ECH3301 Process Analysis and Design Fall 2010

Course Description:
Development and analysis of process models for systems that arise in chemical engineering applications.

Instructor	Office	Email	Phone
Petr Hotmar	373f	ph06@fsu.edu	410-6684 (emergencies only)

Office Hours	Class Time	TA
MW 12:30-2pm	MW 9:45-11am (B134)	Y. Sahanggamu (yps06@fsu.edu)

Pre-requisites:
MAC2312. Calculus II; analytic geometry, differentiation, integration, integration by parts, infinite sequences and series, vector algebra.

Text Book(s) and/or other required material:
Kreyszig K., Advanced Engineering Mathematics, 9th Ed., John Wiley, 2005.
Course Notes and Handouts posted on Course Blackboard site.
Recommended reading:
G. Strang, Linear Algebra and Its Applications
M. Tenenbaum and Harry Pollard, Ordinary Differential Equations

Objectives
Upon successful completion of this course, the students should have the ability to:
- develop and analyze process models for equilibrium and dynamic single-stage and multistage systems,
- optimize process operating conditions using a process model,
- make decisions on the best way to model and analyze a chemical process.

Course Topics:
1. Linear Equations & Matrix Algebra
2. Vector Spaces & Classical Least Squares
3. Determinants & Cramer's Rule
4. Eigenvalues and Eigenvectors
5. Mathematical Models
6. Separable & Exact Ordinary Differential Equations
7. Second-Order ODEs w/ Constant Coefficients
8. Non-homogeneous ODEs w/ Constant Coefficients
9. Laplace Transforms
10. Transforms of Step & Impulse Functions
11. Convolution Theorem & Partial Fractions
12. Systems of Differential Equations
13. Process Optimization

Computer Usage:
Numerical computation assignments will assume the student knows, or is willing to learn, Matlab or other suitable mathematical software or high-level programming language.

Course Policies:

Grading: Homework and quizzes 20%, two mid-term exams 25% each, final exam 30%. A cumulative average of 90% or higher will guarantee at least an A, 80% a B, 70% a C, and 60% a D. If you fall below these ranges, I may decide to implement a curve of roughly the following format: 15% As, 25% Bs, 40% Cs, 15% Ds, 5% Fs.

Homework and quizzes: Homework is due at the beginning of class one week after assignment. All homework should be professional in appearance (see attached Guide for writing mathematics assignments). Late homework (>5 mins after class starts) will not be accepted. Random in-class quizzes of 10-15 mins duration, closed book, based on the homework and reading assignments, may be given instead of collecting the homework for a given day. The quiz score will take the place of the homework score for that day. Missed quizzes may not be made up under any circumstances. The lowest homework grade and quiz grade will be dropped at the end of the semester.

Exams: The two mid-term exams will be of 75 mins duration each. The final exam, of 120 mins duration, will be cumulative. No use of electronics will be allowed during exams, but you can prepare and use one 8.5x11 sheet of paper (both sides) with notes of your choice. Copying or collaboration on quizzes or exams will not be tolerated (grade 0). Makeup exams will be given only under extraordinary circumstances (e.g. a medical emergency), and the instructor should be given documentation for the absence no later than two days after the date of the scheduled exam.

Class Attendance: While attendance will not be formally recorded, a large number of absences will be noted and can be expected to affect the final grade. Please refrain from using any electronics in class, except for pocket calculators.

Academic Honor Code: Students guilty of academic dishonesty, cheating or plagiarism in academic work shall be subject to disciplinary action. Please refer to the appropriate sections of the University Bulletin or Catalog, or to the Student Handbook.

Alternative Format: This syllabus and all other course materials are available in alternative format upon request.

Syllabus change policy: Except for changes that substantially affect grading policy, this syllabus is a guide for the course and subject to change with advance notice.

Exceptions to the rules: If you experience academic, personal or emergency situations which you believe warrant an exception to the rules above, your must request an exception **before** the relevant assignment or exam (unless you are incapacitated).

Americans with Disabilities Act

Students with disabilities needing academic accommodation should:

(1) Register with and provide documentation to the appropriate university office.

- For FAMU students, this is the Center for Disability Access and Resources (CeDAR).
- For FSU students this is and Student Disability Resource Center (SDRC); and

(2) Bring a letter to the instructor indicating the need for accommodation and what type. This should be done during the first week of class.

For more information about services available to students with disabilities,

FAMU Students should contact the:
Center for Disability Access and Resources
(850)599-3180 cedar@famu.edu

FSU Students should contact the:
Student Disability Resource Center
(850) 644-9566 sdrc@fsu.edu

A Brief Guide for Writing Mathematics Assignments

Prepared by: Dr. Karl Glasner, Adapted by: Petr Hotmar

NOTE: It will be a general policy that work which does not follow these guidelines will be returned without a grade.

Presenting mathematical ideas should be no different than any other subject. This may come as a surprise, because most calculation-oriented lower-level classes (algebra and calculus) rarely expect good presentation. This unfortunately reinforces bad habits that transfer to higher-level courses that require written explanations in addition to calculations.

The usual rules of good writing should apply, especially **neatness, clarity and organization**. A good example of mathematical writing can be found in many (but by no means all) textbooks. This is the style you should emulate for written assignments in this course.

Some specific considerations, in rough order of importance are:

(1) The most important rule: **brevity**. Answers should be as long as necessary to convey all significant details, and NO LONGER!

(2) Complete, grammatically correct sentences (yes, just like in other classes) are essential. Note that equations are parts of sentences and should be accompanied by text and proper punctuation.

(3) Homework/projects should be done on blank paper (all those extra lines are really annoying). The writing should be large enough to be **legible – this means readable by the instructor**, not by the writer. Problem numbers should be clear and numerical order should be preserved. **In cases where handwriting is too poor to be readable, assignments will have to be typeset by computer.**

(4) Organizing ideas is the most important part of writing. Large problems may require organization into paragraphs and even entire labeled sections.

(5) Graphs and drawings should be annotated (by hand if necessary), and a textual explanation should accompany. In the case where computer code is used, a copy of the code and graphical/ numerical results should be included at the end. If many variations of the same code are used, only a basic template in necessary.