Course Outline

FACULTY:	**Faculty of Science and Technology**
PROGRAM(S):	243.A0
DEPARTMENT:	247 Computer Engineering Technology
COURSE TITLE:	Embedded Linux Computer
COURSE NUMBER:	247-305-VA
COURSE SECTION(S):	00001
PONDERATION:	2-3-2
NUMBER OF CREDITS:	3 credits
PREREQUISITE(S):	247-208-VA (absolute)
SEMESTER/YEAR:	Third semester Autumn 2019
TEACHER (THEORY):	Manijeh Khataie Office: N245 Tel: *514-744-7500, Ex. 7535* E-mail: MIO
AVAILABILITY:	Office Hours: Thursday 12:30 3:00PM or by appointment
TEACHER (LAB):	Manijeh Khataie

Introduction Course Description:

In this course, students will learn to use the Linux system in an embedded development environment. They will familiarize themselves to a networked embedded Linux system. They will learn how to interface peripherals to an embedded Linux computer. They will become familiar with specifications of an embedded Linux computer. They will analyze the Linux system and plan its integration and installation. They will integrate drivers and modules to an embedded Linux computer. They will assemble, test, optimize and document the embedded Linux computer. They will also program, compile and debug using a development toolchain**.**

Statement of Competency

037Q To integrate and install computerized system components

	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

Bibliography

Embedded Linux Primer: A Practical Real-World Approach (2nd Edition) by Christopher Hallinan

Exploring BeagleBone: Tools and Techniques for Building with Embedded Linux by Derek Molloy

Linux Device Drivers by Jonathan Corbet

ourse outline		
Week	**Theory topics**	**Tentative lab activities**
1	Introduction to embedded software and Linux	Linux on Virtual Box
2	Beagle Bone Black (BBB) hardware platform	Exploring Beagle Bone Black
3	BBB software	Beagle software
4	Linux, basic commands	Linux System Exploration-1
5	Exploring embedded Linux systems, make file	Make file
6	Basic Script language	Script language 1
7	Processes	Script language 2
8	Midterm	Processes
9	Boot loader, U-boot	Continuation of Lab on Processes
10	Linux Functions	U-Boot
11	C programming examples BBB communications	Beagle Bone Black I2C communication and clock using c
12	C programming examples BBB communications	I2Ccommunication, continue
13	Advanced Linux commands	Project
14	Review	Project
15	Final	Final Lab Exam

Additional required material:

Breadboard	Beagle Bone Black	Micro SD Card 8Gb minimum	
Thumb drive			

Beagle Bone related products to buy:

BBONE-BLACK-4G – Single Board Computer, AM3358 ARM Cortex-A8 MCU,4GB eMMC On-board Flash Storage, USB Interface for 71.35$

Course Structure		
THEORY:	2 hours/week:	Quiz, lecture, demonstration, problem solving, and discussion with student participation.
LABORATORY:	3 hours/week:	The student will perform typical tasks embedded Linux.
HOMEWORK:	2 hours/week:	The student will be expected to devote at least 2 hours per week to homework, reading datasheets and other documents.

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 – before if possible.

EVALUATION (tentative)			
The final mark will be weighted:	50% theory:	20%	Homework and Quizzes
		15%	Midterm Test
		15%	Final Test
	50% la work:	30%	lab work and Reports
		15%	lab Test/project
		5%	Professionalism
	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 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 a week after they are assigned unless the instructor provides a specific due date.
- For late assignments, a penalty of 5% per day will be applied up to a max of 25%.
- Any assigned work submitted beyond 1 week late will not be accepted, and a zero mark will be recorded.
- 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
Student Life	OPUS Card
Sustainability	Volunteering

Housing

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.