title: eru-outline

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ERU - Module Outline

Instructor: Jay Brodeur
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Module description

Electronic devices are a vital part of our modern lives, as they enable (or at least mediate) most of our personal and academic activities. Despite this key role, many of us have little understanding of how they work, as well as and how to build useful electronic devices from relatively simple components. Thanks to the widespread availability of inexpensive, user-friendly and well-documented electronics like Arduinos, learning and developing electronic skills has become attainable (and dare we say, even fun) for students of all ages and degrees of experience.

In this module, students will develop their electronic fluency and build functional, useful devices through a collaborative, hands-on introduction to the fundamentals of electronics. Students will learn the basics by building simple circuits that integrate Arduino microcontrollers with various sensors and actuators. Participants will also gain experience with programming through developing the software code required to control the devices. Working with the instructor and small support groups, students will consolidate their learning by building a simple device that integrates a variety of sensors (temperature, light, etc.) and actuators (LEDs, buzzers, etc.). Students will document their work and share their final devices on their own simple project webpage, which will be created in GitHub Pages.

Module objectives:

Through participation in the course, students will develop a number of knowledge- and skill-based competencies. By the end of this module, you will be able to:

1. Explain the fundamental concepts and operational principles of simple circuits, sensors and actuators
2. Apply fundamental principles to build simple circuits that interact with their surrounding environments
3. Create and modify software code to control the device and create comments to document its functionality
4. Apply your skills, knowledge and creativity in the process of creating an original electronic device
5. Use Markdown to format text in a simple yet effective manner
6. Create, edit, and version control files in a GitHub repository
7. Use GitHub Pages to share your results on an openly-accessible webpage

Module structure and schedule:

Students will be required to work approximately 3 hours per day for four consecutive days (May 19 to May 22). Working time will be split between synchronous classwork, synchronous group work, and asynchronous independent work. The instructor will be available for consultation during all working periods, regardless of whether synchronous activities are taking place.

The module will be delivered using a variety of different modes. All synchronous sessions will be carried out using MS Teams (Jay has added (or will soon add) you to a Team). Following the opening class, most work can be done asynchronously (using prepared guides and videos), though it is still expected that you participate in the group support sessions. - Asynchronous working time: Using prepared guides and videos to complete the lessons - Synchronous sessions: - Synchronous lessons with Jay: Meeting on the “General” channel of our Team - Synchronous support time with Jay: Meeting on the “General” channel of our Team - Synchronous group support time: Meeting in your group’s channel of our Team

Date	Time	Details
Tues, 19-May	4:00 - 6:00 pm	Introductory session (everyone); breakout session (groups)
	8:00 - 9:00 pm	Working time with support
Wed, 20-May	4:00 - 5:00 pm	Introduction to day 2; check-ins & updates
	5:00 - 6:00 pm	Working time with support
	8:00 - 9:00 pm	Group breakout session
Thur, 21-May	4:00 - 6:00 pm	Introduction to day 3; Working time with support
	8:00 - 9:00 pm	Working time with support
Fri, 22-May	4:00 - 6:00 pm	Working time with support; Final device presentations

Date	Time	Details
	8:00 - 9:00 pm	Extra support time, if required (but probably not)

Equipment and software required:

Students will require the following equipment to participate in the course: * A computer (preferably a laptop) with Windows, Linux, or Mac OS, with a USB connection and capable of installing Arduino IDE software. Chromebooks can be accommodated with a bit of effort. * Arduino IDE software installed. * GitHub Desktop software is optional. * A basic Arduino kit will be mailed to participants

Assessment and module deliverables

All deliverables will be compiled in a GitHub repository that you will create for this module. You will upload a number of Ardunio sketches (code), and a few images that document your work. Descriptions of your work, and reflections on your progress will be compiled within a single Markdown document that includes images and video of your final device. GitHub Pages will be used to turn your markdown document to a simple project webpage.

Deliverable	Weight	Notes
Day 1 reflection + embedded photo	15%	Started on Day 1; Completed on Day 2
Day 2 results + uploaded thermometer code	20%	Completed on Day 2
Final device description + code + sales pitch video	40%	Completed by Day 4
Final reflection & summary	15%	Completed on Day 4
Overall project webpage quality	10%	

The module will be graded out of 100 points. See the point breakdown and evaluation criteria below:

Day 1 reflection + embedded photo

Total points: 15 - Reflection (/10) -- see notes below about reflections - Embedded photo (/3) - Working webpage (/2)

Day 2 results + uploaded thermometer code

Total points: 20 - Summary is complete and well-written (/5) - Code (/15)--see notes below about code

Final device description + code + sales pitch video

Total points: 40 - Description is complete and well-written; table displays properly (/10) - Code (/15)--see notes below about code - Project pitch video - Originality and creativity (/10) - Production value (/5)

Final reflection & summary

Total points: 15 - Reflection (/15) -- see notes below about reflections

Overall project webpage quality

Total points: 10 - All content is included (/5) - Content is formatted neatly (/5)

Reflections

Reflections will be evaluated according to the following criteria: - Depth of reflection - Connections with other learning and life experiences - Composition (spelling, grammar, formatting) Students are encouraged to follow the general guidance on reflections provided generally for INSPIRE 1A03.

Uploaded code

Uploaded code will be evaluated according to the following criteria: - Code compiles without error - Code is organized and arranged neatly - Sufficient commented preface, which outlines the purpose of the code, what it does, who created it, and when. - Sufficient, plain-language comments throughout the code, which explain the functionality of sections of the code.

Instructor biography:

In his day job, Jay Brodeur is the Associate Director of Digital Scholarship Services in the McMaster University Library, where he oversees a variety of services that support research and instruction at McMaster. His background is in the Environmental Sciences, and his research interests include climate change, GIS and

geomatics, and data management. When he can, Jay also enjoys teaching; he regularly teaches in the iSci program, and has been fortunate to instruct courses in the Faculties of Science, Social Sciences, and Humanities, as well as the Arts & Science Program.

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