APPLICATION FOR NEW COURSE

1. Submitted by the College of: Engineering Date: 10/23/2007

   Department/Division proposing course: Biosystems & Agricultural Engineering

2. Proposed designation and Bulletin description of this course:

   a. Prefix and Number: BAE 206

   b. Title*: Computational Tools in Biosystems Engineering

   *If title is longer than 24 characters, write a sensible title (24 characters or less) for use on transcripts:
   Comput Tools Biosys Eng

   c. Courses must be described by at least one of the categories below. Include the number of actual contact hours per week for each category, as applicable.

   (___) CLINICAL (___) COLLOQUIUM (___) DISCUSSION (4) LABORATORY (1) LECTURE
   (___) INDEPEND. STUDY (___) PRACTICUM (___) RECITATION (___) RESEARCH (___) RESIDENCY
   (___) SEMINAR (___) STUDIO (___) OTHER – Please explain: _____

   d. Please choose a grading system: ☑ Letter (A, B, C, etc.) ☐ Pass/Fail

   e. Number of credit hours: 3

   f. Is this course repeatable? YES ☑ NO ☐ If YES, maximum number of credit hours: _____

   g. Course description:
   Fundamentals of developing structured computer programs for solving engineering problems. Basic skills for using MATLAB will be developed in addition to writing computer programs in MATLAB. The course is laboratory oriented with numerous computer programs developed during the course.

   h. Prerequisite(s), if any:
   MA 113, no credit in CS 221

   i. Will this course be offered through Distance Learning? YES ☐ NO ☑
   If YES, please identify one of the methods below that reflects how the majority of the course content will be delivered:

   ☐ Internet/Web-based ☐ Interactive video ☐ Extended campus ☐ Kentucky Educational Television (KET/teleweb) ☐ Other

   Please describe "Other": _____

3. Teaching method: ☑ N/A ☐ Community-Based Experience ☐ Service Learning Component ☐ Both

4. To be cross-listed as: _____ (Prefix and Number) _____ (Signature of chair of cross-listing department)

5. Requested effective date (term/year): Spring / 09

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6. Course to be offered (please check all that apply): ☐ Fall ☑ Spring ☐ Summer

7. Will the course be offered every year? ☑ YES ☐ NO

   If NO, please explain: _____

8. Why is this course needed?

   There are specific programming needs for biosystems engineering students, such biosystems problems will be addressed as examples in parallel with programming lessons.

9. a. By whom will the course be taught? Michael Montross

   b. Are facilities for teaching the course now available? ☑ YES ☐ NO

   If NO, what plans have been made for providing them?

   _____

10. What yearly enrollment may be reasonably anticipated?

    18-24

11. a. Will this course serve students primarily within the department? ☑ Yes ☐ No

    b. Will it be of interest to a significant number of students outside the department? ☐ YES ☑ NO

    If YES, please explain.

12. Will the course serve as a University Studies Program course[1]? ☐ YES ☑ NO

    If YES, under what Area? _____

    [1]AS OF SPRING 2007, THERE IS A MORATORIUM ON APPROVAL OF NEW COURSES FOR USP.

13. Check the category most applicable to this course:

    ☑ traditional - offered in corresponding departments at universities elsewhere

    ☐ relatively new - now being widely established

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

14. Is this course applicable to the requirements for at least one degree or certificate at UK? ☑ Yes ☐ No

15. Is this course part of a proposed new program? ☐ YES ☑ NO

    If YES, please name: _____

16. Will adding this course change the degree requirements for ANY program on campus? ☑ YES ☐ NO

    If YES[2], list below the programs that will require this course:

    The course will be a required course for Biosystem Engineering and the current requirement for CS 221 will be dropped.

    [2]In order to change the program(s), a program change form(s) must also be submitted.

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17. ☑ The major teaching objectives of the proposed course, syllabus and/or reference list to be used are attached.

