UNIVERSITY OF THE FRASER VALLEY

**ORIGINAL COURSE IMPLEMENTATION DATE:** September 2014
**REVISED COURSE IMPLEMENTATION DATE:** September 2018
**COURSE TO BE REVIEWED: (six years after UEC approval)** March 2024
**Course outline form version: 09/15/14**

# OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

**Note: The University reserves the right to amend course outlines as needed without notice.**

| | |
|---|---|
| **Course Code and Number:** ENGR 210 | **Number of Credits:** 4 Course credit policy (105) |
| **Course Full Title:** Circuit Analysis<br>**Course Short Title (if title exceeds 30 characters):** | |
| **Faculty:** Faculty of Science | **Department (or program if no department):** PHYSICS |

**Calendar Description:**

Introduces mathematical models used to represent a variety of engineering problems (such as the solution of physical electric and electronic circuits). In particular, students will learn about network theorems, phasors, AC circuits, resonance, transformers, and three-phase circuits.

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| **Prerequisites (or NONE):** | PHYS 112. |
| **Corequisites (if applicable, or NONE):** | |
| **Pre/corequisites (if applicable, or NONE):** | PHYS 221. |

**Equivalent Courses (cannot be taken for additional credit)**
Former course code/number:
Cross-listed with:
Equivalent course(s):
*Note: Equivalent course(s) should be included in the calendar description by way of a note that students with credit for the equivalent course(s) cannot take this course for further credit.*

**Transfer Credit**
Transfer credit already exists: ☐ Yes ☒ No
Transfer credit requested (OReg to submit to BCCAT):
☒ Yes ☐ No (if yes, fill in transfer credit form)
Resubmit revised outline for articulation: ☒ Yes ☐ No
To find out how this course transfers, see **bctransferguide.ca**.

**Total Hours: 75**
**Typical structure of instructional hours:**

| | |
|---|---|
| Lecture hours | 57 |
| Seminars/tutorials/workshops | |
| Laboratory hours | 18 |
| Field experience hours | |
| Experiential (practicum, internship, etc.) | |
| Online learning activities | |
| Other contact hours: | |
| **Total** | **75** |

**Special Topics**
Will the course be offered with different topics?
☐ Yes ☒ No
If yes, different lettered courses may be taken for credit:
☐ No ☐ Yes, repeat(s) ☐ Yes, no limit
*Note: The specific topic will be recorded when offered.*

**Maximum enrolment (for information only):** 18

**Expected frequency of course offerings (every semester, annually, every other year, etc.):** Annually

| | | |
|---|---|---|
| **Department / Program Head or Director:** Jeff Chizma | **Date approved:** | November 17, 2017 |
| **Faculty Council approval** | **Date approved:** | December 1, 2017 |
| **Campus-Wide Consultation (CWC)** | **Date of posting:** | February 9, 2018 |
| **Dean/Associate VP:** Lucy Lee (Greg Schlitt) | **Date approved:** | December 1, 2017 |
| **Undergraduate Education Committee (UEC) approval** | **Date of meeting:** | March 23, 2018 |

**Learning Outcomes**

Upon successful completion of this course, students will be able to:

- Describe key circuit elements including resistors, capacitors, inductors, transformers, dependent and independent power sources.
- State the fundamental laws (Kirchhoff's Laws) and theorems (Thevenin/Helmholtz's and Norton/Helmholtz's equivalences) needed for circuit design and analysis.
- Analyze electrical circuits containing a variety of circuit elements using the basic laws, theorems, and techniques.
- Use computer software Matlab to solve DC and AC circuit equations.
- Calculate both steady state and transient responses in 1st and 2nd order circuits.
- Analyze single and three phase AC circuits, including AC power.
- Compare the theoretical results with measurements.

**Prior Learning Assessment and Recognition (PLAR)**

☒ Yes ☐ No, PLAR cannot be awarded for this course because

**Typical Instructional Methods (guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion)**

Lectures.

**Grading system:** Letter Grades: ☒ Credit/No Credit: ☐ Labs to be scheduled independent of lecture hours: Yes ☐ No ☐

**NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.**

**Typical Text(s) and Resource Materials (if more space is required, download Supplemental Texts and Resource Materials form)**

| | Author (surname, initials) | Title (article, book, journal, etc.) | Current ed. | Publisher | Year |
|---|---|---|---|---|---|
| **1.** | J. W. Nilsson and S. A. Riedel | Electric Circuits (E10) | ☒ | Pearson | 2014 |
| **2.** | | | ☐ | | |
| **3.** | | | ☐ | | |
| **4.** | | | ☐ | | |
| **5.** | | | ☐ | | |

**Required Additional Supplies and Materials (software, hardware, tools, specialized clothing, etc.)**

None.

**Typical Evaluation Methods and Weighting**

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|---|---|---|---|---|---|---|---|
| Final exam: | 45% | Assignments: | 15% | Midterm exam: | 25% | Practicum: | % |
| Quizzes/tests: | % | Lab work: | 15% | Field experience: | % | Shop work: | % |
| Other: | % | Other: | % | Other: | % | Total: | 100% |

**Details (if necessary):**

**Typical Course Content and Topics**

- Basic circuit variables, simple resistive circuits
- Techniques of circuit analysis (nodal analysis, mesh analysis, source transformation, superposition, Thevenin and Norton theorem)
- Inductance, capacitance, and mutual inductance
- Response of first-order RL and RC circuits
- Natural and step responses of RLC circuits
- Sinusoidal steady-state analysis (phasors, nodal analysis, mesh analysis, source transformation, Thevenin and Norton theorem)
- Basic concepts and performance characteristics of transformers
- Sinusoidal steady-state power calculations
- Balanced power three-phase circuits