# COMP ENG 3DY4
## Computer Systems Integration Project

COURSE OUTLINE (as of January 6, 2026)

Please refer to course website for updated information.

## COURSE DESCRIPTION

A computer engineering design and implementation project of reasonable complexity to be completed by small groups of students; oral presentations and written reports.

## PRE-REQUISITES, ANTI-REQUISITES AND CO-REQUISITES

Prerequisite(s): COMPENG 2DX3, 3DQ5, ELECENG, 3EJ4, 3TP3
Antirequisite(s): COMPENG 3DR4, ELECENG 3EY4
Co-requisite(s): ELECENG 3CL4, 3TR4

## SCHEDULE and MODE OF DELIVERY

**Lectures**: Thursday from 8:30 a.m. to 10:20 a.m. at ITB 137
**Tutorials**: Tuesday from 9:30 a.m. to 10:20 a.m. at HSC 1A6
**Labs**: Weekly on Tuesday, Wednesday, and Thursday from 2:30 pm to 5:20 pm at ABB C209

*Any schedule or course delivery changes will be communicated via email or in the course announcements section on Avenue to Learn. Please check the email and announcements regularly.*

## INSTRUCTOR

Dr. Nicola Nicolici
Email: nicolici@mcmaster.ca
Office: ITB-A210
Phone: 905-525-9140 ext. 27598

Dr. Kazem Cheshmi
Email: cheshmi@mcmaster.ca
Office: ITB-A217
Phone: 905-525-9140 ext. 27784

Office Hours:  Technical questions will be taken when the instructors are in the lab

Friday noon to 1 p.m. on Teams – this timeslot will be used to discuss personal challenges faced by the concerned students – for this type of meeting, an appointment request needs to be made at least 24 hours before the meeting

## TEACHING ASSISTANTS

- Samirasadat Jamalidinan     jamalids@mcmaster.ca
- Hossein Albakri             albakrih@mcmaster.ca
- Mehdi Salehi                salehm32@mcmaster.ca
- Graham Power                powerg@mcmaster.ca
- Amr El Hossan               elhossaa@mcmaster.ca
- Da Ma                       mad29@mcmaster.ca

TA office hours are held in ABB C209 on Fridays between 2:30 and 5:20 pm after the in-lab experiments for a lab were done, and Mondays between 2:30 and 5:20 pm before the take-home exercises for a lab are due; during the project phase of the course, further announcements will be made concerning additional TA office hours.

## COURSE WEBSITE/S

http://avenue.mcmaster.ca

## COURSE OBJECTIVES

By the end of this course, students should be able to:
- Analyze, design and implement a complex computing system for software-defined radios, from high-level modelling of basic primitives to working prototypes in form factor-constrained environments.
- Use project-based learning to consolidate knowledge from prior courses and develop the mindset needed to pose the appropriate questions that will drive knowledge acquisition in future courses.
- Improve both oral and written communicational skills and acquire the skills needed to enable life-long learning.

## ASSUMED KNOWLEDGE

Good knowledge of software, digital systems, and signal theory is expected. The most relevant prior courses are COE 2SH4, COE 2SI3, COE 2DX3, EE 3TP3, and COE 3DQ5.

## COURSE MATERIALS

**Required Texts**: There is **NO** textbook used in this course. The main sources of information are labs, lectures and tutorials.

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**COURSE OVERVIEW**

| Weeks | Topic | Readings |
|---|---|---|
| 1 to 5 | Digital signal processing (DSP) | Lecture Notes |
| 1 to 5 | Software-defined radios (SDR) | Lecture Notes |
| 6 to 11 | Algorithmic aspects for DSP/SDR | Lecture Notes |
| 6 to 11 | Design methods for complex projects | Lecture Notes |
| 12 | Project presentations | Lecture Notes |
| 13 | Summary | Lecture Notes |

At certain points in the course, it may make good sense to modify the schedule. The instructor may modify elements of the course and will notify students accordingly (in class, on the course website).

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**LABORATORY OVERVIEW**

| Date/Week | Topic | Readings |
|---|---|---|
| Jan 12 / 2 | Lab 1 - DSP primitives in Python | Lab Manual |
| Jan 19 / 3 | Lab 2 - DSP primitives in C/C++ | Lab Manual |
| Jan 26 / 4 | Lab 3 - SDR for mono FM receiver (no real-time constraints) | Lab Manual |
| Feb 2 / 5 | Lab 4 – Code optimization | Lab Manual |
| Feb 9 / 6 | Project release - SDR for mono/stereo/RDS receiver (real-time) Labs cross-examination | Project Description |
| Feb 23 / 7 | Project continued | Project Description |
| Mar 2 / 8 | Project continued | Project Description |
| Mar 9 / 9 | Project continued | Project Description |
| Mar 16 / 10 | Project continued | Project Description |
| Mar 23 / 11 | Project continued (all source code to be submitted on March 26) | Project Description |
| Mar 30 / 12 | Project cross-examination (final report to be submitted on April 2) | |

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**LABORATORY OPERATION**

- *This lab schedule is based upon current university and public health guidelines and may be subject to changes during the term. Any changes to the schedule or course delivery will be communicated on the course announcements section on Avenue to Learn.*

- Each student in the course is required to pass the **lab safety** quiz prior to attempting any of the laboratories. The video and quiz will be on Avenue to Learn.

