

Instructor: Dr. Seung-yun Kim, (E) kims@tcnj.edu, (O) AR 151, (T) 609-771-3443
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Office Hours: Mon. & Thur. 2:00-3:20PM, or by appointment

Open Door Policy: if the door is cracked open and it's ok to knock.

Class: Thursday, 12:30pm – 1:50pm, AR 144

Course Description:

An introduction to the study of engineering design as set within the graphical context of computer-aided engineering software and the procedural context of reverse engineering. Activities include the graphical analysis of the engineering design of products for visualization and communication, utilizing parametric solid modeling and also reverse engineering problems requiring the adaptation of an existing design.

Required Textbook:

Fundamental Concepts in Electrical and Computer Engineering with Practical Design Problems by Reza Adhami, Peter Meenen, and Dennis Hite, 2007, ISBN: 978-1581129717

Optional Textbook:

- *Fundamentals of Electrical Engineering* by Charles Gross and Thaddeus Roppel, 2012, ISBN: 978-1439837146.
- *Design for Electrical and Computer Engineers* by Ralph Ford and Chris Coulston, 2008, ISBN: 978-0073380353.

Course Objectives:

The ability to think clearly, logically, and creatively is an asset for engineers. Teamwork and interpersonal skills are also important to engineers. The course attempts to give students opportunities to see overall picture of the electrical and computer engineering majors.

- To identify problems, design and implement solutions.
- To work in teams and learn collaborative skills.
- To discover missing knowledge needed to solve engineering problems using available resources.
- To demonstrate an ability to appreciate the electrical engineering terminology connected with functioning multi-disciplinary teams.
- To show an ability to apply knowledge of mathematics, science, and engineering.

Student Outcomes:

The Student Outcomes listed below are expected to be achieved of all graduates of the Engineering Programs by the time of graduation. Underlined are student outcomes practiced in this course.

- a. an ability to apply knowledge of mathematics, science and engineering;
Students will apply knowledge of mathematics and engineering

- b. an ability to design and conduct experiments, as well as to analyze and interpret data;
Students will experiment simple electrical and logic circuits to analyze and interpret the measurements.
- c. an ability to design a system, component, or process to meet desired needs;
Students will solve an open ended design problem based on a given set of constraints.
- d. an ability to function in multidisciplinary teams;
Students will work in teams to practice the engineering design process.
- e. an ability to identify, formulate and solve engineering problems;
Students will be exposed to real-life problems and challenged to apply acquired knowledge in order to solve them.
- f. an understanding of professional and ethical responsibility;
- g. an ability to communicate effectively;
Students will give professional technical presentations and write technical reports.
- h. the broad education necessary to understand the impact of engineering solutions in a global and societal context;
- i. a recognition of the need for and an ability to engage in life-long learning;
- j. a knowledge of contemporary issues;
- k. an ability to use the techniques, skills and modern engineering tools necessary for engineering practice;
Students will learn about performing analysis using PSpice.

Evaluation/Grading:

Group Project:	50 pts
Labs:	30 pts
Homework Assignments:	20 pts
Total	100 pts

Grading Scale:

Specified in common section

Laboratory:

You are required to finish each lab experiment during the allotted laboratory time. Late submission of lab reports will be penalized 10% per day but exceptions will be made for cases brought to the instructor attention PRIOR to the due date.

Laboratory Grade

Lab Notebook (Pre-lab)	15 pts
Lab Report	15 pts

• **Laboratory Notebook (15 points):**

The student is required to maintain a Lab notebook which needs to be bounded so that papers cannot be added or removed (e.g., composition notebook). The lab notebook can be used as a tool for preparing the labs, writing the activities report and referencing future work. The lab notebook is mainly for your own use. However, it will be checked by the instructor at the end of each lab and needs to be turned in at the end of the semester for credit.

