ENGINEERING
McMaster-Mohawk
Bachelor of Technology
Partnership

McMaster
University

Course Outline

1. COURSE INFORMATION

Session Offered	Fall 2023
Course Name	Digital Electronics
Course Code	SMRTTECH 3DE3
Date(s) and Time(s) of lectures	Wednesdays 11:30am-1:30pm Thursdays 1:30pm-2:20pm **(L01)** Tuesday 8:30am-11:20am **(L02)** Tuesday 1:30pm-4:20pm **(L03)** Tuesday 4:30pm-7:20pm **(L04)** Wednesday 3:30pm-6:20pm **(L05)** Wednesday 6:30pm-9:20pm
Program Name	Engineering Bach. Technology - Automation Eng Tech CO-OP
Calendar Description	Theory and applications of digital electronic circuits.
Instructor(s)	Dr. Ahmed Fakhr (C01, L01, L02) — E-Mail: fakhrad@mcmaster.ca — Office Hours & Location: By email
	Dr. Kimia Ghalkhani (L03, L04, L05) — E-Mail: ghalkham@mcmaster.ca

2. COURSE SPECIFICS

Course Description			

Instruction Type

Code	Type	Hours per term
C	Classroom instruction	39
L	Laboratory, workshop or fieldwork	39
T	Tutorial	
DE	Distance education	
	Total Hours	78

Resources

ISBN	Textbook Title & Edition	Author & Publisher
ISBN: ISBN-13: 978-0132737968 ISBN-10: 9780132737968	Digital Fundamentals, 11th Edition	Thomas L. Floyd, Pearson
Print ISBN: 9780132543033, 0132543036 **eText ISBN:** 9780133004489, 0133004481	Digital Electronics: A Practical Approach with VHDL, 9th Edition	\ɯqɟr ℗qjɾy¡℞Ujfwxts

Other Supplies	**Source**

Prerequisite(s)	PROC TECH 2EE3 and ENG TECH 2MT3
Corequisite(s)	
Antirequisite(s)	
Course Specific Policies	- Students should have a ZOOM account and MS TEAMs account. - Students should be able to provide video submissions of their work if needed. - This course will be using a range of software. Students are required to submit their work in the appropriate format and produced with a similar version of the software as the one in the lab. No attempts will be made to mark work submitted in a wrongful format or produced with a different version of the software. - Project late submissions will be penalized at 10% per day. Project, tests and final examination on this course are time constrained, meaning that both proficiency and speed of completion are evaluated and graded. - All course components has to be completed. MSAFs does not exempt from completing tasks. Some work for this course is performed in groups. Students are free to choose their group partners. Students that cannot decide which group to join will be randomly assigned one by the instructor. If the number of students is uneven the instructor will decide if the remaining students will form a smaller group or if they will be rearranged within existing groups.
Departmental Policies	Students must maintain a GPA of 3.5/12 to continue in the program. In order to achieve the required learning objectives, on average, B.Tech. students can expect to do at least 3 hours of "out-of-class" work for every scheduled hour in class. "Out-of-class" work includes reading, research, assignments and preparation for tests and examinations. Where group work is indicated in the course outline, such collaborative work is mandatory. The use of cell phones, iPods, laptops and other personal electronic devices are prohibited from the classroom during the class time, unless the instructor makes an explicit exception. Announcements made in class or placed on Avenue are considered to have been communicated to all students including those individuals that are not in class. Instructor has the right to submit work to software to identify plagiarism.

3. SUB TOPIC(S)		
Week 1	Introduction to Digital electronics	
Week 2	Logic gates and Boolean Algebra	
Week 3	Functions of combinational logic	
Week 4	Applications of combinational logic circuits - Logic Simplification	
Week 5	Latches, Flip Flops, and Registers	
Week 6	**Study Break**	

Week 7	**Midterm 1** Programable Logic	
Week 8	Designing Sequential logic circuits	
Week 9	Introduction to Verilog HDL - Part1 Introduction/Basic Modeling structure/ Module and port declaration/Data Types/ Operators	
Week 10	Introduction to Verilog -Making Assignments/Behavioral statements/Loops/Tasks and functions	
Week 11	Shift Registers and Counters	
Week 12	**Midterm 2** Timers	
Week 13	Digital ICs Technologies	
Week 14	Review	
Midterm Recess: Monday, October 9 to Sunday, October 15 Classes end: Wednesday, December 6 Final examination period: Friday, December 8 to Thursday, December 21 All examinations MUST be written during the scheduled examination period		
List of experiments		
Lab 1	Transistor Switching	
Lab 2	Logic Gates	
Lab 3	Adders	
Lab 4	Elevator Display Simulation	
Lab 5	Elevator Display Hardware	
Lab 6	FPGA	
Lab 7	FPGA	
Lab 8	FPGA	
Lab 9	Project	
Lab 10	Project	
Lab 11	Project	
Lab 12	Project	
Note that this structure represents a plan and is subject to adjustment term by term. The instructor and the University reserve the right to modify elements of the course during the term. The University may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes.		

4. ASSESSMENT OF LEARNING *including dates*	Weight
Quizzes	8
Mid-term test 1	18.5
Mid-term test 2	18.5
Project	15
Labs	10
Final examination (tests cumulative knowledge)	30
TOTAL	**100%**

Percentage grades will be converted to letter grades and grade points per the University calendar.

5. LEARNING OUTCOMES

1. Design and simulate logical circuits based on 74 family Integrated Circuits.
2. Analyse and implement combinational and sequential logic functions.
3. Simplify Boolean expressions using the properties of Boolean algebra, and K-maps.
4. Explain basic operations characteristics and parameters of digital ICs (TTL and CMOS)
5. Explain the applications of the logic circuits.
6. Design and implement digital electronic circuits based on common digital ICs and FPGAs.
7. Troubleshoot digital electronic circuits.

6. COURSE OUTLINE – APPROVED ADVISORY STATEMENTS

ANTI-DISCRIMINATION

The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible.

http://www.mcmaster.ca/policy/General/HR/Discrimination_Harassment_Sexual_Harassment-Prevention&Response.pdf

ACADEMIC INTEGRITY

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. It is your responsibility to understand what constitutes academic dishonesty.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/

The following illustrates only three forms of academic dishonesty: The following illustrates only three forms of academic dishonesty:
- plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

AUTHENTICITY / PLAGIARISM DETECTION

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com, please go to www.mcmaster.ca/academicintegrity.

COURSES WITH AN ON-LINE ELEMENT

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using

these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

ONLINE PROCTORING

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

COMMUNICATIONS

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University
 communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their @mcmaster.ca alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.
- Check the McMaster/Avenue email and course websites on a regular basis during the term.

CONDUCT EXPECTATIONS

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the Code of Student Rights & Responsibilities (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, whether in person or online.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University's Academic Accommodation of Students with Disabilities policy.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK

McMaster Student Absence Form (MSAF): In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work".

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests. http://www.mcmaster.ca/policy/Students-AcademicStudies/Studentcode.pdf

COPYRIGHT AND RECORDING

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, including lectures by University instructors

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

EXTREME CIRCUMSTANCES

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.