Dynamic Systems Modeling Lab
BE 350L, Fall 2008
Course Syllabus

Instructor: *Daniel M. Jenkins*
Office: Agricultural Science 415L Telephone: 956-6069
Office Hours: Thursday 3:00-4:00 PM & by appointment Email: danielje@hawaii.edu

Lab Support and Field Trip Co-Coordinator: *Ryan Kurasaki*[*]
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[*] Note that Ryan Kurasaki's efforts are purely voluntary, and in general he should not be bothered!

Teaching Assistant: No teaching assistant will be used for the lab part of this class. If you have questions related to the material that you are uncomfortable speaking about with the instructor, you may request a meeting with the instructor or TA for BE 350:
Gönül Schara (BE 350 instructor): gonul@hawaii.edu, 956-9461, Agr. Sci. 415N.
Devin Takara (BE 350 TA): takarad@hawaii.edu, Agr. Sci. 415 Hallway.

Meeting Times and Locations: In general the lab will meet from 7:30 – 10:15 AM on Thursdays, in Agr. Sci. 315. The meeting time may change for field trips, for which we generally will meet in the driveway between St. John and AEI buildings. For some topics/ labs, especially those related to software, we will start our lab in the CTAHR computer lab, and at least one lab may be held in the AEI machine shop (AEI 122). Deviations from normal meeting times/ locations will generally be communicated a week in advance, although some unforeseen changes are likely. Because of this you are required to check your UH e-mail account the day prior to lab to check for any changes in the itenerary.

Grading:	Attendance:	20%
	Participation/ lab practicals:	20%
	Written reports:	60%[†]

[†] Note that this is a Writing Intensive (WI) course. There will be a series of six lab topics and a final project to write reports about. You must submit lab reports for at least three of the labs, chosen at your discretion, and an additional report for the final project (note that if you submit more than four reports, the extra(s) with the lowest score(s) will not count towards your grade)

Textbook: There is no textbook for the lab portion of this course. Notes, handouts, and supplementary readings will be posted on WebCT:
http://wct01.hawaii.edu/webct/public/home.pl
(Log on with your UH username and password, then click "**Dyn. Syst. Modeling Lab** (BE-350L-001 - MAN)".

Prerequisites: Co-requisite: BE 350 (or consent).

Catalog Description: 1 credit. Industry field trips and lab experiences to illustrate behavior of representative dynamic systems in biological engineering. Data acquisition and model validation.

Lab Topics

Week/ Date	Topics
1/ August 28, 2008	Course Introduction, review of syllabus, report expectations, basic principles of calorimetry.
2/ September 4, 2008	1A) Bomb calorimeter experiments: calibration and analysis.
3/ September 11, 2008	1B) Bomb calorimeter experiments: continued.
4/ September 18, 2008	Field Trip: H-Power (tentative).
5/ September 25, 2008	2A) Introduction to LabVIEW- computer interfacing of lab instruments.
6/ October 2, 2008	2B) Dynamometer experiment- analysis of engine performance.
7/ October 9, 2008	3A) LabVIEW serial communication, file handling; sensor calibration.
8/ October 16, 2008	3B) Gas dissolution and diffusion experiment; multiprocess modeling.
9/ October 23, 2008	4) LabVIEW instr.drivers; analysis of heat exchanger performance.
10/ October 30, 2008	5) Custom libraries and subroutines; stepper motor control and analysis.
11/ November 6, 2008	6) Datalogger programming; analysis of a solar water heating system.
12/ November 13, 2008	Field Trip: Honouliuli Waste Water Treatment Plant (tentative).
13/ November 20, 2008	Field Trip: Hawaii Agricultural Research Center (tentative).
14/ December 4, 2008	7A) Introduction to COMSOL- Multiphysics Finite Element software.
15/ December 11, 2008	7B) Final project- numerical simulation of multidimensional transport.

Important Dates:

August 25 (Monday)- First day of instruction

August 28 (Thursday)- First day of lab (for BE 350L)

September 1 (Monday)- Labor day holiday

September 2 (Tuesday)- Last day to drop without 'W'

September 3 (Wednesday)- Last day to add classes, or change grading option

October 17 (Friday)- First lab report due

October 24 (Friday)- Last day to withdraw (with 'W')

November 3 (Monday)- Last day for submission of "I" removal grades (better finish incomplete work far in advance!)

November 4 (Tuesday)- Election day holiday

November 11 (Tuesday)- Veteran's day holiday

November 14 (Friday)- Second lab report due

November 21 (Friday)- Third lab report due

November 27/28 (Thursday/ Friday)- Thanksgiving holiday (no lab)

December 11 (Thursday)- Last day of lab

December 16 (Tuesday)- Final project presentations, 7:30 – 9:30 AM.[‡]

[‡] Note, there will be no final for this course, but if your previous reports exceed a total of 16 written pages you may opt to present your final project orally (instead of as a written report) during the scheduled final exam time.

