HUMBER

Course Outline

Course Name: DC Equipment and Controls (ELEC 206)

Academic Period: 2022 - 2023

Faculty:

Faculty Availability:

Associate Dean:
Shaun Ghafari
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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:	DC Equipment and Controls (ELEC 206)
Pre-Requisites	none
Co-Requisites	none
Equates	none
Restrictions	none
Credit Value	3
Total Course Hours	56

Developed By:	Prepared By:	Approved by:
		Shaun 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 course intends to teach concepts, principle and procedure for the operation and testing of electrical machines such as DC motors and DC generators. The knowledge gained by students will be helpful in the study of technological subjects such as control design and AC equipment.

Course Learning Method(s)

- Lecture

Learning Outcomes

- Explain the fundamental principles of electricity and magnetism to operate the DC machines and describe their construction.
- Describe the effects of armature reaction and the method used to reduce its effect in DC machines.
- Determine the interrelationships between voltages, currents, flux and speed of DC generators to describe the characteristics and applications of different kind of DC generators.
- Calculate the counter-electromotive force, mechanical power, torque and speed of DC motors to select the proper type of DC motors for different applications.
- Calculate the efficiency of DC machines using relationship between input power, output power, and power losses.
- Demonstrate an understanding of the fundamental control practices and protections associated with DC machines including starting, reversing, braking, plugging, over-speed, over-load, field loss and over-voltage.
- Demonstrate working knowledge with lab equipment to study the characteristics of DC machines and their controls
- Explain how to connect DC generators in parallel a DC voltage line or with other DC generators by considering the safety and efficiency of the system.

Assessment Weighting

Assessment	Weight
In-class Activity	
Lab Assignments-In process evaluation	30%
Quiz	
Quizzes	10%
Test	

Assessment	Weight
Test 1	30%
Test 2	30%
Total	**100%**

Modules of Study

Module	Course Learning Outcomes	Resources	Assessments
Introduction to DC Machines & Construction of DC Machines	• Explain the fundamental principles of electricity and magnetism to operate the DC machines and describe their construction.		• Test 1 • Quizzes • Lab Assignments- In process evaluation
DC Machines and Armature Reaction	• Describe the effects of armature reaction and the method used to reduce its effect in DC machines.		• Test 1 • Quizzes • Lab Assignments- In process evaluation
Characteristics and Types of DC Generators	• Determine the interrelationships between voltages, currents, flux and speed of DC generators to describe the characteristics and applications of different kind of DC generators.		• Test 1 • Quizzes • Lab Assignments- In process evaluation
Characteristics and Types of DC Motors	• Calculate the counter-electromotive force, mechanical power, torque and speed of DC motors to select the proper type of DC motors for different applications.		• Quizzes • Lab Assignments- In process evaluation • Test 2
Efficiency and Performance of DC Machines	• Calculate the efficiency of DC machines using relationship between input power, output power, and power losses.		• Quizzes • Lab Assignments- In process evaluation • Test 2

Module	Course Learning Outcomes	Resources	Assessments
DC Motor Protection and Control Equipment and Circuits	• Demonstrate an understanding of the fundamental control practices and protections associated with DC machines including starting, reversing, braking, plugging, over-speed, over-load, field loss and over-voltage. • Demonstrate working knowledge with lab equipment to study the characteristics of DC machines and their controls		• Quizzes • Lab Assignments- In process evaluation • Test 2
Parallel Operation of DC Generators	• Explain how to connect DC generators in parallel a DC voltage line or with other DC generators by considering the safety and efficiency of the system.		• Quizzes • Lab Assignments- In process evaluation • Test 2

Required Resources

Theodore Wildi (2012), *Electrical Machines, Drives, and Power Systems* (6th Ed.). Pearson

Supplemental Resources

Stephen J. Chapman (2012). *Electric Machinery Fundamentals* (5th Edition), McGraw Hill

Essential Skills

Section	Skills	Measurement	Details
Communication	• Reading • Writing • Speaking • Listening • Presenting • Visual Literacy	Reinforce and measure	• Communicate clearly, concisely, and correctly in 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. • Tests, assignments, reports, and presentations.
Numeracy	• Understanding and applying mathematical concepts and reasoning • Analyzing and using numerical data • Conceptualizing	Teach and measure	• Execute mathematical operations accurately. • Tests, assignments, reports, and presentations.

Section	Skills	Measurement	Details
Critical Thinking and Problem-Solving	• Analysing • Synthesizing • Evaluating • Decision-Making • Creative and Innovative Thinking	Reinforce and measure	• Apply a systematic approach to solve problems. Use a variety of thinking skills to anticipate and solve problems. • Tests, assignments, reports, and presentations.
Information Management	• Gathering and managing information • Selecting and using appropriate tools and technology for a task or project • Computer literacy • Internet skills	Reinforce and measure	• Locate, select, organize, and document information using appropriate technology and information systems. Analyze, evaluate, and apply relevant information from a variety of sources. • Tests, assignments, reports, and presentations.
Interpersonal Skills	• Teamwork • Relationship management	Reinforce and measure	• 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 • Tests, assignments, reports, and presentations
Personal Skills	• Managing self • Managing change and being flexible and adaptable • Demonstrating personal responsibility	Reinforce and measure	• Manage the use of time and other resources to complete projects. Take responsibility for one's own actions, decisions, and consequences. • Tests, assignments, reports, and presentations.

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.

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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