BAE 402: Biosystems Engineering Design I
Biosystems and Agricultural Engineering
College of Engineering
Fall 2013

Instructor: Dr. Czarena Crofcheck
Rm 212 CE Barnhart Building - 257-3000 ext. 212 - crofcheck@uky.edu

Class Times: Lecture: W 3:00-3:50 Lab: Two hours by arrangement

Office Hours: By appointment or whenever my door is open.

BAE 402 Course Description:
A design course for seniors in BAE requiring student to solve open-ended problems. Student will use previously learned engineering principles to produce actual designs which will be built and analyzed in BAE 403. Prereq: BIO 148, 152; prereq or concur with BAE 417 or BAE 447.

BAE 402/403 Student Learning Outcomes:
At the conclusion of the two semester series students should be able to:
1. Define and distinguish different approaches to creativity and creative inquiry.
2. Begin to exercise creativity and engineering judgment in the design of complete systems.
3. Work individually and as a team member in developing project specifications and planning.
4. Develop the ability to integrate varied subject knowledge in engineering and apply it to conceptualization and design of systems.
5. Understand the basic principles of engineering economics in product design and manufacturing.
6. Understand the basic concepts of safety and reliability in the design process.
7. Develop and evaluate design concepts in a team environment, with an emphasis on creativity in the design process.
8. Consider aspects of environment, safety, quality, cost and contemporary issues in design.
9. Articulate the principles of teamwork in achieving creative and workable designs.

Textbook:
Course Notes (provided)

Additional Reading:
- Fritz, Robert: A Practical Guide to the Creative Process and How to use it to Create Anything. [Ballantine, 1993]
- Engineering Design, Dieter and Schmidt, Engineering Design, 4th, McGraw Hill,
BAE 402 Grading
Homework and Lecture Assignments  15%
Individual Design Project  15%
Exam  10%
First Quarterly Report:  15%
  Oral (Individual) 5 %, Written (Team) 10 %
Second Quarterly Report:  30%
  Oral (Individual) 10 %, Written (Team) 20 %
Meeting Project Milestones/Engineering Notebook  10%
Professionalism (i.e., attendance)  5%
Total  100%

Final grades will be assigned as follows: > 90 A, 80 - 89 B, 70 - 79 C, 60 - 69 D, < 59 E

Final Exam Information:
The final exam will be a team presentation (Rm 236) about the semester’s accomplishments. See http://www.uky.edu/registrar/final-hour-exam for the time and date.

Mid-term Grade:
Mid-term grades will be posted in myUK by the deadline established in the Academic Calendar (http://www.uky.edu/Registrar/AcademicCalendar.htm)

Attendance Policy:
Participation in the oral presentations when scheduled is essential and failure to do so, except in the case of illness (with physician's statement) or an emergency (with notification of the instructor as soon as possible), will result in no points awarded. Your senior design experience will consist of in class lectures, in class design team meetings, outside of class design team meetings, individual work on the team project and on the individual projects. You will write reports individually and in teams and be evaluated the same way. You will present in teams, but you will be evaluated as individuals. There will be an exam over lecture material. For this reason, your presence and attention at every lecture is imperative.

Excused Absences:
Students need to notify the professor of absences prior to class when possible. S.R. 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit “reasonable cause for nonattendance” by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Information regarding dates of major religious holidays may be obtained through the religious liaison, Mr. Jake Karnes (859-257-2754).

Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused or unexcused) per university policy.
**Verification of Absences:**
Students may be asked to verify their absences in order for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request “appropriate verification” when students claim an excused absence because of illness or death in the family. Appropriate notification of absences due to university-related trips is required prior to the absence.

**Academic Integrity:**
Per university policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the university may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: http://www.uky.edu/Ombud. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Part II of Student Rights and Responsibilities (available online www.uky.edu/StudentAffairs/Code/part2.html) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about the question of plagiarism involving their own work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording or anything else from another source without appropriate acknowledgement of the fact, the students are guilty of plagiarism. Plagiarism includes reproducing someone else’s work, whether it be a published article, chapter of a book, a paper from a friend or some file, or something similar to this. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work which a student submits as his/her own, whoever that other person may be.

Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone. When a student’s assignment involves research in outside sources of information, the student must carefully acknowledge exactly what, where and how he/she employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas which are so generally and freely circulated as to be a part of the public domain (Section 6.3.1). Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.
Accommodations due to disability:
If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, email address: jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities.

Classroom conduct: Cell phones should be silent (no talking or texting) during class and recitation periods. I typically distribute handouts at the beginning of class. If you are late to class, it is your responsibility to come to the front of the class and pick up handouts, if you miss a day it is your responsibility to get a copy of the handout.

Assignments:
• Lecture assignments are to be turned in at the beginning of lecture.
• Project assignments (i.e. milestones) are to be emailed to Dr. Crofcheck on or before the due date. If you are going to miss the deadline, you must send an email to Dr. Crofcheck explaining why the assignment will be late and when you will be turning in the assignment. Be sure to cc: everyone on the team, including the faculty advisor.
• Reports are not necessarily due during class. You must turn in a hard copy of the report to Dr. Crofcheck or to the front office staff person.

Reports:
There will be four quarterly written reports for your project. You are responsible for being sure that everything required is included in the report. You are responsible for checking the score sheet for each report before turning in the report. You are responsible for making sure your report is the best it can possibly be.

INTELLECTUAL INQUIRY-ARTS AND CREATIVITY OUTCOMES
BAE 402/403 consists of a two semester sequence in conceptualization, analysis, design and prototyping of a device or system to meet a societal need related to biosystems engineering. Students are required to understand the conceptualization and design process, and to apply it in a team environment through the following process elements:

1. Critical inquiry to define customer needs (402);
2. Development of a project plan and product design specification that responds to the customer need (402);
3. Finding credible information from a variety of reference sources (402);
4. Through brainstorming and other techniques for creativity, development of a number of possible concepts to fulfill the product design specification (402);
5. Utilizing qualitative and quantitative methods of reasoning to evaluate the design concepts (402/403);
6. Selecting the “best” concept for implementation (402);
7. Completing the final design (403);
8. Developing a prototype (403);
9. Testing and evaluation of the prototype (403); and
10. Communicating the design solution via written and oral presentations. (402/403)
Lecture material to support the design process is provided, including Product Specifications, Project planning and management; Team building; Engineering economic analysis; The creative elements and the design process, Concept development and selection for product design; Technical communication, written and verbal; Product life-cycle design, sustainable design; Safety and ergonomics; Environmental issues; Product liability; Patents and Intellectual property; Computational Tools; Reliability and Statistics in design; Design for manufacturing; and Engineering Design Ethics.

As such, the course sequence contributes to the following GenEd learning outcomes
I. Students will demonstrate an understanding of and ability to employ the processes of intellectual inquiry. Process elements 1, 2, 3, 4, 8

II. Students will demonstrate competent written, oral, and visual communication skills both as producers and consumers of information. Process element 9

III. Students will demonstrate an understanding of and ability to employ methods of quantitative reasoning. Process elements 5, 6, 7

A description of the types of course assignments that could be used for Gen Ed assessment
The students are required to provide the following, and these are appropriate for Gen Ed assessment:
1. Prepare a written project plan including a product design specification.
2. Submit periodic written progress reports
3. Keep a notebook of individual work on the project effort, with an emphasis on their own contributions to original and creative design concepts.
4. Prepare a poster on their project activities
5. Provide an interim and final written report on their conceptualization and realization efforts
6. Provide a Presentation of their work using verbal and media communication.

Assessment of ABET Outcomes*
b. Design and conduct experiments, as well as to analyze and interpret data.
c. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. Have an ability to function on multidisciplinary teams
f. Understand professional and ethical responsibility.
g. Effectively communicate interpersonally, formally, and technically whether oral or written.
j. Appreciate contemporary issues arising from industrially-relevant design questions.
k. Use techniques, skills and modern engineering tools necessary for engineering practice.

Corresponding assessment artifacts:
b. Statistics homework assignment and statistics section in the final report.
c. Final design report and presentation
d. Teamwork report homework assignment
f. Ethics homework assignments
g. Final design report and presentation
j. Contemporary issue homework assignment
k. AutoCAD and excel assignments
*Full list of ABET Outcomes can be found at http://www.bae.uky.edu/academics/abet/objectives_outcomes.htm