Course Outline

FACULTY:	**Faculty of Science and Technology**
PROGRAM(S):	243.A0
DEPARTMENT:	Computer Engineering Technology
COURSE TITLE:	Circuits and Embedded Systems
COURSE NUMBER:	247-405-VA
COURSE SECTION(S):	1
PONDERATION:	2-3-2
NUMBER OF CREDITS:	2.33 credits
PREREQUISITE(S):	247-205-VA, 247-307-VA
SEMESTER/YEAR:	Forth semester Winter 2021
TEACHER :	Serge Hould Office: K311 Tel: 514-744-7500 Ex.8330 E-mail: houlds@vaniercollege.qc.ca
AVAILABILITY:	Monday: 9:30 AM to 11:30 AM Thursday: 1:00 PM to 4:00 PM

Introduction

In this course students will familiarize themselves with more complex integrated analog circuit devices in a digital environment. They will learn about sensors, noise, instrument amplifiers, opto-electronic devices, active filters and switch mode power supplies. Students will use various analog and digital simulation tools. They will design, troubleshoot and test bench a variety of circuits containing analog and digital systems comprised of microcontrollers and digital processors. They will learn I2C bus protocol to interface between analog circuit and microcontroller circuit.

Statement of Competency

037E–To diagnose an analog electronics problem.

	Competency
1.	Become familiar with the specifications
2.	Identify anomalies
3.	Take measurements.
4.	Analyze the results
5.	Determine the cause or causes of the problem.
6.	Write a report.

037F - To diagnose a digital electronics problem.

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Bibliography (required according to MEES)

Electronic Devices by Thomas L. Floyd

Week	Theory topics	Tentative lab activities
1	Review BJT	Lab1: BJT transistor review
2	Review OP-Amp Linear regulation	Lab2: DC linear regulator
3	Linear regulation	Lab3: Linear power supply with current limiting
4	Comparator	Lab3: continue
5	Coil and inductor	Lab4: Introduction to inductor
6	SMPS	Lab5: SMPS simulation open loop
7	SMPS boost	Lab6: SMPS with voltage feedback
8	**Mid-term exam**	Lab7: PWM generation
9	SMPS buck PWM	Lab7: continue
10	DC motor	Lab8: Dc motor speed control and PID
11	DC motor speed regulation	Lab8: continue
12	Interrupt and timer	Lab9: Interrupt and timer
13	I2C	Lab10: I2C protocol
14	I2C	Lab10: continue
15	**Final exam**	To be determined

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 in circuit wiring, circuit troubleshooting and programming.
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:	*Description (see Department Policy)* *Example:* Consistent attendance is strongly recommended. **Students are responsible for obtaining all material covered during any absence.**
LABORATORY:	*Description (see Department Policy)* 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:	*Description (see Department Policy)* 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:	70% theory:	20% Homework and Quizzes 20% Midterm Test 25% Final Test 5% English proficiency/Professionalism
	30% lab work:	
	Total:	**100%**
		Use of Webcam: This course requires students to have a working webcam. Classes and assessments may be conducted using MS Teams or Zoom where the teacher may require students to turn on their webcams. Students should contact the course instructor if they require accommodations or have any questions or concerns.

The following general rules apply:

- In this course students are required to open their webcam. It is the student's responsibility to ensure they have a working webcam for the duration of the course. However, the College has put in place measures to support students who are lacking the needed technology.
- 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
- Student Advocate
- Health Services (Nurse on staff)
- Academic and Behaviour Policies
- Housing
- Counselling (personal and other problems)
- Financial Aid (including aid and scholarships)
- Student Employment
- Lockers
- 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
- English Exit Exam
- English Peer Tutoring
- Vanier Native Program
- S.T.A.R. Program
- English conversation and pronunciation clubs
- Scholarship information
- 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
- Free private tutoring
- Computer access
- Drop-in help from teachers
- Teacher-led review sessions
- 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.

Information on College Policies

It is the student's responsibility to be familiar with and adhere to Vanier College Academic Policies. A summary of the course-level academic policies that apply in this and all other Vanier courses can be found in Omnivox under Important Vanier Links, or by following this link

http://www.vaniercollege.qc.ca/psi/course-level-policies/

Complete policies can also be found on the Vanier College website, under Policies.