- The lab/project activity will take place in ABB C209. Weeks 2 to 5 will be concerned with lab work, and weeks 6 to 11 will be concerned with project work. The lab/project cross-examinations are mandatory (i.e., without a completed interview, the grades for the concerned submission will be zero). The cross-examination for the labs will occur in the last

week **before** the mid-term recess. All the project source code and an executive summary of the contributions of each group member must be submitted before **March 26.** The project cross-examinations and oral presentations will run in the week of **March 30**, and the detailed final project report is due on **April 2.**

- Note that a late course withdrawal will **not** be permitted if the project has been attempted, and the concerned student's name is included in the project source code submission on **March 26.** For more info, please check the course website regularly.

- For the labs, you are allowed to work in groups of two. For the project, you are allowed to work in groups of four. You must submit written reports and source code for all the deliverables. It is important to note that, unless explicitly stated in the lab report, it is assumed that each group member has contributed equally to all the decisions for every in-lab experiment and take-home exercise. This implies that, if cross-examined, each group member is expected to answer any question. If the contribution of each group member is explicitly stated, then the marks will be scaled accordingly.

- Students are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process, particularly during, but not limited to, the group work for lab and project deliverables. Note also that it is explicitly forbidden for these deliverables (including source code, design files, and lab/project reports) to be shared in any public repositories. Only the members from the same group should have access to their own group's private repositories.

- It is important to note that lab and project marks are provisional until the grades are released in April 2026 because they are subject to an audit (including, but not limited to, an oral cross-examination).

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**ASSESSMENT**

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| Component | Weight |
|---|---|
| Labs | 25% |
| Project source code (and documentation) | 50% |
| Project oral presentation | 5% |
| Final project report | 20% |
| Total | 100% |

Conversion from percentage to letter grade will be by way of the standard scale used in the Office of the Registrar. To pass the course, you must also obtain at least 20 marks of the 50 marks given for the project source code and at least 8 marks of the 20 marks given for the final project report. Statistical adjustments will not normally be used.

## 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/app/uploads/Academic-Integrity-Policy-1-1.pdf

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.

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.

## 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.

## 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, Teams 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.

## GENERATIVE AI: USE PROHIBITED

Students are not permitted to use generative AI in this course. In alignment with McMaster academic integrity policy, it "shall be an offence knowingly to submit academic work for assessment that was purchased or acquired from another source". This includes work created by generative AI tools. "Contract Cheating is the act of "outsourcing of student work to third parties" (Lancaster & Clarke, 2016, p. 639) with or without payment." Using Generative AI tools

is a form of contract cheating. Charges of academic dishonesty will be brought forward to the Office of Academic Integrity.

## ACADEMIC ACCOMMODATIONS

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.

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.

## REQUESTS FOR RELIEF FOR MISSED ACADEMIC 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".

## 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.

## ACCREDITATION LEARNING OUTCOMES

Note: The *Learning Outcomes* defined in this section are measured throughout the course and form part of the Department's continuous improvement process.  They are a key component of the accreditation process for the program and will not be taken into consideration in determining a student's actual grade in the course.  For more information on accreditation, please ask your instructor or visit: http://www.engineerscanada.ca.

| Outcomes | Indicators | Measurement Method(s) |
|---|---|---|
| Actively contributes to the planning and execution of a team project | 6.1 | labs and project |
| Manages interpersonal relationships, taking leadership responsibilities as needed | 6.2 | labs and project |
| Demonstrates comprehension of technical and non-technical instructions and questions | 7.1 | labs and project |
| Composes an effective written document for the intended audience | 7.2 | labs and project |
| Composes and delivers an effective oral presentation for the intended audience | 7.3 | labs and project |
| Describes the duty of a Professional Engineer to the public, client, employer, and the profession | 8.1 | labs and project |
| Evaluates the social impact of engineering activities, including health, safety, legal, cultural, and other relevant factors, and identifies uncertainties in decisions | 9.2 | labs and project |
| Plans and effectively manages a project's time, resources, and scope, following business practices as appropriate. | 11.2 | labs and project |
| Identifies, characterizes, assesses, and manages risks to project success. | 11.3 | labs and project |
| Critically assesses one's own educational needs and opportunities for growth | 12.1 | labs and project |
| Seeks and acquires appropriate external information as required, including showing awareness of sources of information and ability to critically evaluate them. | 12.2 | labs and project |

