

FSNA 137: Amps, Volts, Bits and Bytes

Instructors:

Professor: Sears, Merat, Bhunia or Lee
Office:
Phone:
e-mail:
Office Hours:

Writing Instructor:
e-mail:
Office Hours:

Class Times:

Course Description:

The electrical grid, the computer, biomedical devices, electric vehicles, interactive art, and smart homes are a few examples of the pervasiveness of electronics and computer technology. This discussion-based seminar will introduce the engineering design process, and present the basics of electricity, electronic circuits, measurement, sensors, and microcomputers, and how to use them to design and build useful devices. Students will reverse-engineer products, learn electrical and mechanical prototyping and fabrication techniques, and apply them in a variety of hands-on labs. The seminar will conclude with students proposing, designing, and prototyping projects. These activities will form the foundation of writing and oral presentation assignments designed to build the students' persuasive argument skills. The seminar will make extensive use of the Sears Design Lab and Think[box] and is writing intensive. Prior experience with electronics is not required for this seminar (but an interest to learn about electronics is essential.)

Course Rationale

This seminar will address the *Thinking about the Natural/Technological World* area of SAGES. Students will be exposed to electrical engineering topics and skills, such as creating simple circuits and writing small programs for a microcontroller. There will be laboratory time for students to become acquainted with constructing electrical circuits using discrete electrical components, breadboards and power supplies in a laboratory setting, with programming the Arduino microprocessor development platform and connecting the Arduino to the electrical circuits. This exposure will provide the foundation for a project where students create a device to address and problem or need.

Through readings and class discussions about professional engineering licensure, engineering disaster analysis and engineering ethics, students will be exposed to how simple and minute details can often lead to large failures. Writing assignments will ask students to investigate disasters and

clearly explain the cause. Further, students will explain what steps have been implemented to prevent a future repeat and to argue whether those steps are adequate.

This will be tied to laboratory work where students are asked to address a problem using the skills they learn in the course. Emphasis will be placed on reflecting upon and writing about the errors encountered during laboratory exercises and how these simple errors could propagate and have disproportionately large consequences. The role of licensure and ethics in preventing similar errors from propagating will be included.

The class will include a project which will require students to build a device that performs a specific and relatively complex function. The final writing assignment will be to use the experience and insight gained from the project to inform an analysis of an engineering mishap or disaster.

Textbooks:

D. Kaplan and C. White, *Hands-On Electronics: A Practical Approach to Analog and Digital Circuits*, Cambridge University Press, 2003, ISBN 0521893518; \$37.29 on Amazon. Available from KSL online.

C. Boot, G. Colomb, and J. Williams, *The Craft of Research*, Third Edition, The University of Chicago Press, 2008, ISBN 0226065669; \$12.69 on Amazon.

Course Grading

Major Writing Assignments	40%
Participation**	20%
Final Project	20%
Writing Folder*	20%

*Explanation of the writing folder: In lieu of a final exam, each student will compile a Writing Folder comprising revised versions of 1-3 of her/his papers and a two-page self-assessment of her/his development as a writer through the course of the semester.

** Participation includes typical classroom participation in the form of contributing to class discussion and working with classmates or writing exercises. It also includes participation in the class laboratories.

Getting Feedback on your Writing:

As you work on your papers for this seminar, you are always welcome to make an appointment with me or with the writing instructor. We are happy to discuss the requirements for each assignment, listen to your preliminary ideas, and help you develop a structure for your argument. We can also review your first draft and offer feedback before you submit a paper for a grade.

In addition, we strongly encourage you to take advantage of the one-on-one writing support available to students in the SAGES program. Tutors from the Writing Resource Center (WRC) and the SAGES Peer Writing Crew can assist you at any stage of the writing process:

- generating ideas
- composing a rough draft

- organizing your thoughts in the clearest and most compelling way
- editing and revising

Writing Resource Center

www.case.edu/writing/writingcenter.html

WRC consultants may be English department lecturers or graduate students with expertise in teaching writing. They meet with students at several campus locations and are also available for chat sessions online. You can make an appointment with a WRC consultant at <http://wrc.case.edu>.

SAGES Peer Writing Crew

<http://studentaffairs.case.edu/education/resources/sagesguide/crew.html>

Writing Crew members are undergraduates who have excelled as writers in their SAGES courses. Like WRC consultants, they hold tutoring sessions at several campus locations. In addition, they operate an electronic dropbox (sageswritingcrew@gmail.com) where you can submit drafts and receive written feedback. Their online guide, *Beyond Typing* (<http://studentaffairs.case.edu/education/peer/sagesguide/toc.html>), offers advice on all aspects of college writing. You can make an appointment with the Crew at <http://tutortrac.case.edu>.

Accommodations for Students with Disabilities:

Academic accommodations are available to students with documented disabilities. In order to access the accommodations for which you may be qualified, please register with the office of Disability Resources (ESS, Sears 470). The staff there will verify your need for specific accommodations and provide you with a memo to inform me of your needs. Once you have received this memo, please make an appointment to see me privately to discuss your needs. Please be aware that any needed accommodations cannot be implemented retroactively; therefore, timely notification of your needs is in your best interest.