ELG 4913 - Electrical Engineering Design Project: Part II
Projet de Design en Génie Électrique: Partie II

January 6 – April 4, 2020
Lecture: Tuesday 2:30 PM - 3:50 PM; room VNR_5070

* Students must attend all lectures and laboratory sessions *

Description
Lectures and tutorials on product design and development methodology, and the role of the professional engineer in this regard. Completion of work started in ELG 4912. Deliverables include written documentation and presentations in class.

Prerequisites: ELG 4912, https://catalogue.uottawa.ca/en/search/?search=ELG+4913

Professor:
Emil M. Petriu, P.Eng., http://www.site.uottawa.ca/~petriu/, petriu@uottawa.ca

Course organization:
It is expected that, in this course, students will apply previously acquired theoretical and experimental knowledge and skills (as guaranteed by the mandatory prerequisites) in order to carry out a significant capstone engineering design project.

The lectures will be delivered in 1.5 hour/week sessions aiming to provide a general framework for project design. A team of usually 4 students will work together on a project. The weekly project lab sessions will be under the supervision of the TA.

“Engineering design integrates mathematics, natural sciences, engineering sciences, and complementary studies in order to develop elements, systems, and processes to meet specific needs. It is a creative, iterative, and open-ended process, subject to constraints which may be governed by standards or legislation to varying degrees depending upon the discipline. These constraints may also relate to economic, health, safety, environmental, societal or other interdisciplinary factors.

The engineering curriculum must culminate in a significant design experience conducted under the professional responsibility of faculty licensed to practise engineering in Canada, preferably in the jurisdiction in which the institution is located. The significant design experience is based on the knowledge and skills acquired in earlier work and it preferably gives students an involvement in team work and project management.”

[CEAB – Accreditation Criteria and Procedures, sections 3.4.4.3 and 3.4.4.4]

During this engineering design project, the students are expected to demonstrate the following graduate attributes: (I) competence and mastery of the specialized knowledge that they acquired in the electrical engineering program, (ii) ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve the complex engineering problems in order to reach the substantiated conclusions pertinent to the specific project, (iii) ability to investigate complex problems using appropriate design methodologies including appropriate experiments, data analysis and interpretation, and information synthesis, (iv) ability to pursue an open-ended design process that uses the existent body of engineering knowledge and practice in that field in order to formulate, critically evaluate, and experimentally validate the appropriate design solutions for solving the specific design problems with appropriate attention paid to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations, (v) ability to create and critically select, apply, adapt, and extend appropriate engineering techniques, resources, and tools while recognizing their limitations, (vi) ability to work effectively as a member as well as a leader of the design team, (vii) ability to communicate complex engineering concepts within the engineering community as well as with the society at large (including listening, reading, writing, speaking, and comprehension, effectively giving and responding to clear instructions, as well as writing reports and producing design documentation), (viii) understanding the role and responsibilities of a professional engineer in society, especially the primary role of protection of the public and the public interest, (ix) ability to analyze social and environmental aspects of the engineering practice including understanding of the economic, social, health, safety, legal, and cultural implications of the engineering practice and of the available solutions to avoid and mitigate possible negative effects of these
implications, as well as ability to understand and pursue sustainable engineering design and development solutions and environmental stewardship, (x) ability to recognize ethical and equity situations and appropriately apply the professional ethics and equity principles while demonstrating individual accountability, (xi) ability to develop sound project management plans by appropriately incorporating economic, financial, technical & human resources aspects, and business practice considerations including risks, (xii) ability to identify and address their own life-long learning needs in order to maintain their competence and contribute to the advancement of the engineering in a changing world by independently acquiring and evaluating information from a wide variety of sources of engineering knowledge and practice.

**Marking Scheme**

* **Midterm Project Report:** (15% of the final mark)  
  The midterm progress report should show the teamwork as well as each team-member contribution up to the midterm date. The report should be submitted to the customer, professor and TA no later than **Feb. 24, 2020, noon**.

* **Progress Review:** (15% of the final mark)  
  The design teams will review during the regular lab sessions the design methodology and experimental aspects of their project. The design teams will schedule together with the professor and the TA a specific time for their reviews during the regular lab hours on **Feb. 27, Mar. 2, Mar. 5, and Mar. 9, 2020**.

* **Final Project Presentation:** (20% of the final mark)  
  The presentation and demo will be conducted in front of the evaluation committee and with the attendance of all the course students and any other students wishing to attend. Each member of the team will have to talk about her or his own contribution to the design project including the project report, lab and lecture participation, and individual contribution to the collective team effort. Team members will be evaluated individually based on their personal performance. => Each team will have max 20 minutes for presentation & demo and 10 minutes for discussions. The teams will schedule together with the professor and the TA a specific time for their presentations on one of the following time slots: **Mar. 23, Mar. 24, Mar. 26, Mar. 30, Mar. 31, and Apr. 2, 2020** during the regular lab or lecture hours.

* **Final Project Report** (50% of the final mark)  
  This will be a comprehensive formal report including the background of the work conducted, the design methodology, the design diagrams, the analysis of the results obtained, and the conclusion and recommendation of further development. The report should demonstrate how the students have addressed the graduate attributes (detailed in the Course Organization section) during the engineering design project. *It is expected that each team member underlines his/her personal contribution to the project. 60% of the mark given on the report will be assigned collectively to all the members of the team. 40% of the mark given on the report will be assigned individually to each member of the team.* The final-exam report should be submitted to the customer, professor and TA no later than: **April 6, 2020, noon.**

**PLEASE NOTE:**

(i) all students must attend the mandatory “Health, Safety and Risk Management in Engineering” and “Electrical Hazards, EECS Lab Safety Guidelines” presentations and then sign the attendance documents certifying their participation;

(ii) **before proceeding with any hands-on experiments,** all students must carry out a “Project Hazard and Risk Assessment” of their specific project, experimental setups and protocols. This assessment should be done using the standard form http://www.site.uottawa.ca/~petriu/ProjectHazardAssessment(En).pdf, http://www.site.uottawa.ca/~petriu/AnalyseSecuriteProjet(Fr).pdf. Copies of the assessment should be provided to the professor, TA(s), and Mr. Alan Stewart, astewart@uottawa.ca

(iii) all students should make sure that their projects comply with the uOttawa Office of Research and Ethics guidelines.

(iv) the students **should not buy** any equipment, components, or software for their project before obtaining the written approval from the professor, project customer, and Mr. Alan Stewart.