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| **ELEC275**  **Principles of Electrical Engineering**  Electrical and Computer Engineering  Winter 2024 |
| **Course Instructor: John Xiupu ZHANG**  *Email: Johnxiupu.zhang@concordia.ca* |
| **Course textbook**  **Required Textbook:** *G. Rizzoni and J. Kearns,* **Principles and Applications of Electrical Engineering***, McGraw Hill, 2015, ISBN 978-0073529592 (6th edition), or 7th edition, ISBN 978-1260258042.* |
| **Classroom: LS 207** |
| **Office Hours:**  *Tuesdays, 1.30pm-3.00pm at* ***EV5.155*** |
| **Tutorials**: Please see your class schedule for details  Section JJJA at MB 3.435, Tutor: **Sh. Ghadi**, shadanngh@gmail.com  Section JJJB at ??, Tutor: **Sh. Ghadi**, shadanngh@gmail.com  During the last 15 minutes of almost every tutorial class, one problem will be set as quiz. The topic covering the problem will correspond with the material taught in the previous tutorial session(s). You will need to submit your solutions (steps on how you solved the problem) |
| **Marker**: ?? |
| **Lab Details**  The lab coordinator ([jorris.moreau@concordia.ca](mailto:jorris.moreau@concordia.ca)) will send to each student registered, before starting the semester, complete information concerning rules and operation of lab ELEC 275.  **Please contact this person for any lab issues and questions.**  **How the labs work:**  - The labs start after the DNE deadline (September 18th. 2023).  - There will be 5 lab experiments.  - There will be no lab exam.  - The lab attendance is mandatory.  - If the student come late more than 20 minutes, the student will be considered absent from his lab and will not be graded for that lab.  - Students have to submit individual lab report to the lab demonstrator (TA).  - The lab work is worth 20 % of the course grade. If the student fail the labs (i.e. score less than 60% for the lab work), the student fail the course.  - All students will receive complete lab information about lab rules, lab manual, lab report, lab schedule, etc...via their address e-mail given to Concordia University.  **Lab location:**  Students should come to the room H-832-6. |
| **Course Calendar Description**:  The course provides a survey of topics inherent to the electrical and computer engineering discipline to non-electrical engineering majors. It addresses the underlying concepts and methods behind various applications ranging from electronic to electromagnetic systems.  **6th edition**:  1. Circuit Concepts – Sections 2.1 to 2.7  2. Nodal and Mesh Analysis – Sections 3.1-3.6  3. Thévenin’s and Maximum Power Transfer Theorems – Section 3.6, 3.7  4. Inductors and Capacitors – Section 4.1  5. Complex Numbers – Appendix A  6. Sinusoidal Sources – Section 4.2  7. Phasor representation, nodal and mesh analysis – Sections 4.4.-4.6  8. Complex power and power factor – Sections 7.1-7.3  9. Transformers and impedance matching – Section 7.4  10. Three-phase circuits – Section 7.5  11. Magnetic circuits – Sections 18.1 and 18.2  12. Energy conversion – Section 18.5  13. Electric machines – Sections 19.1-19.8, 20.4 |
| **Prerequisites**: *insert here*  **Co-requisites**: *insert here*  NA |
| **Specific Knowledge and Skills Needed for this Course:**  Students taking this course are expected to have sufficient knowledge of the following topics. Should you have difficulties in any of these topics, you are strongly encouraged to review them before the DNE deadline. |
| **Grading Scheme**  Laboratory 20 %  Quizzes ( best 10 quizzes) 5 %  Mid-term examination 15 %  Final Examination 60 %  Total 100 % |
| **Tentative Course Schedule** |

