Description:
This is the sequel course in Electric Circuits intended to extend the concepts of direct current (DC) circuits in ECE 2205A/B to alternating current (AC) circuits. The course will introduce several advanced circuit analysis tools using Laplace and Fourier techniques. Also, the concept of circuit as a system is introduced in both time and frequency domains.

Instructor:
Dr. Pirathayini Srikantha, P.Eng.
TEB-257, 519-661-2111x84460, psrikan@uwo.ca

Contact Hours:
3 lecture hours/week, 1 tutorial hour/week, 0.5 course
Lectures: Mondays: 7.00 p.m. to 10.00 p.m., Room# SEB-1200
Tutorial: Alternate Wednesdays: 3.30 to 5.30 PM, Room# SEB-2202
Labs: Room # SEB-3107
    Sections 003 and 004: Mondays, 9.30 p.m. to 12.30 p.m.
    Sections 005: Mondays, 3.30 p.m. to 6.30 p.m.

Consultation hours:
Wednesdays: 2.00 p.m. to 3.00 p.m. in TEB-257
The instructor will also be available for additional consultation by appointment via e-mail. All e-mail correspondence to instructor should bear the subject title ECE 2233. Allow at least two working days for a response.

Academic Calendar Copy:
Introduction to a system level analysis of electrical circuits. The S-Plane and frequency response of circuits, frequency selective circuits, state variables, introduction to Fourier analysis, Fourier transform and Laplace transform techniques. Transfer functions and system functions.

Antirequisite(S): MSE 2233A/B.

Prerequisites: Applied Mathematics 2270A/B, ECE 2205A/B

Co-requisite: Applied Mathematics 2276A/B, ECE 2236A/B.
Unless you have either the requisites for this course or written special permission from your Dean to enrol in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from the course for failing to have the necessary prerequisites.

CEAB Academic Units: Engineering Science 100%.

Textbook:
General Learning Objectives (CEAB Graduate Attributes)

<table>
<thead>
<tr>
<th>Knowledge Base</th>
<th>Use of Engineering Tools</th>
<th>Impact on Society and the Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Analysis</td>
<td>Individual and Team Work</td>
<td>Ethics and Equity</td>
</tr>
<tr>
<td>Investigation</td>
<td></td>
<td>Economics and Project Management</td>
</tr>
<tr>
<td>Design</td>
<td>Professionalism</td>
<td>Life-Long Learning</td>
</tr>
</tbody>
</table>

Notation: \( x/y \), where \( x \) is the cognitive level (1: Remember, 2: Understand, 3: Apply) at which the attribute is assessed and \( y \) is the academic level (1: Beginner, 2: Intermediate, 3: Advanced) at which the attribute is assessed.

Topics and Specific Learning Objectives

1. **Phasor Representations of AC Circuits:**
   At the end of this section, students will be able to solve steady-state AC circuits using phasor representations for current and voltage.

2. **Steady-State Power Analysis in AC Circuits:**
   At the end of this section, students will be able to calculate different types of power in AC circuits.

3. **Frequency Response and Resonance of a Circuit:**
   At the end of this section, students will be able to analyze circuits as function of frequency and understand the concept of resonance phenomenon in circuits.

4. **Transfer Functions of Circuits:**
   At the end of this section, students will be able to represent circuits in terms of input-output characteristics or transfer functions.

5. **Laplace Transform in Circuit Analysis:**
   At the end of this section, students will be able to analyze circuits using Laplace techniques and specify circuits in time- and frequency-domains.

6. **Fourier Analysis Techniques and Parseval's Theorem in AC Circuit Analysis:**
   At the end of this section, students will be able to apply Fourier techniques to determine the frequency response of AC circuits and understand how to calculate power as a function of frequency.

7. **Two-Port Network Analysis:**
   At the end of this section, students will be able to characterize circuits as a two-port network and determine equivalent network of interconnected circuits.

**Evaluation:**

<table>
<thead>
<tr>
<th>Course Component</th>
<th>Weight</th>
<th>Penalty (English)</th>
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<tbody>
<tr>
<td>Assignments (4)+Laboratory Exercises (4)</td>
<td>30%</td>
<td>10%</td>
</tr>
<tr>
<td>Midterm Test (2 hours)</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Final Examination (3 hours)</td>
<td>50%</td>
<td>10%</td>
</tr>
</tbody>
</table>

To obtain a passing grade in the course, a mark of 50% or more must be achieved on the midterm and final examination and an overall mark of 50%. A final examination or midterm test mark < 50% will result in a final course grade of 48% or less.
In accordance to the policy of the University, the grade assigned to all written and oral work presented in English shall take into account syntax, diction, grammar and spelling. In the professional life of an engineer, the manner in which oral and written communications are presented is extremely important. An engineering student must develop these skills as an integral part of the undergraduate program. To encourage the student to do so, the grades assigned to all written and oral work will take into account all aspects of presentation including conciseness, organization, neatness, use of headings, and the preparation and use of tables and figures and correctness of final answers in solutions. All work will be marked first for content after which a penalty not to exceed the maximum shown above would be applied.

