Final Project I / Projet Final I   v1.1

OFFICIAL COURSE NUMBER / NUMÉRO DE COURS OFFICIEL 243-B17-HR	IN-HOUSE COURSE NUMBER / NUMÉRO DE COURS INTERNE N/A	SEMESTER / SEMESTRE Fall (5)	YEAR/ANNÉE 2023
TOTAL COURSE HOURS / HEURE DE COURS TOTAL 105	**HOURS PER WEEK / HEURES PAR SEMAINE** 7	**CREDITS / CRÉDITS** 3	**PONDERATION / PONDÉRATION** 3-4-2

DEPARTMENT-PROGRAM / DÉPARTEMENT-PROGRAMME Electronics & Information Technology Électronique &Technologie de l'information	PREREQUISITE(S): /PRÉ-REQUIS: 243-B12-HR (Product Dev) 243-A15-HR (Microprocessor I) 243-B11-HR (Digital Circuits II) 243-B13-HR (Analog Circuits III)	CO-REQUISITE(S): / CO-REQUIS: N/A S/O
COURSE FIT WITHIN PROGRAM First, Final year project course	**COMPETENCY NUMBER AND STATEMENT / NUMÉRO ET ÉNONCÉ DE COMPÉTENCE** 037E – TO DIAGNOSE AN ANALOG ELECTRONICS PROBLEM 037F – TO DIAGNOSE A DIGITAL ELECTRONICS PROBLEM 037E – DIAGNOSTIQUER UN PROBLÈME D'ÉLECTRONIQUE ANALOGIQUE 037F – DIAGNOSTIQUER UN PROBLÈME D'ÉLECTRONIQUE DIGITAL	

TEACHER(S) /ENSEIGNANT(S)	EMAIL /COURRIEL		OFFICE ROOM	OFFICE TELEPHONE NO.
Louis-Philippe Durocher, Eng., M. Eng, C.D.	ldurocher@cegep-heritage.qc.ca		B200	X2048

OFFICE HOURS: TEACHER NAME	MONDAY	TUESDAY*	WEDNESDAY	THURSDAY	FRIDAY
LPD	16h00-19h00	16h00-19h00	16h00-19h00	18h00-19h00	

- Via Teams only

Course Description	Description du cours
In this course students will develop their own electronic IoT device through the application of a product development methodology. On the design side, students will be expected to fully test the functionality of their design via prototype, complete their printed circuit board (PCB) layout design and have their PCB fabricated, populated, and tested at the hardware level.	Dans ce cours, les étudiants développeront leur propre conception électronique IoT grâce à l'application d'une méthodologie de développement de produit. Côté conception, les étudiants devront tester la fonctionnalité de leur conception par prototype, terminer la conception de leur carte de circuit imprimé (CCI) et la faire fabriquer, assembler, souder et tester les composantes du CCI.
Course Learning Outcomes **On successful completion of this course**, students will be able to … 1. Write a project charter 2. Conduct a Preliminary Design Review 3. Simulate/ Prototype an IoT (Internet of Things) design 4. Design a PCB required by the IoT project 5. Fabricate and populate the PCB 6. Test the PCB at the hardware level 7. Present and justify their design	**Résultats d'apprentissage du cours** **Après avoir réussi ce cours, les étudiants seront capables de…** 1. Rédiger une charte de projet 2. Effectuer une revue de conception préliminaire 3. Simuler/prototyper la conception d'un IoT 4. Concevoir une disposition de CCI requise par le projet IoT 5. Fabriquer et peupler le CCI 6. Testez le CCI au niveau matériel 7. Présenter et justifier leur conception
Course Evaluation / Évaluation du cours	

Deliverables	Livrables	Ponderation/ Pondération	Week/ Semaine
Project Charter (accepted & signed)	Charte de projet (acceptée et signée)	5%	3
Industry Review Presentation	Revue de projet (avec industrie)	15%	6
Functional Breadboard Demo, test plan test result	*Demo fonctionnel, plan de test, resultat de test*	15%	13
Final Assessment 1: KiCAD project files	*Final Assessment 1: KiCAD project files*	10%	12-16
Final Assessment 2: FAT (Factory Acceptance Testing) Presentation	*Final Assessment 2: FAT Presentation*	20%	14-16
Final Report	*Rapport final*	20%	15-16
Quiz - Various Topic	Quiz –sujets variés	15%	4-16

Student Progress	Progression des étudiants
Students are encouraged to check OMNIVOX regularly to monitor their progress. Grades are posted in OMNIVOX as soon as possible following an evaluation activity. By the end of week six, students will have completed at least one evaluation activity. During week 7, students' **academic standings** will be reviewed. **Students at risk** of not achieving or maintaining Good Academic Standing will be contacted.	Les étudiants sont encouragés à consulter OMNIVOX régulièrement pour suivre leurs progrès. Les notes sont affichées dans OMNIVOX dès que possible après une activité d'évaluation. À la fin de la sixième semaine, les élèves auront terminé au moins une activité d'évaluation. Au cours de la semaine 7, les **résultats scolaires** des étudiants seront examinés. **Les étudiants risquant** de ne pas atteindre ou maintenir de bons résultats scolaires seront contactés.