Course Policies:

1. ***Safety***: Any student observed willfully engaging in activities hazardous to any of the course participants will be summarily dismissed from the lab with no credit for attendance, will not be allowed to submit the corresponding lab report for a grade, and depending on the severity of the offense may be referred for disciplinary action. Specific safety precautions will be listed at the start of each lab handout, and in general you should not touch or use any equipment that is not explicitly called for in the lab handout without the expressed consent of the instructor. Those committing minor and/or unintended infractions of safety protocols or misuse of lab equipment will be given a warning; the second offense will be cause for removal from the lab. You may not attend the lab if you do not have shoes covering your entire feet, including toes.
2. Accidents in the lab are to be reported to the instructor immediately.
3. You must submit at least one laboratory report by October 17, a total of two by November 14, and a total of three by November 21. Late penalties will be assessed at 20% per week or fraction thereof up to a maximum of 60%. The final project report must be turned in at the assigned "final exam" slot for the course (7:30 AM, Tuesday, December 16). Students with unexcused absences from labs will not receive credit for them. Absences will only be excused for extreme circumstances such as serious injury or illness, death in the family, participation in varsity athletics or other university sponsored activities, or observation of religious holidays. A confirmatory note from the relevant authority will be required, and advanced notice should be given if possible.
4. While most of the labs will be completed in small teams, you are required contribute meaningfully to the execution of the experiment, submit your own written reports, and be capable of performing all of the calculations and analysis required for the report.
5. Up to 25% of the grade for written work may reflect the quality of grammar and spelling, and another 25% may reflect technical organization.
6. All pertinent work must be shown on exams and papers to receive credit. Unintelligible work will not be graded.
7. Questions are encouraged. The instructor should always make himself available to you during scheduled office hours, and to the extent that his schedule permits he will answer questions by e-mail or phone, or arrange for meetings outside of class.
8. Grading: if the overall class average is greater than 75%, those above 90% will receive an A, those above 80% will receive a B, those above 70% will receive a C, and those above 60 will receive a D. If the class average is less than 75%, the grades will be "curved" to make the average 75%, and letter grades will be assigned as described above. Note that the grade thresholds may arbitrarily be made lower than described above, but they will not be made higher (e.g., if you fall in a given range you may receive a grade higher than the nominal value of the range), though the instructor reserves the right to suspend the curving policy of he judges that students are generally not making a sincere effort to meet the course expectations.
9. Attendance and participation combined account for 40% of the grade for the course. While the participation grade is normally reflective of the attendance grade, the former will be severely impacted by habitual tardiness, disrespectful behavior towards your peers

or other course participants, and lack of engagement in the experiments. The participation grade is awarded entirely at the discretion of the instructor.

10. Students are expected to be attentive in lab, and to learn from the execution of the coursework. To encourage this, a discretionary amount of extra credit will be awarded to students who identify errors in lectures or labs distributed by the instructor, or who offer simpler or more elegant proofs and derivations or analyses used in lab. Up to 3% may be added to the students final grade per incidence, depending on the severity of the error and/or the astuteness/ analytical rigor of the students observation/ proof. All extra credit will be added after adjustment of the final averages so that other students' grades are not affected.

Course Learning Objectives

Upon completing this course, the student will be able to:	Level[†]	BE Outcome[‡]
i) apply principles of mass/energy conservation and force balance to derive differential equations for a system;	D	a)
ii) understand the relationship between free energy, entropy, internal energy, and enthalpy;	I	c)
iii) use models of a process to identify the most salient characteristics governing system behavior;	D	e)
iv) design a simple experiment, with effective controls, to quantitatively measure relevant parameters;	M	e)
v) logically interpret data from experiments;	M	e)
vi) apply computational tools for the solution of multidimensional and partial differential equations;	M	f)
vii) write structured code to simulate a system;	M	f)
viii) interface a computer/ controller with a system or process;	M	f)
ix) design simple circuits for signal processing and measurement;	D	f)
x) share responsibilities and duties with team members;	D	g)
xi) objectively discuss the problem and the merits of possible solutions;	D	g)
xii) formulate an effective strategy for action;	D	g)
xiii) maintain constructive dialog with team members with different tasks;	D	g)
xiv) organize the content of a document according to the informational needs and technical background of audience;	M	i)
xv) communicate facts supported by evidence and/or sufficiently detailed explanation;	M	i)
xvi) effectively assimilate feedback from a reviewer/ audience;	M	i)

xvii) submit written work without errors in spelling, punctuation, and usage;	M	i)
xviii) understand the social, cultural, political, and environmental impacts of biological engineering practice;	D	j)
xix) independently research scientific literature and engineering references;	D	k)
xx) understand the role Biological Engineers face in addressing societal challenges.	D	l)

[†] I = Introductory; D = Developmental; M = Mastery.

[‡] UH Biological Engineering Course Outcomes:

a) The graduate has the ability to solve problems involving differential equations.

b) *The graduate has the ability to solve physics problems involving mechanics, electromagnetics, and optics; chemistry problems involving inorganic and organic chemistry; problems involving general and micro-biology*.

c) The graduate has the ability to solve engineering problems related to statics, dynamics, fluid mechanics, and thermodynamics.

d) *The graduate has the ability to design a system, component, or process in which biology plays a significant role*.

e) The graduate has the ability to design and conduct experiments to gather information for engineering designs.

f) The graduate has the ability to use modern engineering techniques, skills, and tools to define, formulate, and solve engineering problems.

g) The graduate has the ability to function effectively on multi-disciplinary teams.

h) *The graduate has the ability to identify professional and ethical responsibilities when practicing engineering*.

i) The graduate has the ability to communicate effectively in large and small groups.

j) The graduate has the background to understand the impact of engineering solutions on the surrounding context.

k) The graduate recognizes the need to engage in life-long learning through participation in professional conferences, workshops, and courses, and by reading and writing in the relevant literature.

l) The graduate has the ability to intelligently discuss contemporary issues.