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OFFICE OF THE SENATE COUNCIL

APPLICATION FOR NEW COURSE

1. Submitted by College of Engineering Date 1/20/2006

   Department/Division offering course Chemical and Materials Engineering

2. Proposed designation and Bulletin description of this course

   a. Prefix and Number CME 199 b. Title* Computational Tools in Chemical Engineering

   *NOTE: If the title is longer than 24 characters (including spaces), write A sensible title (not exceeding 24 characters) for use on transcripts Comp Tools in Chem Eng

   c. Lecture/Discussion hours per week 3 d. Laboratory hours per week

   e. Studio hours per week f. Credits 3

   g. Course description

   An introduction to computational tools used in chemical engineering such as Microsoft Excel, visual basic for applications and Maple.

   h. Prerequisites (if any)

   Enrollment in the College of Engineering or permission by instructor

   i. May be repeated to a maximum of (if applicable)

4. To be cross-listed as

   Prefix and Number Signature, Chairman, cross-listing department

5. Effective Date Spring 2008 (semester and year)

6. Course to be offered ☐ Fall ☒ Spring ☐ Summer

7. Will the course be offered each year? ☒ Yes ☐ No
   (Explain if not annually)

8. Why is this course needed?

   In response to feedback from constituencies, chemical engineering students need to learn computation tools and simulation packages.

9. a. By whom will the course be taught? Chemical Engineering Faculty

   b. Are facilities for teaching the course now available? ☒ Yes ☐ No
   If not, what plans have been made for providing them?

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10. What enrollment may be reasonably anticipated? 40

11. Will this course serve students in the Department primarily? ☒ Yes ☐ No

Will it be of service to a significant number of students outside the Department? ☐ Yes ☒ No
If so, explain.

Will the course serve as a University Studies Program course? ☐ Yes ☒ No

If yes, under what Area?

12. Check the category most applicable to this course

☐ traditional; offered in corresponding departments elsewhere;

☒ relatively new, now being widely established

☐ not yet to be found in many (or any) other universities

13. Is this course applicable to the requirements for at least one degree or certificate at the University of Kentucky? ☒ Yes ☐ No

14. Is this course part of a proposed new program: ☐ Yes ☒ No
If yes, which?

15. Will adding this course change the degree requirements in one or more programs?* ☒ Yes ☐ No
If yes, explain the change(s) below

This course will be required for a BS degree in chemical engineering. Program change is attached.

16. Attach a list of the major teaching objectives of the proposed course and outline and/or reference list to be used.

17. If the course is a 100-200 level course, please submit evidence (e.g., correspondence) that the Community College System has been consulted. ☒ Check here if 100-200.

18. If the course is 400G or 500 level, include syllabi or course statement showing differentiation for undergraduate and graduate students in assignments, grading criteria, and grading scales. ☐ Check here if 400G-500.

19. Within the Department, who should be contacted for further information about the proposed course?

Name Kimberly W. Anderson, Director of Undergraduate Studies Phone Extension 7-4815

*NOTE: Approval of this course will constitute approval of the program change unless other program modifications are proposed.

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Signatures of Approval:

Department Chair	4/20/06 Date
Dean of the College	1/16/07 Date
	12/4/06 Date of Notice to the Faculty
*Undergraduate Council	3/20/07 Date
*University Studies	Date
*Graduate Council	Date
*Academic Council for the Medical Center	Date
*Senate Council (Chair)	Date of Notice to University Senate

*If applicable, as provided by the Rules of the University Senate

ACTION OTHER THAN APPROVAL

Rev 3/04

University of Kentucky
Chemical and Materials Engineering Department

CME 199-001: Computational Tools for Chemical Engineering
Spring 2008

Instructor: Dr. Stephen Rankin 179 FPAT (Anderson Tower) [please knock!]
phone: (859) 257-9799 e-mail: srankin@engr.uky.edu

Office hours:

Time and Place: Tuesday 2:00 - 2:50 pm, FPAT [F.P. Anderson Tower] 263
Thursday 2:00 - 2:50 pm, BE [Business and Economics] 105

Teaching assistant:

Textbook: Prentice Hall compilation of chapters from R. W. Larsen, *Engineering with Excel* [ISBN 0-13-017696-6], S. C. Chapra, *Power Programming with VBA/Excel* [ISBN 0-13-047377-4], and D. I. Schwartz, *Introduction to Maple 8* [ISBN 0-13-032844-8]. The textbook in the bookstore contains excerpts from all books [ISBN 0536878811].

Course web site: http://www.engr.uky.edu/~srankin/egr199.htm

Prerequisite: Enrollment in college of engineering, or permission of instructor.

