# SYSC4805 – COMPUTER SYSTEMS DESIGN LABORATORY

## Course Outline
Winter 2018
(Prof. A.-M. Cretu)

### Instructor Contact Information:
- Office: Mackenzie Bldg. Room 4476
- Email: acretu@sce.carleton.ca

### Calendar Description:
Developing professional-level expertise in selected, important areas of the field by applying, honing, integrating, and extending previously acquired knowledge in team projects in the laboratory. Lecture periods are devoted to new knowledge required for the selected areas, to project-related issues, and to student presentations.

### Prerequisites:
SYSC 3303 and SYSC 3020 and fourth-year status in Computer Systems Engineering. Students who have not satisfied these prerequisites must either: a) withdraw from the course, b) submit a prerequisite waiver online at [www.sce.carleton.ca/ughelp](http://www.sce.carleton.ca/ughelp); or c) will be deregistered from the course after the last day to register for courses in the current term.

### Course Overview:
This course builds on the existing knowledge about software and hardware interfacing, software modeling and software development process, systems development processes and testing, acquired during their program. It aims at enhancing the technical knowledge in the field of computer engineering by the use of various sensors, performing data fusion, and programming a microcontroller to acquire, process the data and make decisions based on it. It also aims at developing soft skills for the future engineers ready to embark in their careers by cultivating team work skills and entrepreneurial spirit. The goal is to develop a deeper understanding of the multifaceted process of managing and developing engineering projects.

### Course Outcomes:
At the end of this course, students will be able to:
- Define concepts of product design, development methodology and team-based (small) project management
- Design and develop an embedded microcontroller-based system for an engineering problem involving hardware and software components.
- Identify and adapt to realistic constraints.
- Analyze potential solutions for an engineering project.
- Use appropriate knowledge and skills to formulate, analyze and solve an engineering problem.
- Apply scientific methods to evaluate and predict performance.
- Define, plan and manage a moderately complex project.
- Develop team work and entrepreneurial skills.
- Develop communications skills through technical presentations and reports.
**Instructional Resources:**
No textbook is required for this course. Course material and all other instructional materials will be posted on the course webpage through cuLearn.

**Lectures:**
- There is one two-hour lecture per week.
- During the first part of the term, lectures will cover issues related to team-based project management and design and development of microcontroller-based sensor system.
- During the last part of the term, lectures will serve for student project presentations.

**Labs:**
- There is one three-hour lab period per week.
- Full attendance to labs is mandatory and will be monitored throughout the term.
- The computer lab for this course is located in Mackenzie Bldg. Room 4233. The lab is open 7 days a week, whenever the building is open. Except for those timetable slots when the room is reserved for specific courses, the lab can be used any time.
- During the first labs, the students will build their team and start preparing the project planning.
- During subsequent lab sessions, the students will build their sensor system, will learn how to read and use the data coming various sensors, will design their solution, will work on their projects (following a team-based project management approach that will be presented in class) and will conduct the demo sessions by teams.
- Each team is expected to demonstrate the lab exercises and the project milestones.

**Project:**
A major component of the course is a team-based project. A topic for the project and a kit of required components will be provided at the beginning of the course. Each team is responsible for proposing a solution to a practical engineering problem and for planning and delivering a workable prototype. Each member of the team is expected to participate in all aspects of project planning, management and the design and development of the technical solution. The final grade will take into consideration team functioning aspects, the individual contributions, the quality of the proposed solution and of the submitted documents.

**Evaluation:**
This is a lab intensive course, and as such, there will be no assignments, quizzes or exams. The course work will be evaluated as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team organization &amp; project management plan document</td>
<td>5%</td>
<td>Team mark</td>
</tr>
<tr>
<td>Project progress report</td>
<td>10%</td>
<td>Team mark</td>
</tr>
<tr>
<td>Final project presentation</td>
<td>10%</td>
<td>Team mark</td>
</tr>
<tr>
<td>Final project demonstration</td>
<td>15%</td>
<td>Team mark</td>
</tr>
<tr>
<td>Final report</td>
<td>20%</td>
<td>Team mark</td>
</tr>
<tr>
<td>Small report on a relevant topic</td>
<td>10%</td>
<td>Individual mark</td>
</tr>
<tr>
<td>Self-evaluation report</td>
<td>10%</td>
<td>Individual mark</td>
</tr>
<tr>
<td>Peer review of individual contributions</td>
<td>10%</td>
<td>Individual mark</td>
</tr>
<tr>
<td>Individual project contributions</td>
<td>10%</td>
<td>Individual mark</td>
</tr>
</tbody>
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**Academic Accommodations:**
You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

**Pregnancy obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: [http://www2.carleton.ca/equity/](http://www2.carleton.ca/equity/)

**Religious obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: [http://www2.carleton.ca/equity/](http://www2.carleton.ca/equity/)

**Academic Accommodations for Students with Disabilities:** The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your *Letter of Accommodation* at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam at [http://www2.carleton.ca/pmc/new-and-current-students/dates-and-deadlines/](http://www2.carleton.ca/pmc/new-and-current-students/dates-and-deadlines/)

You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at [http://www2.carleton.ca/equity/](http://www2.carleton.ca/equity/)

**Plagiarism:**
Plagiarism (copying and handing in for credit someone else's work) is a serious instructional offense that will not be tolerated. Please refer to the chapter on Academic Integrity in the Graduate Calendar for additional information.

**Health and Safety:**
Every student should have a copy of our Health and Safety Manual. An electronic version of the manual can be found at: [http://www.sce.carleton.ca/courses/health-and-safety.pdf](http://www.sce.carleton.ca/courses/health-and-safety.pdf)

**Lecture schedule (Tentative):**

1. Introduction (1 week)
2. Design and development process of an embedded system with microcontrollers (1 week)
3. Team-based project management (2 weeks)
4. Data acquisition. Sensors. Output devices. (1 week)
5. I/O Interfacing (2 weeks)
6. Data processing and decision-making (1 week)
8. Students presentations (2-3 weeks)