

## INTRODUCTION TO AGRICULTURAL & BIOSYSTEMS ENGINEERING (ABEN 110) COURSE SYLLABUS

### **BASIC INFORMATION**

**Number of credits:** 3 credits

**Time and places:** 10:00-10:50 a.m. Monday & Wednesday @ ABEN 201 (lectures)  
2:00-4:00 p.m. Wednesday @ ABEN 210 (labs)

**Office hours:** Monday and Thursday 1:00-2:00 p.m. or by appointment.  
Drop-ins are welcome at other times.

**Instructor's name:** Dr. Zhulu Lin

**Office location:** ABEN 104

**Contact information:** Zhulu.Lin@ndsu.edu/231-7118

### **BULLETIN DESCRIPTION**

Introduction to agricultural and biosystems engineering (ABEN) for students interested in pursuing the major and profession. Content emphasizes ABEN sub-disciplines through engineering problem solving and introductory design. 2 lectures, 1 laboratory. Prerequisites MATH 103 or MATH 107.

### **ABEN EDUCATIONAL OBJECTIVES AND ABET STUDENT OUTCOMES**

**Educational Objective 1:** Within a few years of graduation, graduates are expected to have established themselves as practicing engineers who successfully address emerging engineering challenges in the design or evaluation of machine systems, processing systems, and natural resources and environmental systems affecting the production of food, feed, and other biobased products. This objective addresses the following learning outcomes through this course:

ABET-(1): an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

**Educational Objective 2:** Within a few years of graduation, graduates are expected to have established themselves as practicing engineers who effectively use professional communication, critical thinking, and interpersonal skills as team leaders and team members. This objective addresses the following learning outcomes through this course:

ABET-(3): an ability to communicate effectively with a range of audiences, and

ABET-(5): an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

**Educational Objective 3:** Within a few years of graduation, graduates are expected to have established themselves as practicing engineers who responsibly serve the public and their employers by participating in professional development and by maintaining the highest standard of professional ethics. This objective addresses the following learning outcomes through this course:

ABET-(4): an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

### **COURSE OBJECTIVES**

After completing this course, students should be able to

1. Solve basic and practical problems related to Agricultural and Biosystems Engineering [ABET–(1)].
2. Demonstrate a basic understanding of the engineering design process, team work and professional communication [ABET–(3)&(5)].
3. Explain the basic sub-disciplines of Agricultural and Biosystems Engineering [ABET–(4)].

### **STUDENT LEARNING RESOURCES**

**Textbook:** Students may choose one of the following textbooks (optional):

- Field, H.L. & J.M. Long (2018). Introduction to Agricultural Engineering Technology: A Problem Solving Approach (4th Edition), Springer.
- Field, H.L. & J.B. Solie (2007). Introduction to Agricultural Engineering Technology: A Problem Solving Approach (3rd Edition), Springer.

**Other Resources:** A calculator, a SD card, a smartphone or a laptop computer, and a notebook are required. Computers (Room 222) and 3D printers (Room 210) are available to complete homework and lab assignments. Fees may apply for 3D printing.

### **TENTATIVE COURSE SCHEDULE<sup>1</sup>**

Wk	Day	Date	Topics	Sub-Discipline <sup>2</sup>	Notes
1	W	8/28	Class introduction & Kahoot! survey		
	W	8/28	Lab - Machine shop & computer labs orientation		Julie, Jim & Jana
2	M	9/2	Labor Day (no class)		
	W	9/4	ABEN, ASABE & ABET	General	Club Officers
	W	9/4	Lab - ABEN 496 Internship presentations (ABEN 201)		
3	M	9/9	Significant digits & unit conversions	General	ROTC Officers
	W	9/11	Significant digits & unit conversions	General	
	W	9/11	Lab – Big Iron Farm Show (RRV Fairgrounds) <a href="https://bigironfarmshow.com/">https://bigironfarmshow.com/</a>		Tour 1
4	M	9/16	Engineering design	General	
	W	9/18	Engineering design	General	
	W	9/18	Lab – 3D printing (ABEN 210B) <a href="https://www.tinkercad.com/">https://www.tinkercad.com/</a> <a href="https://www.prusa3d.com/drivers/">https://www.prusa3d.com/drivers/</a>		
5	M	9/23	Simple machines	MS	
	W	9/25	Simple machines	MS	
	W	9/25	Lab – Engineering & Tech Expo (Fargodome) <a href="https://career-advising.ndsu.edu/channels/engineering-tech-expo/">https://career-advising.ndsu.edu/channels/engineering-tech-expo/</a>		
6	M	9/30	Engines	MS	
	W	10/2	Engines (Guest Speaker: Jim Moos)	MS	
	W	10/2	Lab – Simple machine design project presentation (ABEN 201)		Lab notebook due