Required Course Material	Matériel de cours requis
The student should plan on spending $100 to $250 for supplies for the project. This is the cost to be spread across two project courses; this course and the Final Project II course in the winter semester.	L'étudiant doit prévoir de dépenser entre 100$ et 250$ en matériel pour le projet. Il s'agit du coût à répartir sur deux cours du projet ; ce cours et le cours Projet final II au semestre d'hiver.

Required Textbook	Livre requis
Theirs is no required textbook for this course.	Il n'y a pas de manuel obligatoire pour ce cours.

Bibliography / Bibliographie

- Making Things Talk: Using Sensors, Networks, and Arduino to see, hear, and feel your world **ISBN:**0596510519 Tom Igoe
- Physical Computing: Sensing and Controlling the Physical World with Computers **ISBN:**159200346X Dan O'Sullivan Tom Igoe
- Building Wireless Sensor Networks: with ZigBee, XBee, Arduino, and Processing **ISBN:**0596807732 Robert Faludi
- Robot Builder's Bonanza, 4th Edition **ISBN:**0071750363 Gordon McComb
- Robot Building for Beginners (Technology in Action) **ISBN:**1430227486 David Cooke
- Intermediate Robot Building (Technology in Action) **ISBN:**1430227540 David Cooke
- Practical Electronics for Inventors 2/E **ISBN:**0071452818 Paul Scherz
- Arduino Cookbook **ISBN:**0596802471 Michael Margolis

Course Syllabus	**Syllabus**
This course is the first of two courses that, together, form a Capstone project for the student's program. It leverages material from previous courses, such as Project Management and Product Development in the Project streams, as well as C language skills from Micro I. It is heavily reliant on courses that occur at the same time: Microprocessor II and embedded programming. The requirement of the class is to identify a small-scale electronic device that includes: a purpose-built PCB (with surface-mount components), a microcontroller with Wi-Fi connection to a graphical user interface (GUI). The object of this semester's course is to a) identify an acceptable project; b) develop a plan to implement that project by the end of next semester; and c) have a fully designed and/or assembled PCB, for further testing and programming in the following semester. As part of the project plan, a software development plan is required. The software plan must lay out the requirements for the software embedded on the microcontroller and the GUI, running on a PC (or other device) and how the two software pieces will interact. Detail and specifics of the code and the interface will be determined next semester, but an overall concept is required at the end of this semester. The intent of the course is to have a completed 'proof of concept' product that is fully functional, tested and documented well enough that a future student could re-produce the effort accomplished this year. The student will have to learn how to use source control tool git (gitlab.com) for managing their software and document versioning.	Ce cours est le premier de deux cours qui, ensemble, forment un projet *Cap stone* pour le programme de l'étudiant. Il s'appuie sur le matériel des cours précédents, tels que la gestion de projet et le développement de produits dans les flux de projet, ainsi que sur les compétences en langage C de Micro I. Il dépend fortement des cours qui se déroulent en même temps : microprocesseur II et programmation embarquée. L'exigence de la classe est d'identifier un appareil électronique à petite échelle qui comprend : un circuit imprimé spécialement conçu (avec des composants montés en surface), un microcontrôleur avec connexion Wifi à une interface utilisateur graphique (GUI). L'objet du cours de ce semestre est de a) identifier un projet acceptable ; b) élaborer un plan pour mettre en œuvre ce projet d'ici la fin du prochain semestre ; et c) avoir un circuit imprimé entièrement conçu et/ou assemblé, pour des tests et une programmation supplémentaires au cours du semestre suivant. Dans le cadre du plan de projet, un plan de développement logiciel est requis. Le plan logiciel doit définir les exigences pour le logiciel intégré sur le microcontrôleur et l'interface graphique, fonctionnant sur un PC (ou un autre appareil) et comment les deux logiciels interagiront. Les détails et les spécificités du code et de l'interface seront déterminés au prochain semestre, mais un concept global est requis à la fin de ce semestre. Le but du cours est d'avoir un produit de «preuve de concept» complet qui est entièrement fonctionnel, testé et suffisamment bien documenté pour qu'un futur étudiant puisse reproduire l'effort accompli cette année. L'étudiant devra apprendre à utiliser l'outil de contrôle de code source git (gitlab.com) pour gérer ses versions de logiciels et de documents en équipe.