**Homework Assignments:**
A maximum of 4 homework assignments will be administered during the course. Assignments would be posted on the course website. Assignment schedule is as follows:

<table>
<thead>
<tr>
<th>Assignment Release Date</th>
<th>Assignment Submission Date</th>
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</thead>
<tbody>
<tr>
<td>January 21, 2018</td>
<td>February 4, 2018</td>
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<tr>
<td>February 4, 2018</td>
<td>February 25, 2018</td>
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<tr>
<td>February 25, 2018</td>
<td>March 11, 2018</td>
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<tr>
<td>March 11, 2018</td>
<td>March 25, 2018</td>
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</tbody>
</table>

Solutions to all homework assignments must be submitted in the locker assigned to the course. The first page of submission, must clearly indicate assignment #, name of student, and student ID.

**Labs:**
There will be 3 pre-labs (mandatory for ECE students) and 4 labs in total (mandatory for ECE and MSE students).

**Midterm Test:**
Date/Time: Monday the March 4th (tentative), 2018/5.30 p.m. to 7.30 p.m.
Duration: 2 hours
Format: Closed Book (only a non-programmable calculator is permitted)
Location: TBD

**Final Examination:**
Date and Time: TBA (will take place during the regular examination period)
Duration: 3 Hours
Format: Closed Book (only a non-programmable calculator is permitted)
Location: TBD

**Late Submission Policy:**
All submissions are due by 4.30 PM on due dates. Late submissions will be penalized 25% per day and the maximum penalty is 100%.

**Assignment Submission Locker:**
Locker # TBD located on the second floor of TEB.

**Use of English:** In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for improper use of English. Additionally, poorly written work with the exception of the final examination may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.
**Attendance:** Any student who, in the opinion of the instructor, is absent too frequently from class, laboratory, or tutorial periods will be reported to the Dean (after due warning has been given). On the recommendation of the department, and with the permission of the Dean, the student will be debarred from taking the regular final examination in the course.

**Absence Due to Illness or Other Circumstances:** Students should immediately consult with the instructor or department Chair if they have any problems that could affect their performance in the course. Where appropriate, the problems should be documented (see the attached “Instructions for Students Unable to Write Tests or Examinations or Submit Assignments as Scheduled”). The student should seek advice from the instructor or department Chair regarding how best to deal with the problem. Failure to notify the instructor or department Chair immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

For more information concerning medical accommodations, see the relevant section of the Academic Handbook:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf

For more information concerning accommodations for religious holidays, see the relevant section of the Academic Handbook:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

**Missed Midterm Examinations:** If a student misses a midterm examination, the exam will not be rescheduled. The student must follow the Instructions for Students Unable to Write Tests and provide documentation to their department within 24 hours of the missed test. The department will decide whether to allow the re-weighting of the test, where re-weighting means the marks normally allotted for the midterm will be added to the final exam. If no reasonable justification for missing the test can be found, then the student will receive a mark of zero for the test.

If a student is going to miss the midterm examination for religious reasons, they must inform the instructor in writing within 48 hours of the announcement of the exam date or they will be required to write the exam.

**Cheating and Plagiarism:** Students must write their essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. University policy states that cheating, including plagiarism, is a scholastic offence. The commitment of a scholastic offence is attended by academic penalties, which might include expulsion from the program. If you are caught cheating, there will be no second warning.

All required papers may be subject to submission for textual similarity review to commercial plagiarism-detection software under license to the University for the detection of plagiarism. All papers submitted will be included as source documents on the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between the University of Western Ontario and Turnitin.com (http://www.turnitin.com).

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, in the relevant section of the Academic Handbook:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

**Use of Electronic Devices:** Use of a large memory programmable calculator, e.g. HP48, is permitted in any test or examination.
Policy on Repeating All Components of a Course: Students who are required to repeat an Engineering course must repeat all components of the course. No special permissions will be granted enabling a student to retain laboratory, assignment, or test marks from previous years. Previously completed assignments and laboratories cannot be resubmitted by the student for grading in subsequent years.

Internet and Electronic Mail: Students are responsible for regularly checking their Western e-mail and the course web site (https://owl.uwo.ca/portal/) and making themselves aware of any information that is posted about the course.

Accessibility: Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 519-661-2111 ext. 82147 for any specific question regarding an accommodation.

Support Services:
Student Development Centre, http://www.sdc.uwo.ca/
Engineering Undergraduate Services, http://www.eng.uwo.ca/undergraduate/
USC Student Support Services, http://westernusc.ca/services/

Students who are in emotional/mental distress should refer to Mental Health @ Western, http://www.health.uwo.ca/mental_health/, for a complete list of options about how to obtain help.