

**Biological Engineering 4292**  
**Senior Engineering Design and Professionalism Laboratory**  
**Credit Hours: 2 (6 hours lab)**  
**Spring Semester 2009**  
**4:30 – 7:30 p.m., Wednesdays (meeting time)**  
**Lab time set aside for you 4:30-7:30 p.m. Mondays**  
**100 Tureaud Hall**

**Instructor:** Marybeth Lima, Ph.D., P.E., Room 159 E.B. Doran Building, phone: 578-1061, e-mail: [mlimal1@lsu.edu](mailto:mlimal1@lsu.edu). Office hours: Tuesdays 10:30 am to noon or by appointment.

**Course Description:** Engineering principles used to complete the project set forth in the design outline submitted in BE 4290; design project completion.

**Prerequisite:** BE 4290

**Objectives:**

- To become proficient with basic components of experimental design and testing
- To build and test a working prototype of the design you developed in BE 4290
- To effectively present the working prototype of your design to faculty, students, and the public through an oral presentation and a poster presentation
- To work effectively in teams to submit a professional quality technical report to the Gunlogson Design Competition that describes your design and details the building and testing of this design.

**Accreditation:** The Accreditation Board of Engineering and Technology (ABET) has established criteria through which engineering programs, including this one, are accredited. When you complete the Biological Engineering curriculum at LSU, you should be proficient in the objectives listed below. BE 4292 is intended to help you “tie together” all your basic and applied engineering courses in a project-based, pre-professional engineering experience and will assist your mastery of these objectives:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs
- (d) an ability to function on multi-disciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) a recognition of the need for, an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

**Required Text:** Engineering Design (3<sup>rd</sup> Edition), by George Dieter

## References:

- A Mechanical Design Process, by David Ullman
- Creative Problem Solving and Engineering Design, by Edward Lumsdaine, Monika Lumsdaine, and J. William Shelnut
- Fundamentals of Engineering Reference Manual, Michael Lindeburg
- Fundamentals of Engineering Supplied Reference Handbook, National Council of Examiners for Engineering and Surveying
- Strategies for Engineering Communication, by Susan Stevenson and Steve Whitmore

## Grade Breakdown:

Homework	25%
(includes progress reports, design notebook, interim oral presentation grades, etc.)	
Class attendance	10%
Final written report	25%
Final poster and presentation	15%
Individual grade	25%
(assigned by instructor in consultation with faculty advisor(s))	

Late homework assignments will receive 10% off for each day they're late (20% if one day late, 40% if two days late, etc.). Assignments are due by 4:00 p.m.

Course grades will be determined on the following scale: A (90 – 100%), B (80 – 89.9%), C (70 – 79.9%), D (60 – 69.9%), F (<59.9%). Remember, if you are on the border between letter grades, coming regularly to class, participating in class, and following class rules (see below), you will get you the higher letter grade.

There will be no exams or quizzes in this course!

**Progress reports** are an essential component of this course. They will assist you, your project advisor(s), and me in keeping better track of your progress as a group. The progress report should be in memorandum format and will be addressed to me and your senior design advisors, from your group, regarding your senior design project. You will summarize your activities and progress on your project in the body of the memo; this should not exceed one page. In addition, each group member must write a paragraph in which s/he details his/her work during the progress period! These should be attached to the memorandum, and you as group members should sign the memo **ONLY AFTER** you have read every group member's explanation of their individual activities. **IF YOU DISAGREE** or take issue with what you and/or your group members have written, send your group members an e-mail and cc your advisor(s) and me. We will have a meeting immediately to address any issues or conflicts that arise. I will assign a progress report grade (which counts toward your homework grade) **AND** an individual grade (which counts toward the final grade) for each progress report period. **ALL MEMOS REQUIRE EVERYONE'S SIGNATURES!!!**

**Design notebooks.** You must add 30 high quality entries (minimum) to the design notebook that you compiled in BE 4290.

**Communication Across the Curriculum.** LSU has implemented a Communication Across the Curriculum Program (CxC) to improve the communication skills of students at this university.

*This course is certified as a "Communication-Intensive Course" and meets all of the requirements explained on the CxC Web site: <http://cxc.lsu.edu>, including the following: Emphases on formal and informal assignments in written and visual communication, class time spent on communication, 40% of the final grade based on communication projects, revisions after faculty feedback on 2 formal projects (one for each emphasis), and a student/faculty ratio of 35:1. Because it meets these requirements, students may count it toward "Distinguished Communicator" certification on LSU transcripts.*

A visit to the CxC studio to fine tune your final presentation will also be required.

**Final comments:**

Once again, I will do everything I can to make each of you shine in this course! This is it, folks!!! Senior design is extremely important and can have a huge impact on what kind of job you take, what sort of graduate/professional work you do, etc. I am honored to be your instructor in your first *and* one of your last year of this curriculum! Remember class rules!