# Electrical and Computer Engineering Lab Safety

## Information for Laboratory Safety and Important Contacts

This document provides important information for the healthy and safe operation of ECE instructional laboratories. This document is required reading for all laboratory supervisors, instructors, researchers, staff, and students working in or managing instructional laboratories in ECE. It is expected that revisions and updates to this document will be done continually. A McMaster University lab manual is also available to read in every laboratory and online https://hr.mcmaster.ca/app/uploads/2019/07/2019-McMaster-Lab-Manual.pdf

## General Health and Safety Principles

Good laboratory practice requires that every laboratory worker and supervisor observe the following whether conducting lab work at school or at home:

1. Food and beverages are not permitted in the instructional laboratories.
2. A Laboratory Information Sheet on each lab door identifying potential hazards and emergency contact names should be known.
3. Laboratory equipment should only be used for its designed purpose.
4. Proper and safe use of lab equipment should be known before using it.
5. The course TA leading the lab should be informed of any unsafe condition.
6. The location and correct use of all available safety equipment should be known.
7. Potential hazards and appropriate safety precautions should be determined, and sufficiency of existing safety equipment should be confirmed before beginning new operations.
8. Proper waste disposal procedures should be followed.
9. Personal ergonomics should be practiced when conducting lab work. https://bit.ly/3fOE71E
10. Current University health and safety issues, and protocol should be known. https://hr.mcmaster.ca/resources/covid19/workplace-health-and-safety-guidance-during-covid-19/

## Location of Safety Equipment

| **Fire Extinguisher** | **First Aid Kit** |
|---|---|
| On walls in halls outside of labs | ITB A111, or dial "88" after 4:30 p.m. |
| | |
| **Telephone** | **Fire Alarm Pulls** |
| On the wall of every lab near the door | Near all building exit doors on all floors |

## Who to Contact

**Emergency Medical / Security:** On McMaster University campus, call Security at extension **88** or **905-522-4135** from a cell phone.

**Non-Emergency Accident or Incident**: Immediately inform the TA on duty or Course Instructor.

**University Security (Enquiries / Non-Emergency)**: Dial 24281 on a McMaster phone or dial 905-525-9140 ext. 24281 from a cell phone.

**See TA or Instructor**: For problems with heat, ventilation, fire extinguishers, or immediate repairs

**Environmental & Occupational Health Support Services (EOHSS):** For health and safety questions dial 24352 on a McMaster phone or dial 905-525-9140 ext. 24352 from a cell phone.

**ECE Specific Instructional Laboratory Concerns:** For non-emergency questions specific to the ECE laboratories, please contact 24103.

## In Case of a Fire (On Campus Dial 88)

When calling to report a fire, give name, exact location, and building.

1. Immediately vacate the building via the nearest Exit Route. Do not use elevators!

2. Everyone is responsible for knowing the location of the nearest fire extinguisher, the fire alarm, and the nearest fire escape.

3. The safety of all people in the vicinity of a fire is of foremost importance. But do not endanger yourself!

4. In the event of a fire in your work area shout "*Fire!*" and pull the nearest fire alarm.

5. Do not attempt to extinguish a fire unless you are confident it can be done in a prompt and safe manner utilizing a hand-held fire extinguisher. Use the appropriate fire extinguisher for the specific type of fire. Most labs are equipped with Class A, B, and C extinguishers. Do not attempt to extinguish Class D fires which involve combustible metals such as magnesium, titanium, sodium, potassium, zirconium, lithium, and any other finely divided metals which are oxidizable. Use a fire sand bucket for Class D fires.

6. Do not attempt to fight a major fire on your own.

7. If possible, make sure the room is evacuated; close but do not lock the door and safely exit the building.

## Clothing on Fire

Do not use a fire extinguisher on people

1. Douse with water from safety shower immediately or

2. Roll on floor and scream for help or

3. Wrap with fire blanket to smother flame (a coat or other nonflammable fiber may be used if blanket is unavailable). Do not wrap a standing person; rather, lay the victim down to extinguish the fire. The blanket should be removed once the fire is out to disperse the heat.

# Equipment Failure or Hazard

Failure of equipment may be indicative of a safety hazard - You must report all incidents.

Should you observe excessive heat, excessive noise, damage, and/or abnormal behaviour of the lab equipment:

1. Immediately discontinue use of the equipment.
2. In power labs, press wall-mounted emergency shut-off button.
3. Inform your TA of the problem.
4. Wait for further instructions from your TA.
5. TA must file an incident report.

# Protocol For Safe Laboratory Practice

Leave equipment in a safe state for the next person - if you're not sure, ask!

In general, leave equipment in a safe state when you finish with it. When in doubt, consult the course TA.

# Defined Roles

| TA | The first point of contact for lab supervision | |
|---|---|---|
| ECE Lab Supervisor | Steve Spencer- ITB 147 | steve@mail.ece.mcmaster.ca |
| ECE Chair | Shahram Shirani- ITB A111 | shirani@mcmaster.ca |
| ECE Administrator | Shelby Gaudrault- ITB A111 | gaudraus@mcmaster.ca |
| ECE Course Instructor | Please contact your specific course instructor directly | |

**www.eng.mcmaster.ca/ece**