

NET3001A (0.5 credit)  
Real Time Systems  
Fall 2017

<b>Instructor:</b>	Graham Eatherley
<b>Office:</b>	ME4230
<b>Office Hours:</b>	Wednesdays (1:00 to 3:30 p.m.) and by appointment
<b>Lecture:</b>	Tuesdays (10:05 – 11:25) and Thursdays (13:05 – 14:25)
<b>Location:</b>	AP236
<b>Lab:</b>	Tuesdays (12:35 – 14:25) and Thursdays (10:05 – 11:55)
<b>Location:</b>	AP236
<b>Email:</b>	<a href="mailto:graham@sce.carleton.ca">graham@sce.carleton.ca</a>
<b>Phone:</b>	(613) 294-8990
<b>TA:</b>	TBA

**Course Description**

Real-time systems are designed to interact with their environment in a time-critical manner. NET3001 provides an introduction to the fundamental principles of these systems. It also presents different issues associated with using a single processor computer system to implement a real-time system.

**Course Objectives:**

- introduce the architecture of real-time embedded systems
- gain experience with both assembly language and C arm cortex programming
- introduce the interrupt system as a source of events
- introduce the concept of concurrency in a single processor computer system using the event, message and dispatcher model
- provide practical laboratory exercises using an arm cortex development board
- gain experience with event-driven embedded real-time systems
- provide practical hardware experience in a team environment through the proposal and completion of a course project. There will be no other assignments.

**Textbook/Reference Material:**

- There is no textbook for this course; however, students are expected to purchase a downloadable PDF book which will serve as the lab manual. Special arrangements have been made with the author to provide a 50% discount to students. “Mastering STM32” is available through Leanpub. The expected price will be under \$20. Other information will be referenced in the course Web page:

<http://ugrad.bitdegree.ca/~grahameatherly>

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**Grading:**

	%
Mid-term	25
Course Project	25
Final exam	50
Total	100

**Special Rule:** Students must achieve a minimum grade of 50% on the final exam to pass the course

<b>Week</b>	<b>Presentation</b>	<b>Lab</b>
1	Introduction/Number Systems	
2	Arithmetic Fundamentals	Lab0
3	Cortex M4/Memory Layout	Lab1
4	Assembly Language	Lab2
5	C Language	Lab3
6	GPIO/UARTS	Lab4
7	INTS/MIDTERM	Lab5
	Break Oct 26 - 30	
8	Timers	Lab6
9	A to D	Lab7
10	I2C/SPI	Lab8
11	Cooperative Multi-Tasking	Lab9
12	Preemptive Multi-Tasking	Lab10
13	Course Review	

**Inability to Complete a Lab or Write the Midterm due to Illness**

Students who are not able to attend a lab or write the midterm exam due to an illness will be given the opportunity to complete the lab or write the midterm at a later date, upon provision of a medical certificate.

*While every attempt will be made to keep to the schedule listed above, circumstances may necessitate modifications throughout the semester.*

**Medical certificate**

Please note that in all occasions that call for a medical certificate you must use or furnish the information demanded in the standard university form. <http://www1.carleton.ca/registrar/forms/>

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### **Persons with disabilities**

Students with disabilities requiring academic accommodations in this course must register with the Paul Menton Centre for Students with Disabilities (PMC) for a formal evaluation of disability-related needs. Documented disabilities could include but are not limited to mobility/physical impairments, specific Learning Disabilities (LD), psychiatric/psychological disabilities, sensory disabilities, Attention Deficit Hyperactivity Disorder (ADHD), and chronic medical conditions. Registered PMC students are required to contact the PMC at 613-520-6608 every term to ensure that they receive your Letter of Accommodation no later than two weeks before the first assignment is due or the first in-class test/midterm requiring accommodations. If you only require accommodations for your formally scheduled exam(s) in this course, please submit your request for accommodations to PMC by the deadlines published on the PMC website.

### **Religious observance**

Students requesting academic accommodation on the basis of religious observance should make a formal, written request to their instructors for alternate dates and/or means of satisfying academic requirements. Such requests should be made during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist, but no later than two weeks before the compulsory academic event. Accommodation is to be worked out directly and on an individual basis between the student and the instructor(s) involved. Instructors will make accommodations in a way that avoids academic disadvantage to the student. Students or instructors who have questions or want to confirm accommodation eligibility of a religious event or practice may refer to the Equity Services website for a list of holy days and Carleton's Academic Accommodation policies, or may contact an Equity Services Advisor in the Equity Services Department for assistance

### **Pregnancy**

Pregnant students requiring academic accommodations are encouraged to contact an Equity Advisor in Equity Services to complete a letter of accommodation. The student must then make an appointment to discuss her needs with the instructor at least two weeks prior to the first academic event in which it is anticipated the accommodation will be required.

### **Plagiarism**

The University Senate defines plagiarism in the regulations on instructional offenses as: "to use and pass off as one's own idea or product work of another without expressly giving credit to another." Borrowing someone else's answers, unauthorized possession of tests or answers to tests, or possession of material designed in answering exam questions, are also subject to university policy regarding instructional offences. For more information on Carleton University's Academic Integrity Policy, consult their website.

**IMPORTANT DATES – check the Academic Year 2017-18 Calendar**

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