- Turn off your cell phone before class starts!
- Cheating and plagiarism will not be tolerated under any circumstances!
- Be respectful of yourself and each other (don't interrupt each other, listen to each other, seek to understand before being understood, and so on)
- Bring questions and comments to class; on-going dialogue about engineering, design, and professionalism will enrich your experiences in this course and will help your design project!
- Teamwork is the key to success in this course!
- If you have trouble with your teams, try to work within your team first. If the issue doesn't resolve, please consult with me and your project advisor immediately.
- **Remember to check your e-mail regularly for messages from me! This is especially important since we won't be meeting as regularly as we did in BE 4290!**

**Approximate schedule (subject to change!)**

1/14 Going over the syllabus

1/21 Class

**YOUR MATERIALS SHOULD BE ORDERED BY THIS POINT!!!**

**Progress report #1 due**

**FE review classes (6-8 pm) start today in 1109 Patrick Taylor Hall**

1/28 Class

2/4 Guest lecture, Lima in DC

**Progress report #2 due**

2/11 Oral presentations on design project progress

- 2/18 Oral presentations on design project progress  
**Progress report #3 due**
- 2/25 No class, Mardi Gras ☺
- 3/4 Class  
**Progress report #4 due**
- 3/6 **FE Exam registration deadline (NCEES)**  
**COE FE Exam registration deadline**  
(see <http://www.eng.lsu.edu/students/current/feinfo.html> for details)
- 3/11 Oral presentations on design project progress  
**YOUR DESIGN SHOULD BE IN PHYSICAL EXISTENCE AT THIS POINT,  
AND YOU SHOULD BE TESTING IT!!!**
- 3/18 No class, spring break ☺
- 3/25 Class  
**Progress report #5 due**
- 4/1 Class (Lima might be out of town)
- 4/8 No class, spring break ☺
- 4/13 **MONDAY Class:** Oral presentations, dry run of final presentation  
**Progress report #6 due**
- 4/22 Class: Oral presentations, dry run of final presentation
- 4/27 **MONDAY: Final design presentations**
- 5/4 **REQUIRED:**  
**Gunlogson Student Environmental Design Competition, Open**  
**Format: paper due via e-mail (pdf no greater than 5 MG) by 10 pm EST**
- 5/6 Final exam: **Final paper due**  
**Final reflection due**

Class party (date to be determined) in Lynn and Marybeth's pool!

# **2009 G. B. Gunlogson Student Environmental Design Competition Open Format**

The purpose of the Open Gunlogson Student Environmental Design Competition is to encourage undergraduate students to participate in the design of a relevant engineering project and to provide an arena of professional competition for environmentally and biologically related design projects. This competition is complementary to the AGCO National Design Competition, which focuses on agricultural and food related projects, while Gunlogson focuses on environmental and biological related projects.

The competition consists of two parts: (1) Submission of a design report to be judged by an expert panel, and (2) Participation by the three teams earning the highest report scores in a presentation competition at the ASABE Annual International Meeting. Awards will be based on the overall score, which is a composite of the written and oral scores.

Awards will be presented at the ASABE Annual International Meeting awards program. Cash awards of \$500, \$300, and \$100 will be presented to the first, second and third place entries. Their academic department will receive a wall plaque honoring the design team and their faculty advisor.

## **Eligibility**

1. Contestants shall be Student Members of ASABE and undergraduates at the time their design projects are conducted (i.e., student members prior to January 30, 2009).
  - Candidates will be declared ineligible for the competition if more than twelve (12) months have lapsed between the awarding of the degree and May 4<sup>th</sup> 2008.
  - Membership in a local Student Branch is not required and will not substitute for Student Membership in ASABE.
  - Projects may be conceived and executed by multiple contestants. All members of the design groups must be eligible as outlined above.
2. Papers submitted for the K. K. Barnes Student Paper Awards Competition or in the AGCO National Design Competition may not be entered in this Student Design Competition.

## **Competition Entry Requirements**

All projects must involve the application of engineering design for an environmental or biological application. It is expected that designs will reflect a wide spectrum of approaches ranging from management practices development, to equipment design, to bioreactor or ecological system design. Regardless of the specific approach, engineering design is the process of devising a machine, component, system, or

process to meet a desired need. It involves analysis, synthesis and decision-making processes (often iterative), in which the basic sciences, mathematics and engineering sciences, and technology are applied to convert resources optimally to meet a stated objective. Sociological, economic, aesthetic, legal, ethical, etc. considerations can – and often must – be included as part of the design process.

### **Report Requirements**

Design projects are to be fully documented in a written report submitted as a single portable document format (pdf) file. **The report is limited to 15 pages, excluding appendices; appendices are limited to an additional 5 pages (if absolutely necessary).** The report must include drawings and/or specifications that describe the design, as well as extensive or substantial test or performance data obtained from (1) a prototype or physical model of the machine or critical component, and/or (2) a computer simulated test of the system or process.