Course description

Throughout the chemical engineering curriculum at the University of Kentucky, computational tools are used to solve complex problems. This course will serve as an introduction to those tools, and to basic computer programming concepts that allow the efficient solution of engineering problems. Examples of programs that will be emphasized include Microsoft Excel, visual basic for applications (VBA, included with distributions of Microsoft Excel) and Maple 9.

Objectives: By the end of the course, students should:

1. Develop proficiency with the spreadsheet calculation and graphing features of Microsoft Excel
2. Understand and be able to use the Maple user interface to solve equations and systems of equations
3. Know the basic capabilities Excel and Maple, and know when to apply them
4. Be able to perform linear regression for a set of data
5. Understand basic concepts of computer programming such as decision statements and constructing loops
6. Write simple visual basic programs to solve engineering problems
7. Be able to numerically solve nonlinear equations using Maple and Excel
8. Be able to numerically solve sets of linear equations using Maple and Excel

Important Dates

January 12	First day of class.
February 21	Exam 1
March 6	Midterm of semester.
March 14 & 16	Spring break. No class.
April 11	Exam 2
April 27	Last day of class.
May 5	Final Exam, 10:30 am -12:30 pm

Grading

The following percentages will guarantee that a student receives that grade. If the average for the class warrants adjusting the grade distribution, the grade cutoffs may be adjusted, always in favor of higher grades.

100% to 90%: A 89% to 80%: B 79% to 70%: C 69% to 60%: D <60%: E

Grades will be assigned for individual assignments based on this scale, but at the end, all scores will be added together and weighted according to the components specified below, to determine the final grade. If a student receives a "D" or "E" on all exams and quizzes, homework and group project grade (see below) will not be counted (and the score will be renormalized).

Grading Components

Final Exam	35%
Exams (2)	15% each
Quizzes	15%
In-class assignments	10%
Homework	10%

Reading, Homework, and Learning Strategies

Reading assignments will be posted on the course web site and announced in advance in class. You will make the best use of your time in class if you keep up with the assignments, and come prepared for class. You may have an easier time doing the homework if you review the reading and notes before starting. This will be particularly important in *this* course, because we only meet twice a week, and one of the class sessions is devoted to in-class computer labs.

In-class Computer Assignments

On Thursdays, we will meet in a computer lab in the B&E building (see above). Some of the time will be spent on in-class assignments that will need to be turned in by the end of class (they will need to be e-mailed to the TA). Sometimes quizzes will be held instead, which will also need to be turned in by the end of the class period and will contribute more to the student's grade. Because there will be a time limit on the assignments, it is important that students come prepared, and have practiced either by reading and following with the assigned reading, or by doing the assigned homework.

Academic Integrity

All work that students turn in will be expected to be their own. Due to its digital nature, the temptation to copy computer files may be greater than handwritten work. However, instances of cheating and plagiarism will be taken very seriously in this class. Students will be asked to e-mail their answers to in-class exercises and some homework problems, to reduce the possibility for copying without detection. Students found to violate principles of academic integrity will receive an "E" for the assignment.

Tentative Sequence of Topics

It will be important to check the course web site occasionally for changes in the timing and sequence of covering these topics, but the tentative sequence will be:

A. *Excel* basics
    a. Introduction to spreadsheets and Excel [Larsen Ch. 1]
    b. Plotting with Excel [Larsen Ch. 2]
    c. Excel functions [Larsen Ch. 3]
B. Linear regression in Excel
    a. The linear regression problem
    b. Excel's trendlines – use and interpretation [Larsen Ch. 5]
C. Solving nonlinear equations
    a. Approaches to solution [Larsen Ch. 6]
    b. Newton-Raphson method
    c. Implementing Newton-Raphson method in *Excel*
D. Macros and VBA
    a. Using Macros in Excel to automate tasks [Larsen Ch. 7]
    b. Introduction to VBA and modular programming [Chapra Ch. 1-2 and 5]
    c. Writing and debugging programs [Chapra Ch. 7]
    d. Data types, variables and functions in VBA [Chapra Ch. 8-9]
    e. Structured programming: decisions [Chapra Ch. 11]
    f. Structured programming: loops [Chapra Ch. 12]
    g. Data structures and file operations in VBA [Chapra Ch. 13-14]
E. *Maple* basics
    a. Introduction to user interface and syntax [Schwartz Ch. 1-6]
    b. Plotting functions in Maple [Schwartz Ch. 8]
F. Sets of Linear Equations
    a. Matrix representation of set of equations
    b. Matrix operations in *Excel* (inversion approach) [Larsen Ch. 4]
    c. Gaussian elimination in *Excel* with VBA
    d. Matrix algebra in *Maple* [Schwartz Ch. 10]