Course Outline

FACULTY:	**Faculty of Science and Technology**
PROGRAM(S):	243.A0
DEPARTMENT:	Computer Engineering Technology
COURSE TITLE:	Advanced Embedded Systems Programming
COURSE NUMBER:	247-308-VA
COURSE SECTION(S):	1 and 2
PONDERATION:	3-3-2
NUMBER OF CREDITS:	2.67 credits
PREREQUISITE(S):	
SEMESTER/YEAR:	Third semester Autumn 2020
TEACHER (THEORY):	Serge Hould Office: K311 Tel: 514-744-7500 Ex.8330 E-mail: houlds@vaniercollege.qc.ca
AVAILABILITY:	Office Hours: Monday: 1:00 PM to 3:30 PM *or by appointment*
TEACHER (LAB): SECTION 0002	Manijeh Khataie Office: N245 Tel: 514-744-7500 Ex.7535 E-mail: MIO
AVAILABILITY:	Office Hours:

Introduction

This course allows the students to master the language constructs presented in the Embedded Systems Programming course, and introduces the advanced topics of the C language and its syntax in an embedded system context. It also introduces the student to C++ and OOP. A design method will be introduced. The students will familiarize themselves with the specifications and will define appropriate algorithms. The students will use an IDE to analyze and debug programs. Students will write programs to solve typical engineering problems. They will enhance their skills in problem analysis, problem logic development, program design and implementation that can be applied in a wide variety of programming problems. They will document their programs to make it easy to read and maintain.

Statement of Competency

037STo program computerized systems

	Competency
1.	Become familiar with the specifications
2.	Define algorithms
3.	Customize the environment
4.	Code the program
5.	Perform compilation exercises
6.	Conduct tests
7.	Optimize the code
8.	Document the program
037T	**To modify computerized systems programming**
1.	Become familiar with the specifications
2.	Analyze the existing programs
3.	Plan the work
4.	Modify programming
5.	Conduct tests
6.	Write an analysis report

Bibliography (required according to MEES)

C How to Program, 7/e, Paul and Harvey Deitel

C Programming Language (2nd Edition) , Brian W. Kernighan (Author), Dennis M. Ritchie (Author) Est. price

The following subjects will be covered:

Week No.	Theory *	Lab*
1.	Course outline, Review C style, symbolic constants Intro Allegro c library	Lab1: Intro to Allegro C Library and GitHub
2.	Multi-source file system GitHub, Modulo operator Functions, use the random function	Lab1 CONT'D
3.	Structures Array of structures Macro substitution and Macro with arguments.	Lab2: multi-source file project using Allegro C library.
4.	Conditional inclusion and preprocessor directives Dynamic memory allocation-malloc and free Heap and stack memory	Lab2 CONT'D
5.	OOP Type cast, Ternary operator	Lab3: Procedural Oriented Programming (POP) using Allegro C library.
6.	Void pointer, Endianness, Function pointer Review	Lab3 CONT'D
7.	***Mid-term exam***	Lab4: intro to C style OOP using Allegro C library.
8.	Class-object	Lab4 CONT'D
9.	bitwise operations, storage class	Lab5: Intro to class-object in c++
10.	Intro to LabX1 board Pointer to structure	Lab5 CONT'D
11.	Union, Typedef	Lab6: Introduction to LAB-X1 development board
12.	bit fields	Lab7: Interface a keypad to a microcontroller
13.	Array of pointers	Lab7 CONT'D
14.	Review	Lab8: RPN Calculator Project
15.	***Final exam***	Lab8 CONT'D

* The sequence is tentative

Note 1: C programming on two different environments and platform: Windows on a PC and MPLABX on LabX1 platform.

Note 2: Students will use GitHub to upload their code at the end of a lab session. Through GitHib, the teacher will give them a feedback before the next lab session.

Additional required material:

Thumb drive			

Course Structure

THEORY:	3 hours/ week:	Quiz, lecture, demonstration, problem solving, and discussion with student participation.
LABORATORY:	3 hours/ week:	The student will perform typical tasks in programming computerized systems. All their code will be uploaded on GitHub.
HOMEWORK:	2 hours/ week:	The student will be expected to devote at least 3 hours per week to homework , reading lecture documents and complete their lab code.

ATTENDANCE

THEORY:	Consistent attendance is strongly recommended. **Students are responsible for obtaining all material covered during any absence.**
LABORATORY:	Laboratory sessions are part of assessment activities. Failure to complete lab activities assigned in the designated lab class without just cause may result in a failure of the lab session and any results and/or lab report derived from the session. In order to meet and be evaluated on the course competencies lab attendance is required. Note that there is both a separate and an integrated **professionalism** mark associated with the course (see below). During the lab periods, you are expected to work on your assignments. It is not permitted to use the internet during lab periods outside the scope of the lab.
TESTS:	Absence will result in failure of the missed test (mark of 0). Students with a just cause for absence are encouraged to seek alternative arrangements with the instructor – beforehand if possible.

