



Course Outline

Course Name: AC Circuits (TECH 156)

Academic Period: 2022 - 2023

Faculty:

Faculty Availability:

Associate Dean:

Shaun Ghafari

shaun.ghafari@humber.ca

Schedule Type Code:

Land Acknowledgement

Humber College is located within the traditional and treaty lands of the Mississaugas of the Credit. Known as Adoobiigok [A-doe-bee-goke], the "Place of the Alders" in Michi Saagiig [Mi-Chee Saw-Geeg] language, the region is uniquely situated along Humber River Watershed, which historically provided an integral connection for Anishinaabe [Ah-nish-nah-bay], Haudenosaunee [Hoeden-no-shownee], and Wendat [Wine-Dot] peoples between the Ontario Lakeshore and the Lake Simcoe/Georgian Bay regions. Now home to people of numerous nations, Adoobiigok continues to provide a vital source of interconnection for all.

Equity, Diversity and Inclusion Statement

Humber College and the University of Guelph-Humber (Humber) are leaders in providing a learning, working and living environment that recognizes and values equity, diversity and inclusion in all its programs and services. Humber commits to reflect the diversity of the communities the College serves. Students, faculty, support and administrative staff feel a sense of belonging and have opportunities to be their authentic selves.

Faculty or Department	Faculty of Applied Sciences & Technology
Course Name:	AC Circuits (TECH 156)
Pre-Requisites	none
Co-Requisites	none
Equates	none
Restrictions	none
Credit Value	6
Total Course Hours	84

Developed By:

Prepared By:

Approved by:

Shaun Ghafari

A handwritten signature in black ink, appearing to read 'S. Ghafari'.

Humber Learning Outcomes (HLOs) in this course.

The HLOs are a cross-institutional learning outcomes strategy aimed at equipping Humber graduates with the employability skills, mindsets, and values they need to succeed in the future of work. To explore all the HLOs, please consult the [Humber Learning Outcomes framework](#).

Course Description

N/A

Course Rationale

This second-semester course is about alternating currents passing through circuits that consist of passive components, such as resistors, inductors and capacitors. These components have already been studied in the pre-requisite course in simpler circumstances, as in direct-current circuits. Studying them in AC circuits gives the students the thrust they need to handle a host of courses in Electrical and Electronic engineering technology, ranging from radio-frequency circuits to power distribution circuits.

Course Learning Method(s)

- Problem Based Learning (PBL)
- Lecture

Learning Outcomes

- Determine the various voltage and current values of a sine wave by calculating the sine waveform characteristics and using phasor diagrams.
- Describe the characteristics of key circuit elements such as resistors, capacitors, inductors in AC circuits and DC switching circuits by analyzing their time responses.
- Describe the characteristics of series and parallel RC, RL, and RLC AC circuits by considering the impedance or admittance, and the relationship between current and voltage
- Describe the concept of resonance in RLC circuits by introducing the properties, applications, and relevant calculations.
- Define the concept and types of passive filters by introducing the properties, applications, frequency responses, and relevant calculations.
- Employ the network theorems to analysis of AC circuits with reactive components.
- Analyze single-phase transformers by describing their principle of operation, different types, and applications.
- Calculate power in AC circuits to determine the power and energy delivered by the source and stored by the reactive components.
- Apply circuit analysis methods to determine the unknown quantities, currents and voltages, in a circuit.

Assessment Weighting

Assessment	Weight
Final Exam	
Test 2	30%
Midterm Exam	
Test 1	20%
Demonstration	
Lab Assignments - in process evaluation	30%
Quiz	

