HUMBER

Course Outline

Course Name: Logic Fundamentals (ELEC 107)

Academic Period: 2021 - 2022

Faculty:

Faculty Availability:

Associate Dean:
Shaun Ghafari
shaun.ghafari@humber.ca

Schedule Type Code:

GREEN COURSE

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:	Logic Fundamentals (ELEC 107)
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

Digital logic design is foundational to the field of electrical engineering used to develop hardware of computers and other digital devices. This course will provide students with the required knowledge to understand the basics of the programmable logic controllers (PLCs), which are an integral part of automation and manufacturing.

Course Learning Method(s)

- Problem Based Learning (PBL)
- Lecture

Learning Outcomes

- Identify digital logic circuits and their application
- Convert Number system formats of Decimal, Binary, Octal and Hexadecimal
- Interpret Logic Function AND, OR, NOT , NAND, NOR, XOR, and XNOR respect to their internal structure
- Draw Switch circuit diagram to perform AND, OR, NOT, NAND, NOR, XOR, and XNOR logic functions
- Write Boolean Expressions for AND, OR, NOT, NAND, NOR, XOR, and XNOR logic functions in implemented circuit diagrams
- Describe Logic Circuit as machine/process operation sequence
- Convert human machine/process operation description to logic circuit based on narrative
- Implement Latch/Unlatch operator in combination with other logic circuit
- Implement Edge detector Counter and Timers in logical circuit and program
- Write Logical program in Ladder, FBD in Siemens Logo software

Assessment Weighting

Assessment	Weight
Labs	40%
Midterm	25%
Final Exam	25%
Assignment or Quiz	10%
Total	**100%**

Modules of Study

Module	Course Learning Outcomes	Resources	Assessments
Module 1: Introduction to the course, analog concept, digital concept, switches and terminology	• Identify digital logic circuits and their application		• Assignment or Quiz • Midterm • Labs
Module 2: Number Systems Conversion, Hexadecimal, Octal, Binary, and Decimal Systems	• Convert Number system formats of Decimal, Binary, Octal and Hexadecimal		• Assignment or Quiz • Midterm • Labs
Module 3: Switches, Logic operator and function AND, OR, NOT, NAND, NOR, XOR, and XNOR	• Interpret Logic Function AND, OR, NOT , NAND, NOR, XOR, and XNOR respect to their internal structure • Write Logical program in Ladder, FBD in Siemens Logo software		• Assignment or Quiz • Midterm • Labs
Module 4: Translating Boolean expressions of logic gates into electrical circuits and ladder logic diagrams	• Draw Switch circuit diagram to perform AND, OR, NOT, NAND, NOR, XOR, and XNOR logic functions • Write Boolean Expressions for AND, OR, NOT, NAND, NOR, XOR, and XNOR logic functions in implemented circuit diagrams • Write Logical program in Ladder, FBD in Siemens Logo software		• Assignment or Quiz • Final Exam • Midterm • Labs
Module 5: Machinery or Process operation description conversion to logic circuit and its implementation	• Describe Logic Circuit as machine/process operation sequence • Convert human machine/process operation description to logic circuit based on narrative • Write Logical program in Ladder, FBD in Siemens Logo software		• Assignment or Quiz • Final Exam • Labs
Module 6: Latch and latches structure, Function and implementation	• Implement Latch/Unlatch operator in combination with other logic circuit		• Assignment or Quiz • Final Exam • Labs
Module 7: Edge Detector, Internal structure, function and Application and Introduction to Counter and Timers	• Implement Edge detector Counter and Timers in logical circuit and program • Write Logical program in Ladder, FBD in Siemens Logo software		• Assignment or Quiz • Final Exam • Labs

Essential Skills

Section	Skills	Measurement	Details
Communication	- Reading - Writing - Speaking - Listening - Presenting - Visual Literacy	Teach and measure	- communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience. - Labs, Quizzes and tests
Communication	- Reading - Writing - Speaking - Listening - Presenting - Visual Literacy	Teach and measure	- respond to written, spoken, or visual messages in a manner that ensures effective communication. - Labs, Quizzes and tests
Numeracy	- Understanding and applying mathematical concepts and reasoning - Analyzing and using numerical data - Conceptualizing	Teach and measure	- execute mathematical operations accurately. - Quizzes and Tests
Critical Thinking and Problem-Solving	- Analysing - Synthesizing - Evaluating - Decision-Making - Creative and Innovative Thinking	Teach and measure	- apply a systematic approach to solve problems. - Labs, Home work, quizzes and tests
Critical Thinking and Problem-Solving	- Analysing - Synthesizing - Evaluating - Decision-Making - Creative and Innovative Thinking	Teach and measure	- use a variety of thinking skills to anticipate and solve problems. - Student response software , questionnaire, Labs , Homework and quizzes and tests
Information Management	- Selecting and using appropriate tools and technology for a task or project - Computer literacy - Internet skills	Teach and measure	- Locate, select, organize, and document information using appropriate technology and information systems. - Student response software , questionnaire, Labs, Homework and quizzes

Section	Skills	Measurement	Details
Information Management	• Selecting and using appropriate tools and technology for a task or project • Internet skills	Teach and measure	• Analyze, evaluate, and apply relevant information from a variety of sources. • Student response software and questions
Interpersonal Skills	• Teamwork • Relationship management • Conflict resolution • Leadership	Teach and measure	• Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals • Labs
Interpersonal Skills	• Teamwork • Relationship management • Conflict resolution • Leadership	Teach and measure	• Show respect for diverse opinions, values belief systems, and contributions of others • Labs
Personal Skills	• Managing self • Managing change and being flexible and adaptable • Engaging in reflective practice • Demonstrating personal responsibility	Teach and measure	• Manage the use of time and other resources to complete projects • Student response software , questionnaire, Labs , Homework and quizzes and tests
Personal Skills	• Managing self • Managing change and being flexible and adaptable • Engaging in reflective practice	Teach and measure	• Take responsibility for one's own actions, decisions, and consequences • Labs

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.

Given the circumstances due to COVID-19, Humber reserves the right to alter the mode of delivery and examinations/assessments in this course.

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