EVALUATION

The final mark will be weighted:

Lab report and lab results	25%
Quizzes and assignments	25%
Midterm Exam	20%
Final Exam	25%
Professionalism/ English proficiency	5%
Total:	100%

The following general rules apply:

- A minimum mark of 60% is required to pass the course **AND** at least 50% in the Theory portion **AND** at least 50% in the Lab portion. If the mark is less than 50% for either the Theory o**r** Lab portion, the total mark will not exceed 55%.
- At least one week's notice will be given for test dates or changes in test dates.
- Tests questions will not be re-graded after 24 hours of returning and any altered material will not be re--graded
- Quizzes may be given without prior notice – there are no make-ups for quizzes.
- Students are expected to attend all their schedule classes.
  - Absence from any lab class where specific skills are being assessed will result in a failure of that skill.
- **Students are expected to conduct themselves in a professional manner at all times.** This includes but is not limited to:
  - Arriving to class (theory and laboratory) on time and prepared to do the required work;
  - Conducting themselves in an appropriate manner at all times (including being respectful to the teacher, classmates, and any guests);
  - Using professional language (no cursing and/or swearing and using appropriate vocabulary);
  - Arriving to class/lab with all necessary supplies (logbook, notebook, textbook, manual, paper, writing implements, calculator, etc.);
  - Turning off all personal communication/music/video electronics (removing headphones, earphones, ear buds etc.); and
  - Having all assigned work completed.

  Remember that developing professional behaviours and habits now is an important aspect of preparation for entering a professional work environment in the future.
- Students are expected to take their own notes during classes.
- Calculators with memory for equations (for example graphing calculators) will not be allowed when writing tests.
- Reports must be typed and computer generated according to the guidelines provided by the teacher.
- When requested, Lab preparations and Lab Results/logbooks are to be handed in during the lab session. Late Lab Preparations/Lab Results may not be accepted, and a zero mark will be recorded.
- Reports are due two weeks after they are assigned unless the instructor provides a specific due date.
- Any assigned work submitted beyond 1 week late may not be accepted, and a zero mark may be recorded. Assigned work up to and including one week late may be reduced by up to 25% of the maximum mark.
- In-class assignments will only be accepted in the class in which they are assigned.
- Students who are consistently late for class (lab and/or theory) may be refused entry.
- All grades are reported on a numeric scale from 0% to 100%. The following categories briefly describe the relative value of these grades.

range	mean	Description
90 - 100	**95**	Excellent, mastery of the objectives
80 - 89	**85**	Very Good mastery of the objectives
65 - 79	**72**	Good, mastery of objectives
60 - 64	**62**	Fair mastery of objectives
0 - 59	n/a	Poor mastery of objectives

Academic and other Resources

If at any point in the semester, you are concerned about the course or you realise that you are having academic difficulties; your first resource should be to talk to me, your teacher. Academic difficulties include problems with the understanding of the theory, to the development of the practical skills required by the course. The earlier you look for help, the greater your chances of succeeding in the course. If I don't feel I can provide you with the help you need then I may recommend one of the College resources below.

For other problems or difficulties, you may encounter while at Vanier there are a number of Services available to help you within the college. They are there for you to use. These include:

Student Services (C203): Some areas where they provide services and/or information are:

Services for students with disabilities	Counselling (personal and other problems)
Student Advocate	Financial Aid (including aid and scholarships)
Health Services (Nurse on staff)	Student Employment
Academic and Behaviour Policies	Lockers
Housing	Volunteering

Student Services is a great resource for questions about college life and any problems you encounter while at Vanier. If they do not have the answer, they can direct you to the right place to find it.

Tutoring and Academic Success Center - TASC (F-300): Student-orientated centre dedicated to promoting and aiding students' development and success in academics and in society.

Admissions and placement tests	S.T.A.R. Program
English Exit Exam	English conversation and pronunciation clubs
English Peer Tutoring	Scholarship information
Vanier Native Program	Diversity support

TASC is the main college resource for students with learning difficulties and for students with weak English language skills.

Science, Technology, Engineering and Mathematics - STEM (D-301): This Centre aims to promote student success in mathematics and science. The large interactive study space includes a hackerspace for hands-on applied projects such as robotics, and a study hub for collaborative group work. Teacher help, computers, and a large collection of math and science textbooks are equally available. We offer a number of activities, services and resources including:

Free drop-in peer tutoring	Drop-in help from teachers
Free private tutoring	Teacher-led review sessions
Computer access	Laptop borrowing

Mediation and Grades Review

There are two committees available to the student for resolution of academic complaints.

1. The *Grades Review Committee* to review complaints concerning the grading of students' work.
2. The *Faculty Mediation Committee* to review academic complaints other than those dealing with student grades – see *Student Academic Complaints* below.

General College Academic Policies

It is the student's responsibility to be familiar with and adhere to all Vanier College Policies. A summary of the course-level policies that apply in this and all other Vanier courses can be found under “Course-Level Policies” in Important Vanier Links on Omnivox, or by following this link: http://www.vaniercollege.qc.ca/psi/course-level-policies/ . Complete policies can be found on the Vanier College website, under Policies.