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| *Date* | **Topic** | **Suggested Problems in the 6th edition** |
| Week 1  Ch. 2.1-2.7, 2.8 | Basic Circuit Concepts | 2.1-2.3, 2.7-2.9, 2.13, 2.16, 2.18, 2.21, 2.23, 2.24, 2.28, 2.31, 2.36, 2.37, 2.42, 2.48, 2.49, 2.58, 2.59, 2.61, 2.63, 2.66; |
| Week 2  Ch. 3.1-3.4 | Nodal and Mesh Analysis | 3.1 – 3.7, 3.8-3.12, 3.14, 3.16, 3.17, 3.18, 3.20, 3.22, 3.24, 3.30, 3.32, 3.40, 3.44, 3.47, 3.49, 3.50; |
| Week 3  Ch. 3.6-3.7 | Thévenin’s and Maximum Power Transfer Theorems | 3.51, 3.52, 3.53, 3.54, 3.57, 3.58, 3.73-3.75; |
| Week 4  Ch. 4.1 | Inductors and Capacitors | 4.1-4.25; |
| Week 5  Appendix A | Complex Numbers | Worksheet |
| Week 6  Ch. 4.2 | Sinusoidal Sources; | 4.27, 4.30, 4.31, 4.32, 4.33, 4.34; |
| Week 7  Ch. 4.4-4.6 | Phasor representation, impedance | 4.37-4.41, 4.42b, 4.46, 4.47, 4.48, 4.51, 4.52, 4.54-4.60, 4.63, 4.68-4.74, 4.81; |
| Week 8  Ch. 7.1-7.3 | Phasor AC analysis; Complex power and power factor | 7.1-7.21, 7.23-7.32; |
| Week 9  Ch. 7.4 | Transformers and impedance matching | 7.41-7.44, 7.46, 7.47, 7,48, 7.49, 7.52, 7.55, 7.57; |
| Week 10  Ch. 7.5 | Three-phase circuits | 7.58, 7.59, 7.61, 7.62-7.67, 7.72, 7.73; |
| Week 11  Ch. 18.1-18.2, 18.5 | Magnetic circuits, Energy conversion | 18.1, 18.9-18.17, 18.34 (read over example regarding relays) |
| Week 12  Ch. 19.1-19.8, 20. | Electric machines | 19.3-19.13 |

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| **Engineering Tools**  *Insert engineering tools introduced/utilized in the course here.*  NA |
| **Details on assessment tools:**  NA |
| **Other information**  Some lecture materials will be provided on Moodle |
| **Health and Safety Guidelines**  All health and safety rules specific to this course can be found in the lab manual. General health and safety instructions and available health and safety trainings can be found at:  [Safety Programs - Concordia University](https://www.concordia.ca/campus-life/safety/general-safety.html) (https://www.concordia.ca/campus-life/safety/general-safety.html)  **Electricity is very dangerous, always making sure of no power and then having operations.** |
| **On Campus Resources**  Please visit [Student services at Concordia University](https://www.concordia.ca/ginacody/students/services.html) for the services available Gina Cody School students. |

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| **Graduate Attributes:**  The following is the list of graduate attributes (skills) that students use, learn and/or apply throughout the course. |
| **Course Learning Outcomes (CLOs):**  By the end of this semester, students are expected to master the following engineering concepts.   1. Analyze the basic properties of a DC circuit using the nodal and mesh analysis techniques. 2. Develop the Thévenin equivalent circuit of a DC circuit and identify the maximum deliverable power to a load. 3. Understand the operation of inductors and capacitors. 4. Analyze the basic properties of an AC circuit using the nodal and mesh analysis techniques in the phasor domain. 5. Develop the Thévenin equivalent circuit of an AC circuit and identify the maximum deliverable power to a load. 6. Understand the concepts of active and reactive power in an AC circuit (and to calculate these values). 7. Analyze the behavior of an AC circuit with an ideal transformer. 8. Analyze the behavior of 3-phase balanced AC circuits. 9. Analyze the behavior of magnetic circuits and evaluate energy conversion. 10. Understand the basic properties of electric machines through their circuit models. |

Electric principle is the basic knowledge for engineering works and maintenance at home. Knowing basic electrical principle is mandatory for any persons in daily life.