



ECE 557: *Control, Signals, and Systems Laboratory*

Summer 2009

Thursday, 1:30PM–5:18PM, 808 Drees Laboratory

Instructor: Ted Pavlic, 351 Caldwell Laboratory (CL), pavlic.3@osu.edu
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E-mail Policy: Be sure to include **ECE557** in the subject of your e-mail. Otherwise, your e-mail may be accidentally misfiled (e.g., automatically marked as spam). Do not hesitate to e-mail me; I am happy to help.

Content: This course is meant to accompany ECE 551 as an introduction to signals and systems with emphasis on control applications and feedback. We use MATLAB, *Simulink*, and *dSPACE* to build feedback controllers for real plants (e.g., motors, joints, and links). The course covers data acquisition (DAQ), digital signal processing (DSP), gain compensation, lead-lag compensation, and proportional-integral-derivative (PID) control.

Course Web Page: <http://www.ece.ohio-state.edu/~pavlic/ece557/>

Make sure to check the web page for online resources on signals, systems, and control. There are also resources on lab report writing.

Guidelines for lab report grading are also on the web site.

Carmen (<http://carmen.osu.edu>) will be used to distribute grade information.

Office Hours: See [course web page](#) for official hours. Appointments can be made by e-mail. Alternatively, I welcome walk-ins (i.e., office visit without appointment) provided that I have a few minutes to help.

Text: Students are required to purchase the lab book, *Control Systems Technology Lab* by Yurkovich and Abiakel. It is available at most university bookstores. Its content has not changed significantly since 1998, and so most used or borrowed copies will be sufficient. Sometimes I will distribute supplementary material in class and on [the course web page](#).

Data Storage: Local hard disk space is available for in class use at each bench. However, data will need to be gathered for each lab report. Machines are on the department network, and so network file transfers can be a good solution. Otherwise, students should have a means of transporting the data.

Grading: The numeric grade for the course is weighted as follows:

- Pre-lab assignments (individual): 30%
- Lab reports (group): 40%
- Lab clean-up (group): 10%
- Final exam (individual): 20%

The final *letter grade* will be curved based on weighted numeric scores *before* the final exam.

Pre-lab Assignments: Each lab includes a *Laboratory Preparation* section that must be completed **individually** (i.e., not in the lab groups) by **each** student. Pre-lab assignments are due at the beginning of the corresponding lab.

Daily Lecture: There will be a short (i.e., approximately 45 minutes or less) lecture at the beginning of each class. The purpose of the lecture is to explain content relevant to the completion of the lab and subsequent lab report.

Lab Reports: Each lab **group** must submit a single lab report at the beginning of the next class after the lab is completed. Lab reports will be penalized 10% per day late.

Groups: Each lab group will be made up of **two students**. Lab groups are responsible for lab reports. Individual students are responsible for pre-lab assignments.

Final Exam: The final exam has both a written theoretical portion and a practical laboratory portion. The final exam will take place during the last day of scheduled classes. Exams will be completed **individually**, and so all students should know how to use **both** the software and the hardware in the lab.

Attendance: Students are responsible for all assignments, change of assignments, announcements, and other course-related materials. If a lab needs to be missed, arrangements should be made with me at least 24 hours prior to the lab so that the lab work can be made up. I reserve the right to determine when make-up work is allowed.

Honor System: The ECE Honor System rules apply to all student work. All lab reports must reflect the understanding of the lab group. All other written work must reflect the understanding of the individual student. Otherwise, discussions on course material are encouraged.

Tentative Schedule: Due to limited hardware and time, Labs 8 and 9 **are both completed** in Week 8:

Week 1 (June 25): Introduction to Data Acquisition (DAQ) (Lab 1)

Week 2 (July 2): Introduction to Digital Signal Processing (DSP) (Lab 2)

Week 3 (July 9): Time Domain System Identification for a DC Servo (Lab 3)

Week 4 (July 16): Gain Compensation and Feedback for a DC Servo (Lab 4)

Week 5 (July 23): Lag Compensation for Speed Control of a DC Servo (Lab 5)

Week 6 (July 30): Lead Compensation for Position Control of a DC Servo (Lab 6)

Week 7 (August 6): Tuning a Proportional-Integral-Derivative (PID) Controller (Lab 7)

Week 8 (August 13): Position Control for Flexible Joint (Lab 8) **AND** Flexible Link (Lab 9)

Week 9 (August 20): In-class final exam: theory and practice

Make-up schedule: If labs cannot be completed on time by a significant portion of the class, I *may* work with the class to schedule a special lab make-up time before the next lab. Students are strongly encouraged to finish labs during the normal lab time. Students should not expect that additional time will be available.

Disability services: Students with disabilities that have been certified by the *Office for Disability Services* will be appropriately accommodated and should inform the instructor as soon as possible of their needs. [The Office for Disability Services](#) is located at 150 [Pomerene Hall](#), 1760 Neil Avenue. They can be reached by telephone (614-292-3307) or TDD (614-292-0901) or the web (<http://www.ods.osu.edu/>).