Integrated System Design 1

Class Location/Time: 100 Earle Hall – Wednesdays 4:40 PM – 5:30(ish) PM; Lab until 6:30 PM.

Instructor: Dr. Apoorva Kapadia
Email: akapadi@clemson.edu
Office: 307 Fluor Daniel EIB
Phone: 656-3946
Office Hours: Mondays, Tuesdays, Wednesdays, Thursdays 10:30 AM – 12 PM. Feel free to stop by or ask about a more convenient time if my office hours do not work for you. Additionally, there might be days when I will have to cancel Office Hours – I will do my best to ensure it is not before exams or due homework and provide sufficient notice.

Teaching Assistant/Grader: Joseph Clements (jfcleme@clemson.edu), Greg Szrom (gszrom@clemson.edu)

Course Description

Considers engineering design of systems in a continuous process of project definition, planning, execution, and evaluation. This process includes consideration of both technical and non-technical factors in design. Strong emphasis is placed on the development of effective technical communications skills, particularly oral communications competency.

Electronic Distribution
Technical material can be found on the class website: http://akapadi.people.clemson.edu/ece4950.html and certain announcements via Canvas. Bookmarking the class website is strongly recommended.

Prerequisite:
Co-requisite for all students: ECE 4951

Pre-requisites for Electrical Engineering Students: ECE 3200, ECE 3300, ECE 3600, ECE 3800

Pre-requisites Computer Engineering Students: ECE 3200, ECE 3300, ECE 3220, ECE 3520, ECE 3710

All of the above with a C or better.

Course Objectives

The goal of this course is to introduce to you a **professional** methodology of project definition, planning, scheduling, and execution. This methodology will be applied in two ways: 1) by practicing applying your technical skills in a team with your colleagues to complete various projects throughout the semester and 2) by communicating your results clearly and concisely in report form.

Topical Outline

1. The Design Process
   a. Overview
   b. Scheduling
   c. Requirements, Standards, and Specs
   d. Concept Generation and Evaluation
   e. Functional Decomposition
   f. Research and Sources of Information
   g. Safety and Hazards
   h. Environmental Concerns
   i. Ethical Issues
   j. Intellectual Property

2. Technical Considerations
   a. Loopback Testing
   b. Actuator Selection
   c. Actuation Testing
   d. Sensor Selection
   e. Sensor Testing
   f. Closed-Loop Motor Control
   g. Image Processing
   h. System Integration
   i. GUI/HMI
   j. System Logic Design
   k. Emergency Stops
   l. Laser Cutter

Grading

Final grades will be determined by averaging the homework, exams, and the final exam based on the distribution below.

Technical Project 1	5%
Technical Project 2	10%
Technical Project 3	15%
Technical Project 4	20% (includes 3 milestones totaling 6%)
Design Process Analyses	10%
Website Design	10% (3% preliminary + 7% final)
Peer Evaluations	15%
Technical Jury Review	10%
Individual Assignments	5%
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Course Grade	100%

90% – 100%	A
80% – < 90%	B
70% – < 80%	C
60% – < 70%	D
0% – < 60%	F

Additional Policies

Logistics

To keep up with course announcements, you need to check the ECE 4950 Canvas site on a regular basis. All the material you need for the course is either on the Canvas site or the ECE 4950 website. These sites contains the lecture notes, project information and demonstration/due dates, reference material, tutorials, and much more. Any demonstration or class cancelled due to power outages, inclement weather or similar conditions will be held at the next class meeting unless explicitly stated by me on Canvas. Any assignments due at the time of the class cancellation will be rescheduled for the next class meeting day and will be stated on Canvas.

Questions

Questions in class are strongly encouraged. The worst thing I can do is move too slowly and bore you. The second worst thing I can do is move too quickly and confuse you. If either of these occurs, it is your responsibility to speak up. You are paying for an education, and if the material is not presented clearly with confusion being eliminated shortly after it sets in, you are not getting what you contracted for. On the other hand, if I never confuse you I am being unduly conservative, and hence, not conscientious. There is a fine balance here, with you as students and me as instructor each having very definite responsibilities for keeping open all channels of communication. It is extremely difficult to teach a course without some sort of real time feedback.

Attendance Policy

Students are expected to attend all lectures and labs and are responsible for the content. You may be asked to sign in and quizzes/homework assignments will be collected during the lecture period. However, you should not meet with your group in person or attend class if you are sick with a contagious disease, e.g. the flu. You should avoid infecting your group, use email, phone (for example, you could be on the speaker phone during a group meeting), or on-line meetings to stay in contact and contribute to the group effort during your illness. You are expected to contribute equally to the group effort over the course of the semester, if you are sick you will have to make up the lost effort with your group. Physical attendance in class is expected but the following provision is made in the case of illness: **if you miss class you should review the lecture and accompanying reading assignment (if any) on Canvas and write a 1 page summary of the lecture by the end of the week**. If your instructor has not arrived within 15 minutes after the starting time for the class you should assume the class is canceled.

Effective Technical Communications Content

A very important aspect of the professional performance of an engineer is the ability to communicate well both orally and in writing. You will be expected to further develop your communication skills by continual practice in this course. The elements of communication will include: written reports, written responses to reading assignments, and both informal discussions and formal oral reports of your work.

Group Communications with the Instructor

Because of the few formal class meetings during the semester, communication between groups and the instructor will rely mainly on periodic reports to the instructor and notices posted in Canvas. Any student with a question should make direct contact with the instructor.