TRENT UNIVERSITY

DEPARTMENT OF PHYSICS AND ASTRONOMY
TRENT UNIVERSITY

PHYS-COIS2250H: Electronics
2016FA
Peterborough

Instructor: Aaron Slepkov	**Trent Email:** aaronslepkov@trentu.ca	**Telephone:** X6216
Campus: Symons	**Office Location:** SC212	**Office Hours:** Mon: 10:00-11:00(usually) Wed: 12:00-13:00 (firm)

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Course Description:
This course is an introduction to applied electronic circuits and circuit analysis. Topics include circuit analysis theory, semiconductor devices and transistors, power-switching, operational amplifiers, wave-shaping and signal filtering, and digital logic circuitry. A strong hands-on lab component complements the lecture topics. By the end of the course, students should be comfortable with analyzing, designing, and wiring basic circuits, and have a fundamental understanding of digital computing.

Course Format:

Type	Day	Time	Location
Lecture	TUESDAY	12:00-13:50	SC 317
Lecture	THUR	15:00-15:50	
LAB	TUESDAY	9:00-11:50	

Course Pre-requisites: PHYS 1002H: Introductory Physics II
MATH 1100Y OR 1101Y: Calculus I

Course Fees: $10 for printed course notes and lab manuals. These will be available for pickup in the first 2 lectures. Electronic copies will be freely available on blackboard.

Required Texts:

There is no required textbook for this course. Students are required to read the supplied course notes and are strongly encouraged to supplement their readings in any standard electronics textbook or online materials such as:

- Circuits, Devices and Systems, 5th ed, Smith and Dorf.
- Wikipedia
- An Introduction to Modern Electronics, William Faissler
- Introduction to Electronic Circuits, 9th ed, Svoboda and Dorf

Ordering of Topics:

1. Review of electricity
2. DC circuit theory
3. Measuring instruments
4. Capacitors and inductors
5. Network theorems
6. Operational amplifiers (op-amps)
7. Semiconductors and p-n junctions
8. Diodes and wave-shaping
9. Transistors
10. Power Control
11. Transducers and servo-controllers
12. Digital electronics, binary, logic
13. AC circuits and complex impendence
14. DC Power supplies and voltage regulators
15. Oscillators

Learning System/Blackboard:

We will use the online course management system (blackboard) for this course. For class notes, additional texts, and class resources: https://learn.trentu.ca/.

Learning Outcomes/Objectives/Goals/Expectations: See end of document

Course Evaluation:

Problem Sets	20%	(Approx. 4-5 problem sets, due bi-weekly)
Lab participation & reports	20%	(7 labs are scheduled, approx. weekly)
Lecture Quizzes	10%	(~8 15-minute in-class quizzes on pre-lecture readings)
Midterm Exam	15%	(Tuesday, Nov. 1, 2016; 2-H in class)
Lab Exam	10%	(Dec. 6; Scheduled for lab period)
Final Exam:	25%	(exam period; April 9-22, 2012)

By the class drop-date of November 8, 2016, it is expected that you will know approximately 25% of your final grade. This includes the results of a Midterm exam, 2-3 quizzes, and 2-3 Labs.

Missed Quizzes: There will be a pop-quiz at the start of several of the 2-H Tuesday lectures. These short quizzes will be based on pre-lecture readings and on the content of the previous lectures. No opportunity will be available to make-up missed quizzes. To allow for occasional unavoidable absences, the lowest quiz mark will be dropped for each student.

Late Problem Sets: The due date and time are specified in the header of each problem set. Most sets will be due at the 15:00 start of a Thursday lecture. Late assignments will be accepted at the

start of the following lecture with a penalty of 25 percentage points. No assignments will be accepted after this time. All extensions must be authorized by the instructor at least 3 days before the assigned due date.

Department and/or Course Policies:
Students are encouraged to work together to complete problem sets, and students will be working together during laboratory time. However, it is essential that each student hands in their own work for the problem sets and every student is individually responsible for knowing the course material. Regardless of the overall grade calculated according to the above mark-breakdown, an average of **AT LEAST 40%, weighted accordingly, on the midterm and final examination must be obtained** in order to pass the course. Otherwise, a maximum grade of 45% (i.e. an F) will be assigned.

University Policies

Academic Integrity:
Academic dishonesty, which includes plagiarism and cheating, is an extremely serious academic offence and carries penalties varying from failure on an assignment to expulsion from the University. Definitions, penalties, and procedures for dealing with plagiarism and cheating are set out in Trent University's *Academic Integrity Policy*. You have a responsibility to educate yourself – unfamiliarity with the policy is not an excuse. You are strongly encouraged to visit Trent's Academic Integrity website to learn more: www.trentu.ca/academicintegrity.

Access to Instruction:
It is Trent University's intent to create an inclusive learning environment. If a student has a disability and documentation from a regulated health care practitioner and feels that he/she may need accommodations to succeed in a course, the student should contact the Student Accessibility Services Office (SAS) at the respective campus as soon as possible, (Peterborough, Blackburn Hall, Suite 132, 705-748-1281 or email sas@trentu.ca
For Trent University – Durham, Thornton Road, Room 111 contact 905-435-5102 ext. 5024 or email corinnphillips@trentu.ca Complete text can be found under Access to Instruction in the Academic Calendar.

STUDENT LEARNING GOALS

By the completion of the course, successful students should be able to…

1. Identify various circuit components such as resistors, capacitors, inductors, diodes, op-amps, voltage and current sources and transistors in standard circuit diagrams.
2. Utilize and explain the roles of current, voltage, and resistance in Ohm's Law.
3. Describe the basic theory behind semiconductor p-n junction devices such as transistors.
4. Analyze the use of transistors as power-switching devices
5. Analyze linear circuits using Thévenin, Norton, and mesh analysis theorems
6. Conduct nodal analysis for nonlinear circuit analysis
7. Create truth-tables for logic gates and basic digital circuits.
8. Use truth-tables to generate logical algebra expressions and utilize digital logic algebra (i.e. DeMorgan's theorems) to establish digital computations.
9. Use complex representation to analyze AC circuit response for circuits containing complex-impedance elements such as inductors and capacitors.