



National Taiwan University of Science and Technology

2021 Summer Program

ELEC 210 Electric Circuit Analysis

Course Outline

Course Code: ELEC 210

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Home Institution: Queen's University

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Credit: 4

Course Description:

The basic principles for analyzing and characterizing DC and AC circuits will be explored. Models for passive circuit elements will be employed in order to analyze the transient response and steady state response of first-order circuits. Phasor notation will be introduced, and power and energy transfer will be investigated.

Required Textbooks:

Neil Storey, "Electronics: A Systems Approach", 6th Ed., 2017 (note: the 5th or 4th editions are also fine).

Grading & Evaluation:

Homework Assignments: 20%

Laboratory Work: 30%

Midterm Exam: 20%

Final Exam: 30%

There will be one homework assignment due at the start of class every Tuesday and Thursday. Each assignment will take you about ninety minutes to complete. Your two lowest homework marks will be dropped in calculating your final grade.

Each lecture topic will have a corresponding problem-solving session.

Each student is required to purchase a laboratory kit. The components list is included below as



Appendix A.

Course work throughout the session will be assessed using percentage grades, but the final course grade will be converted to a letter grade according to the following scale: A (94%-100%), A- (90%-93%), B+ (87%-89%), B (84%-86%), B- (80%-83%), C+ (77%-79%), C (74%-76%), C- (70%-73%), D (60%-69%), and F (59% and below). Note: most colleges and universities do not award transfer credit for grades of D or F.

Attendance: Attendance at every class session is mandatory.

Course Schedule:

Week 1:

Topic 1: Basic concepts, sources and loads; Ohm's Law

Topic 2: Thévenin's theorem, Norton's theorem, and source transformations

Topic 3: Kirchhoff's Laws

Lab 1: Basic electrical measurements

Week 2:

Topic 4: Principle of superposition

Topic 5: Maximum power transfer theorem

Topic 6: Capacitance and inductance

Topic 7: Transient response

Lab 2: Temperature measurement

Week 3:

Topic 8: Diodes

Midterm Examination

Topic 9: AC circuit analysis

Lab 3: I-V characteristics of diodes

Week 4:

Topic 10: Amplitude, RMS, and phasors

Topic 11: Power (real, apparent and complex), and power factor

Topic 12: Filters

Lab 4: Light intensity monitor

Final Examination



Appendix A – Laboratory Kit Component List

All students require an electronics kit consisting of at least the following components:

Required:

- 1 x Arduino Uno R3 board
- 1 x USB cable type A/B
- 1 x solderless breadboard (min 400 tie points)
- 1 x 40 pin male-male jumper wires (20cm in length)
- 1 x 40 pin male-male jumper wires (10cm in length)
- 15 x 5mm LEDs (5 each: red, amber, green)
- 5 x 1N4007 diodes
- 100 x resistors (10 each: 100 Ω , 220 Ω , 330 Ω , 1k Ω , 2k Ω , 5k Ω , 10k Ω , 20k Ω , 100k Ω , 1M Ω)
- 6 x potentiometers (2 each: 10k Ω , 50k Ω , 100k Ω)
- 2 x thermistor NTC-103 (10k Ω)
- 2 x photoresistor (LDR) (CdS 161, 200k Ω dark resistance)
- 5 x SPST pushbutton switches
- 35 ceramic capacitors (5 each: 22pF, 0.01 μ F, 0.033 μ F, 0.047 μ F, 0.1 μ F, 0.33 μ F, 0.47 μ F)
- 8 capacitors (4 each: 10 μ F, 100 μ F) 50V

Optional:

- 5 x BC547 npn transistors
- 5 x BC557 pnp transistors
- 2 x LM555
- 2 x LF411 OpAmps
- 1 x Phototransistor (OP506A)