ENGR-2300 Electronic Instrumentation
Course Syllabus

Basic Overview

Course Instructor: Kyle Wilt, JEC6004, wiltk2@rpi.edu

Office Hours: See Course Website.

Class/Lab Schedule and Location:
- Lecture: Prerecorded and beginning of select laboratory time.
- Laboratory:
  - Monday 10:30 AM - 12:35 PM ET
  - Monday 1:30 PM - 3:35 PM ET
  - Thursday 10:30 AM - 12:35 PM ET

Teaching and Undergraduate Support Assistants: See Course Website.

Overview: A survey, application-oriented course for engineering and science majors. Transducers and measurement devices. DC and AC analog circuits including impedance, power, frequency response, and resonance. Diodes, transistors and operational amplifiers. Signal conditioning, noise, and shielding. Digital electronics, A/D and D/A conversation. Power supplies, rectifiers, and electromagnetic devices. *4 credit hours*

Overall Educational Objective: Build basic background in circuit, electronic and sensor fundamentals for students outside of electrical and computer engineering.

Student Learning Outcomes: Students will be able to: (1) Students will be able to analyze simple DC circuits and will understand AC steady-state responses of resistance, inductance and capacitance in terms of impedance and be able to analyze simple AC circuits. (2) Students will be familiar with basic properties of operational amplifiers and the analysis of simple operational amplifier circuits. (3) Students will be able to identify circuit symbols and operations of logic gates. (4) Students will understand functions and characteristics of diodes, transistors, and transformers. (5) Students understand the concept of frequency response and the transient responses of capacitors and inductors. (6) Students will be able to draw accurate schematics and use them to perform electrical

measurements, construct circuits on breadboards and model the circuit response using simulation software. (7) Students will be proficient in the use of a standard set of electrical instruments, both in their traditional stand-alone form and as pc-based virtual instruments. (8) Students will be able to effectively interface between electrical systems and essentially all other engineering systems (e.g. biological, thermal, mechanical, photonic ...) through the use of sensors and actuators and the application of basic engineering design principles.

Student Assessment Measures: Assessment of student progress in the course objectives will be performed through a variety of mechanisms.

- 8 Homeworks will be assigned for each major topic in the class.
- 8 Hands-on experiments will be assigned to guide student learning in each topic.
- 4 Projects to serve as a culmination of sets of topics.
- 3 Exams will also be used to gauge understanding. There is no final exam for this course.

Pre-Requisite Courses:

- PHYS-1200: Physics II or PHYS-1250: Introductory Electromagnetic Theory
- MATH-1020: Calculus II

Texts:

- No required textbook. All information is available from the Course Website

Online Tools: The following online tools will be used to support this course. If you do not have access to any of these tools, please inform the instructor as soon as possible.

- Course Website: https://www.ecse.rpi.edu/courses/static/ENGR-2300/index.html
  - Contains all course information and links to LMS and Gradescope Platforms.
- Cisco Webex: https://www.webex.com/video-conferencing.
  - Webex will be used for questions, group discussions, and announcements.
- Gradescope: Gradescope ENGR-2300
  - Submission of graded assignments will be done through this platform.
- RPI LMS lms.rpi.edu/webapps/login
  - Central link location to all course needs.
  - Hosts homeworks problem sets.

Policy Detail

FERPA Statement: The Online Tools used in this course provide a service designed to assist schools, teachers and other educational partners to improve student learning outcomes. In some circumstances, these online tools may receive personally identifiable information about students ("Student Data") from the instructor in the course providing this service. For example, an instructor will provide a class roster, email addresses of all students in the class, as well as coursework data that may be linked to a particular student. All listed online resource companies used by the instructor consider Student Data to be strictly confidential and have physical, administrative and technical security protections in place to protect such data. They do not use personally identifiable Student Data for any purpose other than to provide the services to the instructor, and they do not share personally identifiable Student Data with any third party except as authorized or required by the instructor. The online tools above may collect, analyze, and share anonymized or aggregated data or data derived from Student Data for certain purposes, but only if the disclosure of such data could not reasonably identify a specific individual or specific School. Collection and use of Student Data provided by the instructor is governed by Terms of Service for each platform and by the provisions of the Family Educational Rights and Privacy Act (FERPA). Student Data is provided and controlled by the instructor. If you have questions about reviewing, modifying, or deleting personal information of a student, please contact (point of contact TBD).

Collaboration and Academic Dishonesty: Intellectual integrity and credibility are the foundation of all academic work. A violation of Academic Integrity policy is, by definition, considered a flagrant offense to the educational process. It is taken seriously by students, faculty, and Rensselaer and will be addressed in an effective manner. If found responsible for committing academic dishonesty, a student may be subject to one or both types of penalties: an academic (grade) penalty administered by the professor and/or disciplinary action through the Rensselaer judicial process described in this handbook. Three relevant academic integrity violations to emphasize include:

Collaboration: Collaboration is defined as deliberately facilitating an act of academic dishonesty in any way or form; for example, allowing another student to observe an exam paper or allowing another student to "recycle" one's old term paper or using one another's work in a paper or lab report without citing it as another's work.

Copying: Copying is defined as obtaining information pertaining to a graded exercise by deliberately observing the paper of another student; for example, noting which alternative a neighboring student has circled on a multiple-choice exam.