Here are general guidelines for the lab notebook:

1. Write your name, email (in case misplaced), and course title and number on the front page.
2. Put page numbers at the bottom of each page.
3. Place the title “Table of Contents” in the first page (may go on to the second page and add page numbers to all other pages). Your first lab should start page number 3.
4. Use all pages consecutively. Leave no blank pages.
5. All activity should be recorded in pen, NOT pencil. Cross your mistake out neatly (you should be able to read it after you draw a line through it).
6. Discuss any problem you may have had during the lab.
7. Briefly summarize your lab experience after each lab.

- **Laboratory Report (15 points)**

You are required to finish each lab experiment during the allotted laboratory time. The lab reports are due to the beginning of the following lab session. Late submission of lab reports will be penalized 10% per day but exceptions will be made for cases brought to the instructor attention PRIOR to the due date. A Laboratory report will be required after the completion of each lab assignment. The goal of lab reports is to document your findings. Use your lab notebook to develop a quality lab report. For each lab, the following should be included in the report:

1. Title Page: course number and title, experiment number and title, your name and date conducted.
2. Introduction: brief overview and objectives.
3. Experiment: equipment list, design work, truth table, wiring diagrams, schematics of the circuit, and so on.
4. Procedure: details on how the experiment was conducted.
5. Results
6. Discussion and conclusions

All reports must be stapled and typed (i.e. using a word processor and other software needed for plotting, drawing and analysis) in a legible font, preferably 12pt, Times New Roman, and single-spaced. All your tables and figures must be numbered and referenced properly (it means you need to explain tables and figures in your report).

Homework Assignments:

Homework will be assigned on the CANVAS. All assignments must be turned in at the beginning of the class on the date specified. **Late assignment** will NOT be accepted but exceptions will be made for cases brought to the instructor attention PRIOR to the due date. All hand-written solutions for homework assignments must be on an **engineering paper** to receive credit. NO EXCEPTIONS.

Cell Phone and Text Messaging Policy

Cell phones are not permitted during class. Please turn your cell phone off or put it onto silent (in case of an emergency situation) before class starts. Do not place your cell phone on the desk. Any student leaving during class/lab to answer a vibrating phone will not be permitted to return to class. Text messaging will not be permitted during class. Any student whose cell phone rings (or text messaging) during class will be asked to leave and marked as an absence.

Selected TCNJ Policies

TCNJ's Final Examination Policy is available on the web:

<http://policies.tcnj.edu/policies/digest.php?docId=9136>

Attendance

Every student is expected to participate in each of his/her courses through regular attendance at lecture and laboratory sessions. It is further expected that every student will be present, on time, and prepared to participate when scheduled class sessions begin. At the first class meeting of a semester, instructors are expected to distribute in writing the attendance policies which apply to their courses. While attendance itself is not used as a criterion for academic evaluations, grading is frequently based on participation in class discussion, laboratory work, performance, studio practice, field experience, or other activities which may take place during class sessions. If these areas for evaluation make class attendance essential, the student may be penalized for failure to perform satisfactorily in the required activities. Students who must miss classes due to participation in a field trip, athletic event, or other official college function should arrange with their instructors for such class absences well in advance. The Office of Academic Affairs will verify, upon request, the dates of and participation in such college functions. In every instance, however, the student has the responsibility to initiate arrangements for make-up work.

Students are expected to attend class and complete assignments as scheduled, to avoid outside conflicts (if possible), and to enroll only in those classes that they can expect to attend on a regular basis. Absences from class are handled between students and instructors. The instructor may require documentation to substantiate the reason for the absence. The instructor should provide make-up opportunities for student absences caused by illness, injury, death in the family, observance of religious holidays, and similarly compelling personal reasons including physical disabilities. For lengthy absences, make-up opportunities might not be feasible and are at the discretion of the instructor. The Office of Academic Affairs will notify the faculty of the dates of religious holidays on which large numbers of students are likely to be absent and are, therefore, unsuitable for the scheduling of examinations. Students have the responsibility of notifying the instructors in advance of expected absences. In cases of absence for a week or more, students are to notify their instructors immediately. If they are unable to do so they may contact the Office of Records and Registration. The Office of Records and Registration will notify the instructor of the student's absence. The notification is not an excuse but simply a service provided by the Office of Records and Registration. Notifications cannot be acted upon if received after an absence. In every instance the student has the responsibility to initiate arrangements for make-up work.

