**University of Michigan-Dearborn Syllabus Template**

**Engineering Design 1: ECE 4981 (Electrical), 4982(Computer), 4987 (Robotics) ( 2 cr. hrs. )**

**Fall 2020**

Prof. Paul C Richardson

**Office Location**: 2060 IAVS

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**Office Hours:** 1:45 – 2:45 pm Mon, Wed via Blue Jeans Notification. We can also arrange further office hours as necessary. Simple questions can be answered by email.

**Course Meeting Times and Location**: All classes will be remote. All lectures will be recorded and posted to Canvas. Attendance at lectures is encouraged but optional. Attendance at class events such as demonstrations, presentations, and reviews are mandatory. See class schedule below If necessary, class schedule will be update and updates will be announced in lecture and on canvas. Also if necessary, on campus office hours can be arranged if a team really needs it. Otherwise, office hours will be remote.

\*note - do not come to campus unless explicitly stated. There are strict campus access rules with access list by name. If you are not on the list, you will be asked to leave campus.

**Course Description:**

The course is conducted as a guided project design course over a two-semester period. The class is divided into student teams. Each team identifies a specific project at the beginning of the first semester. The projects culminate in a system test and final report at the end of the second term.

The project development follows an engineering design process that is presented during lecture. The engineering process consists of different analysis leading to derivation of specifications. The specifications are presented at milestone reviews over the first and second semester. In the first semester the students must derive a concept description, requirements specification, high level design specification, and draft test plan. The milestone reviews in the first semester include Concept Description Definition (CDD), System Requirements Review(SRR), and Preliminary Design Review (PDR). The specifications developed in the second semester include the low level design, final system test plan, and system test report. The milestone reviews include the Critical Design Review (CDR), Test Readiness Review (TRR), and System Test Review (STR).

The engineering process includes several ongoing activities to include cost analysis, schedule analysis, and risk analysis. Student teams have to consider their efforts in the context of contemporary issues and broader impact relevant to their projects, professional ethical responsibility, and lifelong learning A series of lectures during the first and second semester will guide the students through the engineering process.

A series of tutorials will be presented to provide student teams with insight into important system level considerations and trade offs. The tutorials will be presented in the context of alternatives and trade-offs relevant to specific system needs for different types of capabilities. The tutorials will include DC Motors, Networks and Communications, Signals and Sensors, and Microprocessors.

**Prerequisites by Course**

**ECE 4981:**  (COMP 270 or COMP 106 or COMP 220 or COMP 280) and (ECE 317 or ECE 3171) and (ECE 372 or ECE 3731) and (ECE 414 or ECE 415 or ECE 450 or ECE 460 or ECE 480 or ECE 4951)

**ECE 4982:** (COMP 270 or COMP 106 or COMP 220 or COMP 280) and (ECE 372 or ECE 3731) and ECE 375 and (ECE 471 or ECE 473 or ECE 475 or ECE 478)

**ECE 4987:** (COMP 270 or COMP 106 or COMP 220 or COMP 280) andECE 311 and ECE 3171 and (ECE 3731 or ECE 372) and ECE 3641 and (ECE 460 or ECE 4641)

**Prerequisites by Topic**1. Basic signals and systems analysis.

2. Computer and microprocessor fundamentals.

3. Basic programming knowledge.

4. Basic concepts in either communication systems or control systems.

**Program Goals / Student Outcomes:**

* **Program Educational Objectives**: <https://umdearborn.edu/cecs/departments/electrical-and-computer-engineering/undergraduate-programs/bse-electrical-engineering/program-educational-objectives>
* **Program Student Outcomes**: <https://umdearborn.edu/cecs/departments/electrical-and-computer-engineering/undergraduate-programs/bse-electrical-engineering/student-outcomes>
* **Dearborn Discovery Core Goals:** <https://umdearborn.edu/696973/>

**Learning Goals (Student Outcomes) and assessment tools for Engineering Design 2: 2, 3, 4, 5, 7**

|  |  |
| --- | --- |
| 2 | An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors |
| **Assessment Tools**: Supervised build sessions that evaluate design/build progress. Preparation and submission of written specifications for low level design, test plan, and test report. |
| 3 | An ability to communicate effectively with a range of audiences. |
| **Assessment Tools**: Oral presentation of design specification, test plan, and test report to peers and faculty. Preparation and submission of written specifications for low level design, test plan, and test report. |
| 4 | An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts |
| **Assessment Tools: quizzes and written assignments.** |
| 5 | An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives |
| **Assessment Tools:** Supervised build sessions, preparation of specifications for low level design, test plan, and test report. |
| 7 | An ability to acquire and apply new knowledge as needed, using appropriate learning strategies |
| **Assessment Tools:** Supervised Build sessions, quizzes, and written assignments. |

**Required Materials and/or Technology:** Lecture material will be covered primarily by my course notes provided on Canvas. You are encouraged to download notes and use them along with lecture material.