Plagiarism: Plagiarism is defined as representing the work or words of another as one's own through the omission of acknowledgment or reference. Examples include using sentences verbatim from a published source in a term paper without appropriate referencing, or presenting as one's own the detailed argument of a published source, or presenting as one's own electronically or digitally enhanced graphic representations from any form of media.

The Rensselaer Handbook of Student Rights and Responsibilities defines the full list of forms of Academic Dishonesty and you should make yourself familiar with these. In this class, all assignments that are turned in for a grade must represent the student's own work. In cases where help was received, or teamwork was allowed, a notation on the assignment should indicate your

collaboration. If you have any questions concerning this policy before submitting an assignment, please ask for clarification.

Inclusivity and Accessibility Statement: Rensselaer Polytechnic Institute strives to make all learning experiences as accessible as possible. We strive to provide an environment that is equitable and conducive for learning for all students. Please contact the instructor as soon as possible if you anticipate or experience academic barriers based on a disability, please let the instructor know immediately so that alternative options may be discussed and determined early. To establish reasonable accommodations, please register with The Office of Disability Services for Students. After registration, make arrangements with the instructor as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. To receive any academic accommodation, you must be appropriately registered with DSS.

DSS contact information: dss@rpi.edu; 518-276-8197, 4226 Academy Hall.

Assignments and Gradeables

Homework: All homework assignments are on LMS. There are eight graded out of 10-15 points each; one for each experiment. They are generally due a few days before the experiment is due. For the exact dates, check the course website. Each homework may be attempted three times prior to the due date.

Experiments: Eight experiments will be completed throughout the semester. These will be completed in teams of two. Each experiment will require submission of a "write-up." All components of the experiment must be complete prior to the submission of the write-up. Experiments are graded via the write-up and student participation:

- Experiment write-ups [80 %] are not designed to be a formal report. They should include the following: (1) Annotated plots required for each section; (2) Answer the questions for each section; (3) Include a summary of key points; (3) Discuss mistakes and problems; (4) List member responsibilities. The cover/signature sheet (with dated signatures) must be added to the write-up, otherwise it will not be graded. Submission templates for the write-ups are provided.
- Participation [20 %] will be based on class attendance and participation. Students will earn 20 points for each experiment if they are in attendance and contributing to the team effort. Students should discuss with the instructor about how to make up work if a class is missed.

Design Projects: Four design projects will be completed throughout the semester. These will be completed in teams of two or four. Each project will require submission of a report. Projects are graded via the report and student participation:

- Project reports [80 %] are full reports documenting the work done. For guidelines on writing the report, please see the course website.
- Participation [20 %]. This is the same policy as described for the Experiments.

Exams: There will be three exams on the four main topics of the course. All Exams will be closed book, but students will be given one or more 8.5" x 11" crib sheet(s). Specific topics to be addressed on each exam are listed on the course website. Any new topics will be announced at least one week before the exam date. Check the webpage on Exam Information to see the kind of questions you can expect to see on the exams. Attendance at exams is required. Official requests for an alternate exam time and/or additional time to complete exams will be accommodated if received two weeks before the scheduled exam time. Requests received at a later time will be considered up to two days before the exam, but will be accommodated only if arrangements can be made. Remote students must be active within a Webex video meeting during the exams with their microphones on.

Overall Class Participation: A portion the final grade will be based on participation. This will include a student's class attendance, active participation, and contribution to write-ups. This assessment will be based on the observations of the TA's, the instructors and fellow students.

Course Logistics

Grading:

Component	Quantity	Weight
Homeworks	8	10 %
Experiments	8	28 %
Projects	3	12 %
Exams	3	45 %
Overall Class Participation	-	5 %
	Total:	100 %

Late Policy: Homeworks, Experiments, and Projects are allowed to be submitted late, with penalty:

- Homeworks: If you miss the due date, you will have two chances to get a maximum score of 12 points in three days time. If you miss this deadline, you will still be able to do the homework any time before the end of the semester for a maximum score of 7.5 points.
- Experiments and Projects: For each school day late (weekends and vacations are not counted): 4 points per day for the first two days and 7 points per day for each additional day. Thus, if the report is handed in 5 days late, the penalty is 29 points. Please note that there are, at most, 5 school days per week.

Attendance Policy: As noted, students will work in groups of two or four (in some cases) to complete experiments and projects. Teams of two will be formed the first week of class; however, if students are unsatisfied with the current arrangement, they are encouraged to either (1) work independently or (2) find a different group member. In either case, the instructor should be notified of any group dynamic changes.

Students are expected to contribute to the group goals in a timely and constructive manner. Students are required to be in the classroom during class times *unless all currently assigned work is complete**.

Students are allowed to miss up to two laboratory classes without penalty. For each missed laboratory class afterwards, a 1-point penalty will be assessed on the student's Overall Class Participation grade (up to 5 points total). This is in addition to any grading penalties on the experiments and projects.

Similarly, presence of a student in the classroom does not necessarily imply the student is contributing to the group effort. This will also be monitored.

Re-Grading Policy: All Experiment and Project deliverables are subject to regrades through Gradescope's regrade features. Any LMS homework from which a student finds an error in grading will result in the student receiving full credit for the assignment.

COVID Disclaimer: Any and all portions of this course are subject to change as the COVID-19 pandemic evolves. It is a unique time that requires flexibility, patience, and communication. Communication is vital. All changes will be presented to the entire class through designated channels (email, LMS, Webex, in lecture). The grading structure will remain the same.