1 INSTRUCTOR
Instructor: Suresh Neethirajan, Ph.D., P.Eng.
Office: RICH 3513, ext. 53922
Email: sneethir@uoguelph.ca
Office hours: By appointment

2 LEARNING RESOURCES

2.1 Course Website
Course material, news, announcements, and grades will be regularly posted to the ENGG*6150 Courselink site. You are responsible for checking the site regularly.

2.2 Required Resources

2.3 Recommended Resources

2.4 Additional Resources
Lecture Information: All the lecture notes are posted on the web page (week #1–#12).
Assignments: Download the assignments according to the schedule given in this handout. All the solutions will be posted as indicated.
2.5 Communication & Email Policy

Please use lectures and lab help sessions as your main opportunity to ask questions about the course. Major announcements and/or changes will be posted to the course website. It is your responsibility to check the course website regularly. Electronic communication should be limited to the course forum, however topics of a personal and confidential nature (e.g. marks) should be emailed to the instructor: sneethir@uoguelph.ca As per university regulations, all students are required to check their uoguelph.ca e-mail account regularly: e-mail is the official route of communication between the University and its student.

3 ASSESSMENT

3.1 Dates and Distribution

<table>
<thead>
<tr>
<th>Distribution</th>
<th>Grades</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Report 1 (Thermocouple Sensor)</td>
<td>0%</td>
<td>October 5, 2015</td>
</tr>
<tr>
<td>Design Component 1</td>
<td>2%</td>
<td>On or before September 28, 2015</td>
</tr>
<tr>
<td>Design Component 2</td>
<td>2%</td>
<td>On or before October 9, 2015</td>
</tr>
<tr>
<td>Design Component 3</td>
<td>2%</td>
<td>On or before October 23, 2015</td>
</tr>
<tr>
<td>Design Component 4</td>
<td>2%</td>
<td>On or before November 4, 2015</td>
</tr>
<tr>
<td>Design Component 5</td>
<td>2%</td>
<td>On or before November 11, 2015</td>
</tr>
<tr>
<td>Presentation (Trade Show 😊)</td>
<td>30%</td>
<td>November 18, 2015</td>
</tr>
<tr>
<td>Final Design Project Report</td>
<td>60%</td>
<td>November 27, 2015</td>
</tr>
<tr>
<td>Assignments (A total of 6)</td>
<td>0%</td>
<td>None</td>
</tr>
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</table>

Design Component Schematics – Final Design Project

<table>
<thead>
<tr>
<th>Submission</th>
<th>Description</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Design Component 1</em> – One Page Proposal &amp; Project Pitch – Accompanied with Oral Presentation of the Group – During Lab Hours</td>
<td>September 28, 2015</td>
</tr>
<tr>
<td>2</td>
<td><em>Design Component 2</em> – Two Page Report - Background literatures from journal articles (or) News Magazines (or) from the Internet</td>
<td>October 9, 2015</td>
</tr>
<tr>
<td>3</td>
<td><em>Design Component 3</em> – Alternate Design – Two Page Report</td>
<td>October 23, 2015</td>
</tr>
<tr>
<td>4</td>
<td><em>Design Component 4</em> – Full Design of the Final Circuit of</td>
<td>November 4, 2015</td>
</tr>
</tbody>
</table>
Prototype – Two page Report

5 Design Component 5 – Project Progress Update – Demo of the Prototype – Accompanied with an Oral Presentation of the Group – During Lab Hours November 11, 2015

None Oral Presentation in SOE Atrium – Show case of your design instrument prototype (Trade Show 😊) November 18, 2015

3.2 Course Grading Policies

When You Cannot Meet a Course Requirement: When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course in writing, with your name, id#, and e-mail contact. See the graduate calendar for information on regulations and procedures for Academic Consideration:

http://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/sec_d0e1415.shtml

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the graduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations:

https://www.uoguelph.ca/registrar/calendars/graduate/current/

Passing grade: In order to pass the course, you must pass both the laboratory and exam course portions. Students must obtain a grade of 65% or higher on the exam portion of the course in order for the laboratory write-up portion of the course to count towards the final grade.

4 AIMS & OBJECTIVES

4.1 Calendar Description


4.2 Course Aims

This course will involve selected readings and analyses in developing knowledge areas applicable to your graduate thesis. The main goals of the course are

• To develop the ability to apply knowledge of science and mathematics to solve problems at the interface of biology and engineering

• To understand the principles of instrumentation used to measure factors that characterize
biological, physical or chemical factors that have a profound effect of biosystems.