**Textbook**: NONE

**Assignment and Grading Distribution:**

|  |  |
| --- | --- |
| **ASSIGNMENT** | **POINTS** |
| draft concept description ( with advisor comments) | 4 |
| final concept description ( presentation to class) | 10 |
| draft requirements specification ( with advisor comments) | 8 |
| final requirements specification (report and presentation to class) | 20 |
| draft high level design ( with advisor comments) | 8 |
| final high level design (report and presentation to class) | 20 |
| draft test plan | 10 |
| excursions demonstration 1 | 15 |
| excursions demonstration 2 | 15 |
| report - life long learning | 3 |
| report - ethics | 3 |
| report-contemporary issues | 3 |
| report - broad education | 3 |
| Peer Review SSR | 3 |
| Peer Review PDR | 3 |
| Peer Review - Excursions | 3 |
| class participation – attendance, positive contributions | 9 |
| project merit - scope and complexity | 20 |
| **total** | **160** |

**Grading Scale:**

94%- 100% A

90%- 93% A-

87%- 89% B+

84%- 86% B

80%- 83% B-

77%-79% C+

74%-76% C

70%-73% C-

67%-69% D+

64%-66% D

60%-63% D

**University Attendance Policy:** A student is expected to attend every class and laboratory for which he or she has registered. Each instructor may make known to the student his or her policy with respect to absences in the course. It is the student’s responsibility to be aware of this policy. The instructor makes the final decision to excuse or not to excuse an absence. An instructor is entitled to give a failing grade (E) for excessive absences or an Unofficial Drop (UE) for a student who stops attending class at some point during the semester.

**Academic Integrity Policy:** The University of Michigan-Dearborn values academic honesty and integrity. Each student has a responsibility to understand, accept, and comply with the University’s standards of academic conduct as set forth by the Code of Academic Conduct (http://umdearborn.edu/697817/), as well as policies established by each college. Cheating, collusion, misconduct, fabrication, and plagiarism are considered serious offenses and violations can result in penalties up to and including expulsion from the University.

**Disability Statement:** The University will make reasonable accommodations for persons with documented disabilities. Students need to register with Disability Resource Services (DRS) every semester they are enrolled. DRS is located in Counseling & Support Services, 2157 UC (http://www.umd.umich.edu/cs\_disability/). To be assured of having services when they are needed, students should register no later than the end of the add/drop deadline of each term. If you have a disability that necessitates an accommodation or adjustment to the academic requirements stated in this syllabus, you must register with DRS as described above and notify your professor.

**Safety:** All students are strongly encouraged to register in the campus Emergency Alert System, for communications during an emergency. The following link includes information on registering as well as safety and emergency procedures information: <http://umemergencyalert.umd.umich.edu/> Finally, all students are also encouraged to program 911 and UM-Dearborn’s Public Safety phone number (313) 593-5333 into personal cell phones. In case of emergency, first dial 911 and then if the situation allows call UM-Dearborn Public Safety.

**Academic Calendar**

Classes begin Tuesday, September 1

Labor Day (Holiday) Monday, September 7

Thanksgiving recess Monday-Sunday, November 23-29

Classes resume Monday, November 30

Classes end Monday, December 14

Study days Tuesday, December 15 & Saturday-Sunday, December 19-20

Examinations Wednesday-Friday, December 16-18 & Monday-Tuesday, December 21-22

**Fall 2020 Tentative Schedule**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Mon** | **activity** | **assignments** | **Wed** | **activity** | **assignments** |
| Aug 31 |  |  | Sep 2 | **LECTURE**: introduction, engineering design process; concepts description | form teams, discuss project concepts |
| Sep 7 | Labor Day |  | Sep 9 | **LECTURE**: engineering process, concepts description, overview CPU’s | due Sep 11: finalize team members & name, faculty advisor |
| Sep 14 | **LECTURE**: requirements analysis, risk mgt and excursions, networks overview |  | Sep 16 |  | due Sep 18: draft concept description with advisor comments |
| Sep 21 | Present Concept Description |  | Sep 23 | Present Concept Description | due Sep 25: final concept description report |
| Sep 28 | **LECTURE**: requirements analysis, DC motors overview |  | Sep 30 |  | Due Oct 2: 1st definition of planned excursions with advisor comments |
| Oct  5 | **LECTURE:** design analysis test plan, sensors and signals |  | Oct  7 |  | Due Oct 9: ROM budget |
| Oct  12 | peer review SRR |  | Oct  14 |  | Due Oct16: Draft SRR with advisor comments |
| Oct  19 | SRR: system requirements review |  | Oct  21 | SRR: system requirements review | Due Oct 23: Final requirements spec and Draft test plan |
| Oct 26 | Demonstrate excursion 1 results |  | Nov 4 | Demonstrate excursion 1 results |  |
| Nov 2 | **LECTURE** design analysis discussion broad education and ethics |  |  |  | 2nd definition of planned excursions due Nov 6 with advisor comments |
| Nov 9 | **LECTURE** design analysis discussion lifelong learning |  | Nov 11 |  |  |
| Nov 16 | Demonstrate excursion 2 results |  | Nov 18 | Demonstrate excursion 2 results | Due Mar 27: Draft High Level Design Spec with advisor comments |
| Nov 23 | Thanksgiving Break |  | Nov 25 | Thanksgiving Break |  |
| Nov 30 | peer review high level design |  | Dec 2 |  | Due Apr 10: Draft High Level Design Specification with advisor comments |
| Dec 7 | PDR high level design review |  | Dec 9 | PDR high level design review | Due Apr 17: Final High Level Design Specification |
| Dec 14 |  |  |  |  |  |