Assessment	Weight
Quizzes	20%
Total	100%

Modules of Study

Module	Course Learning Outcomes	Resources	Assessments
Introduction to Alternating Current and Voltages	<ul style="list-style-type: none"> Determine the various voltage and current values of a sine wave by calculating the sine waveform characteristics and using phasor diagrams. 	Textbook (Chapter 11)	<ul style="list-style-type: none"> Quizzes Lab Assignments - in process evaluation Test 1
Capacitors and Inductors in AC Circuits	<ul style="list-style-type: none"> Describe the characteristics of key circuit elements such as resistors, capacitors, inductors in AC circuits and DC switching circuits by analyzing their time responses. 	Textbook (Chapters 12 & 13)	<ul style="list-style-type: none"> Quizzes Lab Assignments - in process evaluation Test 1
RC, RL, and RLC AC Circuits	<ul style="list-style-type: none"> Describe the characteristics of series and parallel RC, RL, and RLC AC circuits by considering the impedance or admittance, and the relationship between current and voltage 	Textbook (Chapters 15, 16 & 17)	<ul style="list-style-type: none"> Quizzes Lab Assignments - in process evaluation Test 1
Circuit Theorems in AC Analysis	<ul style="list-style-type: none"> Employ the network theorems to analysis of AC circuits with reactive components. 	Textbook (Chapter 19)	<ul style="list-style-type: none"> Quizzes Lab Assignments - in process evaluation Test 2
Branch, Loop, and Node Analysis	<ul style="list-style-type: none"> Apply circuit analysis methods to determine the unknown quantities, currents and voltages, in a circuit. 	Textbook (Chapter 9)	<ul style="list-style-type: none"> Quizzes Lab Assignments - in process evaluation Test 2
Power Analysis in AC Circuits	<ul style="list-style-type: none"> Calculate power in AC circuits to determine the power and energy delivered by the source and stored by the reactive components. 	Textbook (Chapters 12, 13, 15 & 16)	<ul style="list-style-type: none"> Quizzes Lab Assignments - in process evaluation Test 2

Module	Course Learning Outcomes	Resources	Assessments
Resonance in RLC Circuits	<ul style="list-style-type: none"> Describe the concept of resonance in RLC circuits by introducing the properties, applications, and relevant calculations. 	Textbook (Chapter 17)	<ul style="list-style-type: none"> Quizzes Lab Assignments - in process evaluation Test 2
Passive Filters	<ul style="list-style-type: none"> Define the concept and types of passive filters by introducing the properties, applications, frequency responses, and relevant calculations. 	Textbook (Chapter 18)	<ul style="list-style-type: none"> Quizzes Lab Assignments - in process evaluation Test 2
Transformers	<ul style="list-style-type: none"> Analyze single-phase transformers by describing their principle of operation, different types, and applications. 	Textbook (Chapter 14)	<ul style="list-style-type: none"> Quizzes Lab Assignments - in process evaluation Test 2

Required Resources

Textbook: Floyd, T.L., Buchla, D.M. (2020). <i>Principles of Electric Circuits: Conventional Current</i> (10th Ed.). Pearson.
Lab book: Buchla, D.M. (2020). <i>Experiments in Basic Circuits: Theory and Application</i> (10th Ed.). Pearson.

Supplemental Resources

Textbook and Lab Manual: Jackson, H.W., Temple, D., Kelly, B., Craigs, K., Fuentes, L. (2019). <i>Introduction to Electric Circuits</i> . (10th Edition) Oxford University Press.