TCNJ's attendance policy *is available on the web:*

<http://policies.tcnj.edu/policies/digest.php?docId=9134>

Academic Integrity Policy

Academic dishonesty is any attempt by the student to gain academic advantage through dishonest means, to submit, as his or her own, work which has not been done by him/her or to give improper aid to another student in the completion of an assignment. Such dishonesty would include, but is not limited to: submitting as his/her own a project, paper, report, test, or speech copied from, partially copied, or paraphrased from the work of another (whether the source is printed, under copyright, or in manuscript form). Credit must be given for words quoted or paraphrased. The rules apply to any academic dishonesty, whether the work is graded or ungraded, group or individual, written or oral.

Academic integrity will be strictly enforced as per TCNJ policy. Dishonest behavior displays lack of respect for yourself, your peers, the instructor and TCNJ community. TCNJ's academic integrity policy *is available on the web:* <http://policies.tcnj.edu/policies/digest.php?docId=7642>

Americans with Disabilities Act (ADA) Policy

Any student who has a documented disability and is in need of academic accommodations should notify the professor of this course and contact the Office of Differing Abilities Services (609-771-2571). Accommodations are individualized and in accordance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1992.

Disability Support Services information available at: <http://differingabilities.pages.tcnj.edu> and

Americans with Disability Act Policy is available on the web: <http://policies.tcnj.edu/policies/digest.php?docId=8082>

Course and Instructor Evaluation

A formal course and instructor evaluation will be conducted at the end of the semester. Suggestions for improving the instruction and course content are welcome at any time and are particularly appreciated.

Feedback Mechanism

All student homework assignments, exams and design project deliverables will be evaluated and marked by the instructor.

TENTATIVE COURSE TIMELINE

#	Date	Content	Reading Assignment	Due
1	9/1 Thur.	Course Introduction: Course Syllabus, Lab Logbook and Engineering Paper Requirement Number systems: Binary, Octal, Hexadecimal, and Decimal Numbers	• Chapter 1 (p.3-37)	
2	9/8 Thur.	Group Project: Forming Groups (2-3 students per group) Group Project discussion Number conversions: Binary, Octal, Hexadecimal and Decimal number conversions Negative Binary Numbers	• Chapter 2 (p.39-75)	• Project Logbook Due
3	9/15 Thur.	Intro. to Digital Logic: Truth Tables, Simple Gates- AND, OR, and NOT gates	• Chapter 7 (p.295-336)	• HW #1: Number Conversions and Negative Binary Numbers
4	9/22 Thur.	Intro. to Digital Logic: Boolean Algebra		• Breadboard
5	9/29 Thur.	Intro. to Digital Logic: Minterms, Maxterms and K-map		
6	10/6 Thur.	Group Project	• Chapter 8 (p.337-351)	• HW #3: Boolean Algebra and K-map Simplifications
7	10/13 Thur.	Prelab Materials: Breadboards, Function Generator, Power Supply	Chapter 4 (p.156-220)	• Breadboard • Research Paper Draft Due
8	10/20 Thur.	Lab 1: 4-bit Binary and BCD counters	• Chapter 5 (p.227-240)	
9	10/27 Thur.	Lab 2: Digital Logic Gates	• Chapter 6 (243-283)	• Lab 1 Report
10	11/3 Thur.	Group Project		• Lab 2 Report
11	11/10 Thur.	Group Project		
12	11/16 Wed.	Robot Contest		
13	11/17 Thur.	No Class		
	11/24	Thanksgiving Break		
14	12/1 Thur.	Review and Evaluations		
15	12/8 Thur.	No Class		

The instructor reserves the right to change any portion of this syllabus whenever necessary. In the event that this action becomes necessary, students will be notified in a reasonable and timely fashion.