labs. If WHMIS 1A00 has not been completed, please complete it online by January 15, 2021. The approved calculator for all courses in the B.Tech. Program is the CASIO FX991. The instructor reserves the right to choose the format of any deferred midterms or deferred final exams (i.e. format may be written or oral). Please note that announcements concerning any type of graded material may be in any format (e.g., announcements made only in class). Students are responsible for completing the graded material regardless of whether they received the announcement or not.

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	Course organization Characteristics of Power Grids Introduction to Ontario's Transmission Grid	Chapter 1
Week 2	Series Impedance of Transmission Lines • Line Resistance • Inductance Definition • GMR and GMD • Inductance of Three-Phase Lines • Bundled Conductors • Double Circuit Line as Bundled Conductors	Chapter 4
Week 3	Capacitance of Transmission Lines • Capacitance of a Two-Wired Line • Capacitance of a Three-Phase Line • Capacitance Calculations for Bundled Conductors	Chapter 4
Week 4	Representation of Lines • Short Line • Medium Line • Transmission Line Equivalent Circuit with Lumped Parameters	Chapter 5
Week 5	Review of Per Unit System Load Flow Analysis –Transmission systems Load Flow Analysis – Distribution systems	Chapter 6
Week 6	Introduction to Term Project Transmission Path Loading Capability	ETAP Manual
Week 7	Mid-term Recess: Monday Feb 21- to Sunday, Feb 27, 20**22**	
Week 8	Midterm Exam	

Week 9	Tap Changing Transformers • Transformer Equivalent Circuit • Off-Nominal Ratio • Parallel Operation of Power Transformers	Chapter 3
Week 10	Voltage Control a. Reactive Power Flow b. Shunt Compensation c. Series Compensation d. Transformer Tap Changing	Chapter 12
Week 11	Linear Load Flow Analysis • Formulation of Linear Load Flow Problem • Solution Methods • Accuracy of Linear Load Flow Solutions • Applications of Linear Load Flow	Chapter 6
Week 12	Transient Response of RLC Circuits	
Week 13	Course Review	

Classes end – Tuesday, April 12 2022
Final examination period: Thursday, April 14, 2022 to Monday, April 29, 2022
All examinations MUST be written during the scheduled examination period.

List of experiments	
Lab 1	
Lab 2	
Lab 3	
Lab 4	
Lab 5	
Lab 6	
Lab 7	
Lab 8	
Lab 9	
Lab 10	
Lab 11	
Lab 12	

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	**20%**
Term Project	**10%**
Midterm	**30%**
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. Identify the operating characteristics of the Ontario power grid
2. Derive modelling parameters for overhead transmission and distribution lines and underground cables
3. Perform linear load flow analysis
4. Perform large scale AC load flow analysis using PSSE
5. Perform active and reactive power control
6. Perform voltage control
7. Perform transient RLC network analysis

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

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 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. 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