Course Outline

FACULTY:	**Faculty of Science and Technology**
PROGRAM(S):	**Computer Engineering Technology**
DEPARTMENT:	**Computer Engineering Technology**
COURSE TITLE:	**EMBEDDED SYSTEMS PROGRAMMING**
COURSE NUMBER:	**247-208-VA**
COURSE SECTION(S):	0001, 0002
PONDERATION:	2-3-2 lecture - lab work - homework
NUMBER OF CREDITS:	2.33 credits
PREREQUISITE(S):	**247-108-VA**
SEMESTER/YEAR:	Semester 2/2020
TEACHER (THEORY):	Subash Handa
	Office: K-309
	Tel: 514-744-7500 Ex. 7756
	E-mail: handas@vaniercollege.qc.ca
AVAILABILITY:	Office Hours: Tuesday 2:30- 4 pm. or By appointment

Course Description:

In this course, C programming language and its syntax will be introduced to the student. The student will familiarize with programming, optimizing and modifying of C programs in an embedded context, with the specifications and will define appropriate algorithms. The students will use an IDE to analyze and debug structured C programs. They will be introduced to different environments: Linux, Windows and embedded microcontroller. They will document their programs to make it easy to read and maintain.

Statement of Competency

Competency 037S—To program computerized systems

Achievement Context:

- Working with specifications, standards in effect, a standard check-out procedure and instructions
- Using simulation and emulation software, a software test bench associated with the microprocessor type, appropriate French and English technical documentation, a networked computer and an operating system
- In various types of software development environments
- In various programming languages

Element 1:	Become familiar with the specifications.
Element 2:	Define algorithms.
Element 3:	Customize the environment.
Element 4:	Code program.
Element 5:	Perform compilation exercises.
Element 6:	Conduct tests.
Element 7:	Optimize the code.
Element 8:	Document the program.

MINIMUM REQUIREMENTS:

Where specified, students are to read the required reading every week of the semester. Readings may be added or changed at the instructor's discretion. The following week, students should expect to be evaluated with a brief quiz on the prior week's subject.

- Class notes taken by the student.
- Handouts as required.
- USB Stick, Storage of all files for the course

For this course, all students are required to *buy the online book* by following the procedures listed below:

Instructions for student access:

Sign in or create an account at learn.zybooks.com

1. Sign in or create an account at learn.zybooks.com
2. Enter zyBook code: Vanier247208VAHandaSpring2020
3. Subscribe—US$58

AND

- Beagle Bone Black (approximate cost $80)

Bibliography

- *C How to Program, 8/e, Paul and Harvey Deitel, ISBN-13:978-0-13-397689-2*
- *Exploring BeagleBone, Derek k Molloy, ISBN: 978-1-118-93512-5*

Course Content (see *Note1)

Week	Theory	Lab
1	Course outline Language rules and syntax Reserved words Variable types Constants Headers	Introduction to environment. Hello world Chapters 1 &2
2	Assignment operators Mathematical and logical operators Precedence	Decision making / Chapter 3
3	Decision making structures & loops	Loops / Chapter 4
4	Decision making structures & loops	Loops / Chapter 4
5	Arrays	Chapter 5
6	Arrays / User-Defined functions	Chapter 5/ Chapter 6
7	Midterm	Catchup Lab
8	Modularity and functions	Modularity/Chapter 6
9	Structures	Chapter 7
10	Pointers	Chapter 8
11	Files/I/O	Files Chapter 9
12	Recursion	Chapter 10
13	Additional Material / Beaglebone	Chapter 12
14	Review	Beaglebone Exercise
15	Final Exam	Lab Exam

**Note1: Dates and content may vary*

Course Structure

THEORY:	2 hours/week:	Lectures and demonstrations, discussions and problem solving with student participation.
LABORATORY:	3 hours/week:	The student will perform typical tasks in programming computerized systems. Detailed report written by the students demonstrating an understanding of the programing done.
HOMEWORK:	2 hours/week:	The student is expected to devote approximately 2 hour per week to homework and study.

ATTENDANCE

THEORY:	Consistent attendance is strongly recommended. **Students are responsible for obtaining all material covered during any absence.**
LABORATORY:	Failure to complete all 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).
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:	75% theory:	25%	Homework and Quizzes
		25%	Midterm Test
		25%	Final Test
	25% lab work:	20%	Lab Reports & lab results/Lab Exam
		5%	Professionalism and English proficiency.
	Total:	**100%**	

The following general rules apply:

- A minimum mark of 60% is required to pass the course. Student must pass the midterm and the final or receive 75% in the final exam to pass the course
- At least one week's notice will be given for test dates or changes in test dates.
- Tests 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 one weeks after they are assigned unless the instructor provides a specific due date.
- **ALL** assigned work (assignment, lab report etc.) must be submitted **ON TIME**. **NO LATE SUBMISSION WILL BE ACCEPTED** and a zero mark will be recorded, unless a valid reason was communicated to the instructor at least 2 days prior to the deadline.
- 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.