7	M	10/7	Powertrains	MS	
	W	10/9	Powertrains	MS	
	W	10/9	Lab – Powertrains design project team meeting		
8	M	10/14	Powertrains	MS	
	W	10/16	MS Review	MS	
	W	10/16	Exam (ABEN 201)		Exam 1
9	M	10/21	Rain, runoff & erosion	NRES	
	W	10/23	Rain, runoff & erosion	NRES	
	W	10/23	Lab – NRCS sites field tour (Absaraka)		Tour 2
10	M	10/28	Rain, runoff & erosion	NRES	
	W	10/30	Rain, runoff & erosion	NRES	
	W	10/30	Lab – Nonpoint source pollution demonstration (ABEN 210)		
11	M	11/4	Irrigation	NRES	
	W	11/6	Irrigation (Guest lecture by Dr. Scherer)	NRES	
	W	11/6	Lab - Irrigation scheduling (210B)		
12	M	11/11	Veteran's Day (no class)		
	W	11/13	NRES Review	NRES	
	W	11/13	Exam (ABEN 201)		Exam 2
13	M	11/18	Moisture content	PS	Dr. Bon
	W	11/20	Moisture content	PS	Dr. Steele
	W	11/20	Powertrain design project presentation (ABEN 201)		Lab notebook & Report due
14	M	11/25	Moisture content	PS	Dr. Jia
	W	11/27	Moisture content	PS	Dr. Monono
	W	11/27	Thanksgiving Holiday (no lab)		
15	M	12/2	Moisture content	PS	Dr. Nahar
	W	12/4	Waste management	PS	Dr. Rahman
	W	12/4	Lab – Moisture content measurement (Pilot Plant, Dr. Monono)		
16	M	12/9	Waste management	PS	Dr. Simsek
	W	12/11	Processing system review	PS	
	W	12/11	Lab – Moisture content & processing (Pilot Plant, Dr. Monono)		
17	W	12/18	Comprehensive Final Exam (8:00 - 10:00 a.m.)		Final

1 Except for examination dates, the above course schedule is subject to change.

2 MS – Machine Systems, NRES – Natural Resources and Environment Systems, and PS – Processing Systems.

### **EVALUATION PROCEDURES AND GRADING CRITERIA**

**Assignment Policy:** The due dates for homework and projects will be given with the assignments. Late assignments will be accepted with a 10% penalty per NDSU class day. All assignments must be submitted before 5 p.m. to be credited to the day it is received. Late assignments will not be accepted after solutions are posted/handed out/discussed or after 2 NDSU class days from the date they are due.

You are encouraged to work together with others for your homework and lab assignments because that will help you learn. Mentors are also available through our department's mentoring program and NDSU ACE tutoring ([https://www.ndsu.edu/studentssuccess/about\\_ace/](https://www.ndsu.edu/studentssuccess/about_ace/)). You are also encouraged to see the instructor for assistance during office hour times or any other time as long as I am in my office. Although students are encouraged to work together and assist one another with assignments, all work submitted should be created by that individual. If it is apparent that work has simply been copied from other's work, all students involved will receive 0 points for that assignment.

To do well on your homework, you should read the attached ABEN Homework Guidelines carefully. This document explains what is expected and how your homework assignments will be graded by the instructor.

**Exam Policy:** Quizzes will not be announced ahead of time and no make-up quizzed will be given for any reason. As for scheduled midterm and final exams, missed exams will receive 0 points unless missed for a valid justification *and* the instructor is notified prior to the date and time of the exam. Valid justification is a statement indicating illness, obituary notice (death in family or loved one), or co-curricular activities. For such justified reasons, a make-up exam may be given at a mutually acceptable time or the weight of the missed mid-term exam will be shifted to the final exam. Extracurricular activities, weddings, vacations, hunting and fishing trips, work, dentist's appointments, and undocumented car-related incidents are examples of unjustifiable reasons for missing the scheduled dates and times for exams. The instructor reserves the right to determine whether the excuse is legitimate or not. The grades for group design projects may be adjusted individually based on group feedback.

