

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

BASIC INFORMATION

Number of credits: 3 credits

Time and places: Lectures MW 10:00-10:50 a.m. @ ABEN 208

Labs W 2:00-4:00 p.m. @ ABEN 208/210B

Office hours: Monday and Thursday 1:00-2:00 p.m. or by appointment.

Instructor's name: Dr. Zhulu Lin

Office location: ABEN 104

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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 student 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 student 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 student 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 or USB drive, and a smartphone or a laptop computer are required. Computers (Room 222) and 3D printers (Room 210) are available to complete homework and lab assignments. Fees may apply for 3D printing.
- Holden, N. M., Wolfe, M. L., Ogejo, J. A., & Cummins, E. J. (Eds.). (2020). Introduction to Biosystems Engineering, ASABE and Virginia Tech Publishing.
doi:10.21061/IntroBiosystemsEngineering, CC BY 4.0,
<https://creativecommons.org/licenses/by/4.0>

TENTATIVE COURSE SCHEDULE¹

Wk	Day	Date	Topics	Sub-Discipline ²	Notes/ Faculty Intro
1	W	8/24	Class introduction & Kahoot! survey		
	W	8/24	Machine shop, computer lab & 3D printer orientation		Julie, Taylor & Jana
2	M	8/29	ABEN, ASABE & ABET	General	Club Officers
	W	8/31	Basic numerical skills		
	W	8/31	Lab 1 – 3D printing (ABEN 210B) https://www.tinkercad.com/ https://www.lulzbot.com/content/downloads		
3	M	9/5	Labor Day (no class)		
	W	9/7	Basic numerical skills	General	
	W	9/7	ABEN 496 internship presentations		
4	M	9/12	Basic numerical skills	General	
	W	9/14	Basic numerical skills	General	
	W	9/14	Lab 2 – Big Iron Farm Show at RRV Fairgrounds https://bigironfarmshow.com/		
5	M	9/19	Basic numerical skills	General	
	W	9/21	Engineering design	General	
	W	9/21	Lab 3 – Engineering & Tech Expo at Fargodome https://career-advising.ndsu.edu/channels/career-fairs/		

6	M	9/26	Engineering design	General	
	W	9/28	Teambuilding and teamwork (Mr. Brian Gregor)	General	Guest Lecture
	W	9/28	Engineering Entrepreneurship & Innovation (Dr. Jessica Vold – ME Dept)		Guest Lecture
7	M	10/3	Simple machines	MS	
	W	10/5	Engines	MS	
	W	10/5	Simple machine design project presentation		Lab notebook & Report due
8	M	10/10	Engines	MS	
	W	10/12	Powertrains	MS	
	W	10/12	Exam 1		Exam
9	M	10/17	Powertrains	MS	
	W	10/19	Powertrains	MS	
	W	10/19	Powertrain design project meeting 1 (Individual Groups)		
10	M	10/24	Powertrains	MS	
	W	10/26	Rain, runoff & erosion	NRES	
	W	10/26	Lab 4 – Soil and water lab		
11	M	10/31	Rain, runoff & erosion	NRES	
	W	11/2	Rain, runoff & erosion	NRES	
	W	11/2	Product Development Process (Mr. Nathan Carlson – CNH Industrial)		Guest Lecture
12	M	11/7	Rain, runoff & erosion	NRES	
	W	11/9	Rain, runoff & erosion	NRES	
	W	11/9	Exam 2		Exam
13	M	11/14	Moisture content	PS	Dr. Bon
	W	11/16	Moisture content	PS	Dr. Eshkabilov
	W	11/16	Powertrain design project presentation		Lab notebook & Report due
14	M	11/21	Moisture content	PS	Dr. Steele
	W	11/23	Thanksgiving Holiday (no class)		
	W	11/23	Thanksgiving Holiday (no lab)		
15	M	11/28	Moisture content	PS	Dr. Jia
	W	11/30	Waste management	PS	Dr. Feng
	W	11/30	Lab 5 – Part 1: Moisture content measurement (Pilot Plant, Dr. Monono)		Dr. Monono
16	M	12/5	Waste management	PS	Dr. Clementson
	W	12/7	Processing system review	PS	
	W	12/7	Lab 5 – Part 2: Moisture content & processing (Pilot Plant, Dr. Monono)		
17	T	12/13	Comprehensive Final Exam (8:00 - 10:00 a.m.)		Exam

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.