### 4.3 Learning Objectives

At the successful completion of this course, the student will have demonstrated the ability to:

1. Engage in independent and reflective learning, addressed by the projects and presentation
2. Translate an understanding of the concepts of bioinstrumentation in design and development of systems
3. Demonstrate effective technical communication through presentation

### 4.4 Instructor’s Role and Responsibility to Students

The instructor’s role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on Courselink/D2L but these are not intended to be stand-alone course notes. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and project.

The study and learning process are more self-directed at the graduate level than at the undergraduate level. This graduate course assumes that the students are well-prepared in the basic elements of the field of study, i.e., Basic Electrical Circuits and Instrumentation Concepts. In general, this graduate course is not lecture style or lecture based but rather informal, with emphasis on exchanging ideas between faculty and students. This is usually done as a seminar model, by allowing the students to give presentations and participate in discussions. The attendance in all the scheduled lectures, class participation and submitting research papers on time is important.

### 4.5 Students’ Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and tutorials. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

**E-mail Communication:** As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

**Recording of Materials:** Presentations which are made in relation to course work—including lectures—cannot be recorded in any electronic media without the permission of the presenter, whether the instructor, a classmate or guest lecturer.

### 4.6 Relationships with other Courses

**Previous Courses:**

ENGG*3450 & ENGG*4390 or equivalent.
5 Teaching and Learning Activities

5.1 Timetable

Lectures:
Monday, Wednesday, Friday: 4:30 pm to 5:20 pm MCKN, Room 029

Lab Schedule: LAB Mondays - 08:30 AM - 10:20 AM and 01:00 PM - 02:50 PM Room: RICH 1504A

5.2 Course Topics and Schedule

<table>
<thead>
<tr>
<th>Topic Nominal Weeks</th>
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</thead>
<tbody>
<tr>
<td>Week 1 and 2: Review Basic Instrumentation Concepts &amp; Instrumentation Systems</td>
</tr>
<tr>
<td>Week 2, 3 and 4: Transducers, Control Elements, Amplifier Circuits</td>
</tr>
<tr>
<td>Week 5, and 6: Direct and Indirect recording methods, Amperometric, Potentiometric Sensors</td>
</tr>
<tr>
<td>Week 7 and 8: Optical Sensing Techniques, Microfluidics, Surface Enhanced Raman Spectroscopy and Biosensors</td>
</tr>
<tr>
<td>Week 9 and 10: Circuit Design and Electrical Safety</td>
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<td>Week 11 and 12: Technical Presentations</td>
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</table>

Project:
The instrumentation project may be related to your thesis or dissertation, or of personal interest. Although, there are no scheduled lab hours for this course, you will be given access to the Electrical Labs of SOE, to build or design an instrumentation system. The lab technician and the instructor will be able to accommodate your request for your project.

5.3 Other Important Dates

Drop Date: The last date to drop one-semester courses, without academic penalty, is November 6, 2015. Two-semester courses must be dropped by the last day of the add period in the second semester. Refer to the Graduate Calendar for the schedule of dates:
http://www.uoguelph.ca/registrar/calendars/graduate/current/sched/sched-dates-w11.shtml
6 LAB SAFETY

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in.

7 ACADEMIC MISCONDUCT

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. The Academic Misconduct Policy is detailed in the Graduate Calendar: http://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/sec_d0e1687.shtml

7.1 Resources

A tutorial on Academic Misconduct produced by the Learning Commons can be found at: http://www.academicintegrity.uoguelph.ca/

The School of Engineering has adopted a Code of Ethics that can be found at: http://www.uoguelph.ca/engineering/undergrad-counselling-ethics

The Graduate Calendar is the source of information about the University of Guelph’s procedures, policies and regulations which apply to graduate programs: http://www.uoguelph.ca/registrar/calendars/graduate/current/

8 ACCESSIBILITY

Provision of Academic Accommodation: The Centre for Student with Disabilities (CSD) (https://www.uoguelph.ca/csd/) has authority to make decisions for academic accommodation. CSD advisors can help to identify appropriate academic accommodations, provide supportive information required in order to access resources, and assist in the arrangements for appropriate academic accommodations. Students are strongly encouraged to engage in the process of requesting accommodation early to CSD. For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: http://www.uoguelph.ca/csd