Additional Tools and Equipment

- Scientific Calculator
- Electronics Parts Kit – mandatory for all students

Essential Skills

Section	Skills	Measurement	Details
Communication	<ul style="list-style-type: none"> • Reading • Writing • Speaking • Listening 	Reinforce and measure	<ul style="list-style-type: none"> • Communicate clearly, concisely, and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience. Respond to written, spoken, or visual messages in a manner that ensures effective communication. • A combination of summative and formative assessments, such as tests, quizzes, lab reports, and presentations has been applied to evaluate the learners.
Numeracy	<ul style="list-style-type: none"> • Understanding and applying mathematical concepts and reasoning • Analyzing and using numerical data 	Teach and measure	<ul style="list-style-type: none"> • Execute mathematical operations accurately. • A combination of summative and formative assessments, such as tests, quizzes, lab reports, and presentations has been applied to evaluate the learners.
Critical Thinking and Problem-Solving	<ul style="list-style-type: none"> • Analysing • Synthesizing • Evaluating • Decision-Making 	Reinforce and measure	<ul style="list-style-type: none"> • Apply a systematic approach to solve problems. Use a variety of thinking skills to anticipate and solve problems. • A combination of summative and formative assessments, such as tests, quizzes, lab reports, and presentations has been applied to evaluate the learners.
Information Management	<ul style="list-style-type: none"> • Gathering and managing information • Selecting and using appropriate tools and technology for a task or project • Computer literacy 	Reinforce and measure	<ul style="list-style-type: none"> • Locate, select, organize, and document information using appropriate technology and information systems. Analyze, evaluate, and apply relevant information from a variety of sources. • A combination of summative and formative assessments, such as tests, quizzes, lab reports, and presentations has been applied to evaluate the learners.
Interpersonal Skills	<ul style="list-style-type: none"> • Teamwork • Relationship management • Conflict resolution • Leadership • Networking 	Reinforce and measure	<ul style="list-style-type: none"> • Show respect for diverse opinions, values belief systems, and contributions of others. Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. • A combination of summative and formative assessments, such as tests, quizzes, lab reports, and presentations has been applied to evaluate the learners.

Section	Skills	Measurement	Details
Personal Skills	<ul style="list-style-type: none"> Managing self Managing change and being flexible and adaptable Engaging in reflective practice Demonstrating personal responsibility 	Reinforce and measure	<ul style="list-style-type: none"> Manage the use of time and other resources to complete projects. Take responsibility for one's own actions, decisions, and consequences. A combination of summative and formative assessments, such as tests, quizzes, lab reports, and presentations has been applied to evaluate the learners.

Prior Learning Assessment & Recognition (PLAR)

Prior Learning Assessment and Recognition (PLAR) is the formal evaluation and credit-granting process whereby candidates may obtain credits for prior learning. Prior learning includes the knowledge competencies and skills acquired, in both formal and informal ways, outside of post-secondary education. Candidates may have their knowledge, skills and competencies evaluated against the learning outcomes as defined in the course outline. Please review the [Assessment Methods Glossary](#) for more information on the Learning Portfolio assessment methods identified below.

The method(s) that are used to assess prior learning for this course may include:

- Challenge Exam (results recorded as a % grade and added to student's CGPA)

Please contact the Program Coordinator for more details.

Course Specific Policies and Expectations

A passing grade for this course is 50%. To get an overall passing grade in this course, students must independently pass the Test and the Lab/Assignment portions of the course. If one or more of these sections is less than 50% then the final grade for the course will be the lower of the two marks.

Academic Regulations

It is the student's responsibility to be aware of the College Academic Regulations. The Academic Regulations apply to all applicants to Humber and all current students enrolled in any program or course offered by Humber, in any location.

Information about academic appeals is found in the [Academic Regulations](#).

Anti-Discrimination Statement

At Humber College, all forms of discrimination and harassment are prohibited. Students and employees have the right to study, live and work in an environment that is free from discrimination and harassment. If you need assistance on concerns related to discrimination and harassment, please contact the [Centre for Human Rights, Equity and Inclusion](#) or the [Office of Student Conduct](#).

Accessible Learning Services

Humber strives to create a welcoming environment for all students where equity, diversity and inclusion are paramount. Accessible Learning Services facilitates equal access for students with disabilities by coordinating academic accommodations and services. Staff in Accessible Learning Services are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations. If you require academic accommodations, contact:

[Accessible Learning Services](#)

North Campus: (416) 675-6622 X5090

Lakeshore Campus: (416) 675-6622 X3331

Academic Integrity

Academic integrity is essentially honesty in all academic endeavors. Academic integrity requires that students avoid all forms of academic misconduct or dishonesty, including plagiarism, cheating on tests or exams or any misrepresentation of academic accomplishment.

Disclaimer

While every effort is made by the professor/faculty to cover all material listed in the outline, the order, content, and/or evaluation may change in the event of special circumstances (e.g. time constraints due to inclement weather, sickness, college closure, technology/equipment problems or changes, etc.). In any such case, students will be given appropriate notification in writing, with approval from the Dean (or designate) of the School.

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