### **Deadlines**

- Please send an e-mail to the Competition Coordinator at [reinhold@egr.msu.edu](mailto:reinhold@egr.msu.edu) stating your team's intention to compete as early as possible. Notification of intention to compete is **January 30, 2009**.
- Entries are to be submitted by e-mail to the Competition Coordinator (Dawn Reinhold; [reinhold@egr.msu.edu](mailto:reinhold@egr.msu.edu)) no later than **Monday May 4<sup>th</sup> at 10:00 PM EST**. The pdf file should be no more than 5 megabytes in size. If large graphics have been inserted into the pdf file, you will need to re-convert to a new pdf file to reduce the file size to 5 megabytes.
  - In the subject line of the e-mail, please write "open competition"; your school's name (e.g. Univ. of TN), and a highly abbreviated title (e.g. Managing Wetlands)
- An e-mail documenting receipt of the report will be returned to teams by May 6<sup>th</sup>, 2009 at 5 pm. If you do not receive a receipt, contact the Competition Coordinator.

**Selection of Winners Phase I:** Each written submission will be judged by at least three judges in accordance with the Student Design Competition score sheet. Judges shall then forward scores to the Awards Coordinator for selection of top three teams, based on the scores submitted by the judges. If number of submissions exceeds that which is reasonable for one person to judge, a tiered approach to selection will be adopted (e.g., submissions will be divided into two groups and top 5 submissions from each group will be judged by a third set of judges).

**Phase II:** The top three teams will be invited to attend the ASABE International Meeting to participate in the oral presentation portion of the competition. Should any of the top three be unable to participate, the next ranking entries shall be invited.

- *Although only the top three entries from Phase I will make oral presentations at the ASABE Annual International Meeting, the remaining entries will be provided with poster space at the meeting, and a poster viewing time will be scheduled for these entrants.*

Judges will evaluate the oral presentations of participants. The oral score will be added to the written score to determine final standing of the top three papers. Decision of the judges is final.

### Awards

- Awards will be presented at the ASABE Annual International Meeting awards program.
- Awards of \$500, \$300, and \$100 will be presented to the first, second and third place entries. The method of distributing the prize money to design team members shall be determined by the respective members of each team. All participants of the first, second, and third place entries shall receive certificates of recognition.
- The Academic Department of the first, second and third place entries will receive a wall plaque. The wall plaque will include the names of the design team and their faculty advisor(s).

### Disposition of Entries

ASABE reserves the right to keep one copy of each of the award entry reports and to publish entries in whole or in part in Society publications.

### STUDENT DESIGN COMPETITION SCORE SHEET

<b>I. Project</b>	
A. Establishment of Need and Benefit to the Environment and Society	5
B. Approach and Originality	6
C. Definition of Design Objectives and Criteria	5
D. Extent of Analysis and Synthesis of Alternatives	10
E. Evidence of Sound Evaluation and Adherence to Good Engineering Design, and Safety Consideration	10
F. Adequacy of Drawings and Specifications	7
G. Appropriateness of Tests and/or Performance Data	7
H. Achievement of Objectives	10
TOTAL	60
<b>II. Written Report</b>	
A. Organization, Clarity, and Ease of Reading	10
B. Effective Use of Graphics, Illustrations, etc.	5
C. Neatness, Accuracy and Style	5
TOTAL	20
<b>III. Oral Presentation</b>	
A. General Effectiveness and Audience Appeal	8
B. Organization and Information Flow	5
C. Quality and Adequacy of Visuals	5
D. Compliance with 10 Minute Limit	2
TOTAL	20
GRAND TOTAL	100

## STUDENT DESIGN COMPETITION FORMAT FOR ENTRIES

The first three pages are required (These pages are not included in 15 pg limit).

1. **Title Page.** The cover page of the entry shall state:
  - the project title,
  - full name(s) of the contestant(s),
  - ASABE student member number(s),
  - e-mail address of the corresponding author,
  - name of the department and school,
  - name(s) of the advisor(s) for the paper,
  - expected date(s) of graduation,
  - signatures of contestant(s), advisor(s), and the student branch faculty advisor (department head if no student branch exists), and the date of signing.
  
2. **Second Page.** The second page shall contain:
  - The project title,
  - a 200 - 300 word abstract of the project report, and
  - acknowledgements, which must include specific contributions of all other individuals, organizations and/or companies that have made any supportive contributions to the project such as drafting, typing, prototype construction, photo or art work, financial support, etc.
  
3. **Third Page.** The third page shall contain the table of contents.

**Organization & Length.** Each report should be organized under appropriate headings. The presentation should follow a logical pattern and conform to good technical writing standards. Strive for brevity and clarity. **Report is limited to 15 pages, excluding three required pages (above) and appendices; appendices are to be included only if absolutely necessary and are limited to 5 pages.** Drawings and/or specifications and test data should be presented as appropriate.

### **Appropriate Format**

The Competition Coordinator will check each design report as it is received for the appropriate format as specified in **FORMAT FOR ENTRIES** given above. Entries which do not meet the specified format will be returned to the authors without further judging.