**Grading Policy:** The course work consists of the following five categories: 1) homework & lab assignments, 2) unannounced quizzes, 3) group design projects, 4) midterm exams, and 5) a comprehensive final exam. The group design projects are a team work and each team may consist of 3-4 members. The requirements for the term design project include a notebook with well-documented lab notes, one written report and an in-class oral presentation. The possible points can be earned for all work categories are listed in the table below. Each student's final letter grade will be determined by the percentage of the total earned points over the total possible points using the following grading scale:  $A \geq 90\%$ ,  $80\% \leq B < 90\%$ ,  $70\% \leq C < 80\%$ ,  $60\% \leq D < 70\%$ ,  $F < 60\%$ .

Work category	Possible Points
1. Homework & lab assignments	150
2. Quizzes (unannounced)	100
3. Group design projects (the term project include lab note, written report & oral presentation)	150
4. Midterm exams (2)	200
5. Final exam (comprehensive)	200
Total	800

### **ATTENDANCE STATEMENT**

In accordance with NDSU Policy 333 (<http://www.ndsu.edu/fileadmin/policy/333.pdf>), class attendance and participation are expected at all regularly scheduled class times as they are critical to

every student's success in this course. Students who do not attend class are responsible for the material covered in class (for example, getting the notes from a fellow student). The instructor will not repeat lectures on an individual basis and does not provide copies of lecture notes to students. Class attendance will be randomly recorded and given credits toward the overall course grade.

Students are expected to respect the right of others to learn and thus all students should behave in accordance with NDSU's Students Code of Behavior. Disruptive behavior may result in ejection from the classroom ([http://www.ndsu.edu/student\\_rights/policy](http://www.ndsu.edu/student_rights/policy)). Late arrivals disrupt lectures and discussion, so avoid being late and be considerate of the class if it has started. Lecture material will not be repeated once a class is in progress.

### **ACADEMIC HONESTY STATEMENT**

*"The academic community is operated on the basis of honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of Registration and Records. Informational resources about academic honesty for students and instructional staff members can be found at [www.ndsu.edu/academichonesty](http://www.ndsu.edu/academichonesty)."*

All work in this course must be completed in a manner consistent with: 1) NDSU Policy, Section 335: Code of Academic Responsibility and Conduct

<https://www.ndsu.edu/fileadmin/policy/335.pdf> and 2) the COE Honor Code

[https://www.ndsu.edu/coe/current\\_students/honor\\_code/](https://www.ndsu.edu/coe/current_students/honor_code/)

### **AMERICAN DISABILITIES ACT FOR STUDENTS WITH SPECIAL NEEDS STATEMENT**

Any students with disabilities or other special needs, who need special accommodations in this course are invited to share these concerns or requests with the instructor and contact the Disability Services Office as soon as possible. Assistance is also available from Disability Services in 212 Ceres Hall (231-8463). <http://www.ndsu.edu/disabilityservices/>

### **VETERANS AND MILITARY PERSONNEL**

Veterans or military personnel with special circumstances or who are activated are encouraged to notify the instructor as early as possible.

### **IMPORTANT DATES**

September 2	Labor Day holiday (no classes/offices closed)
September 4	Last day to add classes via Campus Connection
September 4	Last day for no-record drop of classes @ 100% refund
September 4	Last day to withdraw to 0 credits @ 100% refund
September 10	Financial Aid applied to Student Accounts
September 16	Last day to submit request to audit, pass/fail
September 20	Undergraduate fall graduation application due
September 20	Graduate student fall Graduate Degree applications due
October 18	Grades of Incomplete convert to F
November 4	Spring registration begins

<i>November 11</i>	<i>Veteran's Day (no classes/offices closed)</i>
November 15	Last day to withdraw to 0 credits
November 15	Last day to drop classes with record (W)
<i>November 27-29</i>	<i>Thanksgiving (offices open on Friday)</i>
December 2	Fall commencement participation deadline
December 9-13	Dead Week
December 16-20	Final Examinations
December 20	Commencement

**SYLLABI ON WEB PAGES**

The course syllabus is also available at Blackboard.