ENGPHYS 4US2
Modern and Applied Physics Laboratory – Smart Systems
Undergraduate Fall 2022
Course Outline

CALENDAR/COURSE DESCRIPTION
The course will explore the design, assembly and test of smart systems based on software, computer, electronic, and photonic components. Students will study the operation of such systems to address real-world problems. One lab (three hours each); first term

PRE-REQUISITES AND ANTI-REQUISITES
Prerequisite(s): ENGPHYS 3BB3 or 3BB4 and registration in an Engineering Physics program
Antirequisite(s): ENGPHYS 3G03, 3G04, 4G03, 4U02, 4U04

INSTRUCTOR OFFICE HOURS AND CONTACT INFORMATION

Dr. A. Buijs
JHE A325
buijsa@mcmaster.ca
ext. 24925

Office Hours:
By appointment

TEACHING ASSISTANT OFFICE HOURS AND CONTACT INFORMATION

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Office Hours:
Monday – 8:30 am
Tuesday – 10:30 am

COURSE WEBSITE/ALTERNATE METHODS OF COMMUNICATION
The course website, including all course information will be hosted on Avenue to Learn: http://avenue.mcmaster.ca/ All course-related submissions must be done through Avenue to Learn Dropboxes. It is the students' responsibility to check regularly the course web page (Avenue to Learn) for updates and announcements. Students are required to obtain and maintain McMaster and Avenue to Learn e-mail accounts for timely communications between the instructors and the students.

It is assumed that emails sent through ATL were read by students.

COURSE INTENDED LEARNING OUTCOMES
The objective of this course is to apply previously learned electronics and control knowledge to develop basic smart systems, in particular a smart electricity grid. Through these experiential learning activities, the students will learn about the controls and interactions between the components involved in these two projects.
By the end of this course, students should be able to:
- Understand the mechanisms and role of sensors and actuators in the design of a smart system;
- Understand control mechanisms and use microcontrollers to build compact data acquisition systems;

- Use modern computing platforms for continuous data monitoring, processing and analysis.
- Use proper circuit components for a smart systems project.
- Understand the functioning of a smart electricity grid in the real world

A very important aspect of this course is collaboration. Collaboration will be required both within teams and between teams because all teams will work on the same project.

MATERIALS AND FEES

Required Texts:
None
Recommended Additional Texts:
Journal papers from the open literature relevant to the subject
Calculator:
Any computing device may be used.
Other Materials:
Basic electronic materials will be provided, including power supplies, breadboards and Arduinos, and basic components such as resistors, capacitors, transistors, inductors etc. Specialty components such as motors, batteries, relays should be sourced by the students and will be refunded up to a certain amount. Please consult with the TA and/or lab technician before making the purchase.

COURSE FORMAT AND EXPECTATIONS

The course is delivered as a lab course with three hours of scheduled lab time.
Attendance of the lab is mandatory.
The project is to be performed in teams of three.

COURSE SCHEDULE

Date/Week	Topic	Readings
1	Safety instruction, team building, project overview	White paper on smart electricity grid
2-11	Project execution	
12	Demo	

ASSESSMENT

Component	Due Date	Weight
Progress reports (2 pages max, predetermined headings and rubrics)	Before start of next lab	60%
Performance at demo	Last week	20%
Contribution to final report (2 pages)	Last day of class	20%
Total		100%

EQUITY, DIVERSITY, AND INCLUSION

Every student registered for this course belongs in it. Diversity of backgrounds and experiences is expected and welcome. You can expect your instructor to be respectful of this diversity in all aspects of the course, and the same is expected of you.

The Department of Engineering Physics is committed to creating an environment in which students of all genders, cultures, ethnicities, races, sexual orientations, abilities, and socioeconomic backgrounds have equal access to education and are welcomed and treated fairly. If you have any concerns regarding inclusion in our Department, in particular if you or one of your peers is experiencing harassment or discrimination, you are encouraged to contact the Chair, Associate Undergraduate Chair, Academic Advisor or to contact the Equity and Inclusion Office.

PHYSICAL AND MENTAL HEALTH

For a list of McMaster University's resources, please refer to the Student Wellness Centre.

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:
1. plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
2. improper collaboration in group work.
3. copying or using unauthorized aids in tests and examinations.

COURSES WITH AN ON-LINE ELEMENT

McMaster is committed to an inclusive and respectful community. These principles and expectations extend to online activities including electronic chat groups, video calls and other learning platforms.

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.

EXPECTATIONS OF CONDUCT

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.

COURSE POLICY ON MISSED WORK, EXTENSIONS, AND LATE PENALTIES

1. Weekly reports submitted after the deadline are not accepted.
2. If an msaf is used for a missed lab, the weight for that lab report is shifted to the other reports.
3. Late submission of the contribution to the final report results in 10% reduction of the mark per day.
4. An msaf for the contribution to the final report gives an automatic extension of five days.

SUBMISSION OF REQUEST FOR RELIEF FOR MISSED ACADEMIC WORK

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".

1. **Relief for missed academic work worth less than 25% of the final grade resulting from medical or personal situations lasting up to three calendar days:**

    - Use the McMaster Student Absence Form (MSAF) on-line self-reporting tool. No further documentation is required.
    - Students may submit requests for relief using the MSAF once per term.
    - An automated email will be sent to the course instructor, who will determine the appropriate relief. Students must immediately follow up with their instructors. Failure to do so may negate the opportunity for relief.
    - The MSAF cannot be used to meet a religious obligation or to celebrate an important religious holiday.
    - The MSAF cannot be used for academic work that has already been completed or attempted.
    - An MSAF applies only to work that is due within the period for which the MSAF applies, i.e. the 3-day period that is specified in the MSAF; however, all work due in that period can be covered by one MSAF.
    - The MSAF cannot be used to apply for relief for any final examination or its equivalent. See *Petitions for Special Consideration* above.

2. **For medical or personal situations lasting more than three calendar days, and/or for missed academic work worth 25% or more of the final grade, and/or for any request for relief in a term where the MSAF has been used previously in that term:**

- Students must report to their Faculty Office to discuss their situation and will be required to provide appropriate **supporting documentation**.
- If warranted, the Faculty Office will approve the absence, and the instructor will determine appropriate relief.

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.

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.