18. ☐ Check box if course is 400G or 500. If the course is 400G- or 500-level, *you must include a syllabus showing differentiation* for undergraduate and graduate students by (i) requiring additional assignments by the graduate students; and/or (ii) the establishment of different grading criteria in the course for graduate students. (See *SR 3.1.4)*

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

Name: Michael Montross Phone: 7-3000 x 106 Email: montross@bae.uky.edu

20. Signatures to report approvals:

8-15-07 DATE of Approval by Department Faculty	Scott A. Shearer Reported by Department Chair
04/09/09 DATE of Approval by College Faculty	Richard J Swigard Reported by College Dean
October 6, 2009 * DATE of Approval by Undergraduate Council	Sharon Gill Reported by Undergraduate Council Chair
* DATE of Approval by Graduate Council	Reported by Graduate Council Chair
* DATE of Approval by Health Care Colleges Council (HCCC)	Reported by Health Care Colleges Council Chair
* DATE of Approval by Senate Council	Reported by Office of the Senate Council
* DATE of Approval by University Senate	Reported by Office of the Senate Council

Digitally signed by Sharon Gill
DN: cn=Sharon Gill, o, ou=Undergraduate Education, email=sgill@uky.edu, c=US
Date: 2009.11.19 15:07:13 -05'00'

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

BAE 206: Computational Tools in Biosystems Engineering
3 Credits

COURSE DESCRIPTION:
Fundamentals of developing structured computer programs for solving engineering problems. Basic skills for programming will be developed in addition to writing computer programs in MATLAB. The course is laboratory oriented with numerous computer programs developed during the course.

PREREQUISTIES: MA 113, no credit in CS221

TEACHING OBJECTIVES

1. Design and develop structured computer programs
2. Understand the elements of structured program (loops, conditional statements, arrays, read/write, etc.)
3. Apply the concepts to solving engineering problems with a primary focus on the psychometric chart and numerical analysis.

COURSE LAYOUT:
The course will meet twice a week. The format will be 1 hour lecture and 4 hours of lab per week. The laboratory will be used to reinforce the lecture material to ensure that students can do the homework. The majority of the laboratory assignments will be based on solving parameters from the psychometric chart. This will be used in future classes within BAE. Homework problems will be based on examples from numerical analysis and applied mathematics. Graphing, formatting, and solving engineering problems using Excel will also be covered.

TEXT: Essential MATLAB for Engineers and Scientists, Third Edition (Paperback)
by Brian Hahn and Dan Valentine.

GRADING:

Homework	45%
Lab assignments	25%
Exams	15%
Final exam	15%

Grades will be assigned by a percentage as follows:
A: 90-100%; B: 80-89.9%; C: 70-79.9%; D: 60-69.9%; E: <60%

LABORATORY AND HOMEWORK EXPECTATIONS
Each assignment will contain pseudo-code, documented source code, and the results from the program. The pseudo-code is for your benefit, debugging a program due to logic errors is very time consuming. Pseudo-code will help insure that you develop the logic before you start programming. Any individual should be able to follow your program and understand the input and output without running the program. Laboratory

assignments will focus on the psychometric chart. The psychometric chart will be used in numerous courses within BAE.

COURSE OUTLINE

Sections	Week	Lecture	Example Lab Topics	Chapter
Introduction to Structured Programming	1	Introduction	Simple calculations in Matlab	1
		Program design and algorithm development	Creating flow charts	3
Structured Programming in Matlab	2	Definitions, matrix manipulations, logic operators	Plotting in Matlab	2,5
		Basics of programming in Matlab	Developing m files, simple calculations	
	3	"if then" statements	Menus - Celsius or Fahrenheit	2
			Enthalpy, heat of vaporization	
	4	Loops, For i = 1 to 10	Calculate saturation vapor pressure	8,17
		Nested loops, Do while	Solve for wet bulb temperature	
	5	Debugging	Checking for logic errors	9,17
			Breakpoints, watching variables	
	6	Subroutines	Other variables on psych chart	10
		Functions	Other variables on psych chart	
	7	Read/write	Read list of temp/rh	4,15
			Calculate wet bulb, write to file	
	8	Graphics in Matlab	Graphics in Matlab	2,7,12
		Errors	Rounding errors, accuracy	
	9	Advanced matrix manipulations	Introduction to dynamic systems	6,11,14
			Predator/prey	
Introduction to Numerical Analysis and Programming Applications	10	Solving engineering problems - Matlab	Heat conduction/subsurface drainage	17
		Solving in Excel		
	11	Solving engineering problems - Matlab	Spring mass	
		Solving in Excel		
	12	Solving engineering problems - Matlab	Fermentation	
		Solving in Excel		
Structured Programming in Excel's Visual Basic	13	Visual Basic	Solution of previous examples in VB	
	14	Visual Basic		
	15	Visual Basic		