ATTENDANCE POLICY

In accordance with NDSU Policy 333 (<http://www.ndsu.edu/fileadmin/policy/333.pdf>), class participation is expected at all regularly scheduled class and lab times as they are critical to every student's success in this course. Students are expected to attend every class and remain in class for the duration of the session. Although students are expected to participate in the course in person, when needed occasionally students may request the instructor to record the lecture and review it at a different time. If you are unable to attend class at the regularly scheduled time due to health issues, contact the instructor prior to the class meeting time for alternate arrangements, including recordings of class sessions and accommodations needed for assignments.

EVALUATION PROCEDURES AND GRADING CRITERIA

Assignment Policy: The due dates for homework, lab reports 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/ace/tutoring/>). You are also encouraged to contact the instructor for assistance during office hours or by appointment. 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 zero point 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 be given through Blackboard regularly throughout the semester and no make-up quizzes will be given for any reason. As for scheduled midterm and final exams, missed exams will receive zero point 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) Blackboard 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 poster 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 (Blackboard)	100
3. Group design projects (the term project include lab note, written report & poster presentation)	150
4. Midterm exams (2)	200
5. Final exam (comprehensive)	200
Total	800

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."

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.

ADDITIONAL RESOURCES FOR STUDENTS

As a member of the NDSU community, resources are available for you should you need help in dealing with adverse reactions to things happening in the world today. A variety of resources are listed below. For students on campus and remotely (telehealth):

- Counseling Services: 701-231-7671; <https://www.ndsu.edu/counseling/>
- Disability Services: 701-231-8463; <https://www.ndsu.edu/disabilityservices/>
- Student Health Service: 701-231-7331; <https://www.ndsu.edu/studenthealthservice/>
- Dean of Students Office: 701-231-7701; <https://www.ndsu.edu/deanofstudents/>

In a crisis or emergency situation:

- Call University Police: 701-231-8998
- Call 9-1-1
- Go to a Hospital Emergency Room
- Go to Prairie St. Johns for a Needs Assessment: 701-476-7216 (510 4th St. S.)

- Call the FirstLink Help Line: 1-800-273- TALK (8255) or 2-1-1
- Call Rape and Abuse Crisis Center: 701-293-7273

IMPORTANT DATES

<https://www.ndsu.edu/onestop/academic-calendar>

August 29	Last day to add classes via Campus Connection
August 31	Last day for no-record drop of classes @ 100% refund
August 31	Last day to withdraw to 0 credits @ 100% refund
<i>September 5</i>	<i>Labor Day holiday (no classes/offices closed)</i>
September 6	Financial Aid applied to Student Accounts
September 12	Last day to submit request to audit, pass/fail
October 14	Undergraduate/Professional fall graduation application due
October 14	Graduate student fall Intent to Graduate forms due
October 14	Grades of Incomplete convert to F
October 27	Spring registration begins
November 10	Last day to drop to 0 credits
November 10	Last day to drop classes with record (W)
<i>November 11</i>	<i>Veteran's Day (no classes/offices closed)</i>
November 18	Fall commencement participation deadline
<i>November 23-25</i>	<i>Thanksgiving (offices open on Wednesday & Friday)</i>
December 5-9	Dead Week
December 12-16	Final Examinations
December 16	Commencement
December 20	Fall grade access begins online

SYLLABI ON WEB PAGES

The course syllabus is also available at Blackboard.

APPENDIX

QR code used in the first lab.