Week Semaine	Date	Course Delivery (campus or online)	Topic/Course Activity	Important Dates
1	August 21	on campus	• Course Introduction • Brainstorming • Pair formation	**First Day** of Classes August 25th is **last day to change a course**
2	August 28	on campus	• Project ideas exploration • Reverse engineering exercise	
3	September 5	On campus	• Team formation (2 pair) • Class project charter • Individual Project proposal	Monday holiday
4	September 11	on campus	• Preliminary Design I - nano • Breadboard Prototyping & testing • Component exploration	September 15 is **last day to drop a course**
5	September 18	on campus	• Preliminary Design II - GPIO • Breadboard Prototyping & testing • Component selection	
6	September 25	on campus	• Preliminary Design III - BLE • Design presentation Dry run • Presentation to Industry	
7	October 2	on campus	• Draft PCB design • Bill Of Materials	
8	October 9	on campus	• Parts ordering • PCB design verification • Complete PCB Layout & Ship	October 9 is **Thanksgiving holiday** (no classes)
9	October 16	on campus	• Preliminary Design IV – Wifi • Introduction to mqtt	
10	October 23	on campus	• Receive parts • Receive PCB	**Wellness Days** (no classes)
11	October 30	on campus	• Test PCB (when arrived) • Begin Firmware Development • Procure additional Parts • PCB Assembly (if PCB is received)	

			• Prepare FAT Test Presentation & Report	
12	November 7	on campus	• Test PCB (when arrived) • Circuit Prototyping & Simulation • Firmware Development II • Procure additional Parts • PCB Assembly (if PCB is received) • Prepare FAT Test Presentation & Report	
13	November 14	on campus	• Test PCB (when arrived) • Circuit Prototyping & Simulation • Firmware Development III • Procure Parts • PCB Assembly (if PCB is received) • Prepare FAT Test Presentation & Report	
14	November 21	on campus	• Evaluate finalized & completed work (PCB Schematic, Layout, circuit simulation/prototype) • Final project I presentation dry run	
15	November 28	on campus	• Final project I presentation	
16	December 5	on campus	• Update project artefacts • Draft Final Report • Course wrap-up and Feedback	**December 8** is the **last day of classes**

In this course, please know that:

Communication is so Important!

Attendance
Regular attendance is essential for your success. It is your responsibility to participate and to complete the course requirements. Please advise your teacher if you will be absent.
Note: First year, first semester attendance is monitored.

Student Conduct
- o Students are expected to behave in a respectful and professional manner with their instructor and their peers, as per Policy 24.
- o Students are expected to attend all classes and do all coursework assigned to them.

      o   Students must follow the **EIT's Lab Housekeeping rules**.

Grade Review

A passing grade in this course is 60%. Being your capstone project, you should consider aiming for 75+%

Understanding your grade is important!

- **During the semester**, if you do not **understand** the mark you received for an evaluation activity, please review it with your teacher as soon as possible, within one (1) calendar week of receiving your graded evaluation.
- Following a discussion with the teacher, if you find your evaluation to be **unfair or inequitable**, submit a Request for Grade Review form to the department co-ordinator within one (1) calendar week of reviewing your grade with your teacher.
- If the grade issue remains unresolved, you have the **right to appeal your final grade** in this course within one (1) calendar week of the course final grade being posted in OMNIVOX. Fill out the remaining sections of the Request for Grade Review form and submit it to Academic Services. Your grade may be lowered, raised, or stay the same because of the grade review process.

The **last day to drop this course** without penalty is **September 16**, 2023.

Accommodation for Evaluation Activities

If you fall into any of these categories, you may request accommodation:

- **Ongoing accommodation**—for AccessAbility students
- **Critical, unforeseen incidents**—for emergencies, such as accidents
- **Pre-scheduled absences/appointments**—for college approved activities, submitted no later than four (4) weeks in advance of your evaluation(s)

If you are **absent for any other reason**, such as the flu, contact your teacher directly as soon as possible.

Correct Use of the English Language

Your use of English will be graded in this course, **20%** for each evaluation activity. College Policy 36.

Presentation and Submission of Assigned Work

Assigned work must be submitted on Omnivox as per the instructions provided there.

Late Assignments

Assignments **must be submitted** by their prescribed deadlines. Late submissions *will not* be accepted.

Missed Tests

Students are responsible to attend all tests. The instructor may allow students to re-write missed tests in cases of approved accommodation.

Academic Integrity

Academic integrity is about completing your work in a fair, honest, respectful, and responsible way. If your work shows evidence of cheating, plagiarizing, or aiding or abetting, your work will be penalized as per department policy.

Please read College Policy 33 and the recently revised Guide to Copyright.

***Please be familiar with all College policies and bylaws, particularly*:**
- Policy 5 Relating to the Evaluation of Student Achievement (IPESA)
- Bylaw 5 Concerning Support for Student Success
- Policy 36 Concerning the Promotion of the English Language
- Policy 33 Concerning Academic Integrity
- Policy 24 Concerning Standards of Student Conduct

These are available on the College's website. Please read them.

This course is subject to the rules relating to intellectual property and to image rights. Therefore, it is explicitly prohibited to share or use it in any form without the written permission of the copyright holder. Any infringement will be subject to sanction. The recording of this course can only be used within the framework of this course, and only by the students enrolled in it.

Propriété intellectuelle et cours en ligne
Tout le matériel du cours est soumis aux règles relatives à la propriété intellectuelle et au droit à l'image. Il est donc formellement interdit de le partager sous quelque forme que ce soit sans l'autorisation écrite de la professeure sous peine de sanction. Ce matériel ne peut être utilisé que dans le cadre du présent cours par les étudiantes et les étudiants qui y sont inscrits.

Concernant les cours en mode synchrone et les autres rencontres virtuelles, il est formellement interdit de l'enregistrer (vidéo, photo, capture d'écran, etc.)