

EEE 59500 - Pollution from Livestock Operations

BASIC INFORMATION

Class information:	Instructor information:
3-Credit	Dr. Halis Simsek
Fall 2026	Office: ABE 3041E
Classroom: MATH 215	Phone: 765-496-6331
CRN: 29208	E-mail: simsek@purdue.edu
Time: Tuesday/Thursday 3:00 – 4:15 pm	

Prerequisites: TBD

Textbook: MidWest Plan Service (MWPS) Ventilation Package (MWPS 32, 33, 34) and MWPS Manure Package (MWPS 18-S1, 18-S2, and 18-S3)

References: Managing Livestock Wastes by James A. Merkel. Others have found it appropriate.

COURSE DESCRIPTION

This course provides an in-depth understanding of environmental pollution and water quality challenges associated with animal agriculture and water systems. Students examine the sources and causes of water quality impairments, with emphasis on pollutants from confined animal housing. Topics include the design and operation of animal housing systems, maintenance of optimal indoor environmental conditions under varying climates, and manure and waste management practices such as storage design, composting, biodegradation, and contaminant removal. The course also addresses air quality control—including moisture, odor, and emissions—using strategies such as biofiltration, as well as thermal properties, heat transfer, and ventilation requirements in livestock housing, with a focus on practical, cost-effective solutions to protect environmental and source water quality.

COURSE OBJECTIVES AND ABET STUDENT OUTCOMES

- **Analyze** sources and mechanisms of environmental pollution and water quality impairment associated with animal agriculture systems.
 - **ABET 1:** Identify, formulate, and solve complex engineering problems using principles of engineering, science, and mathematics.
- **Apply** engineering principles to the design and operation of animal housing systems to maintain appropriate indoor environmental and air quality conditions.
 - **ABET 1:** Engineering problem solving.
 - **ABET 2:** Apply engineering design to produce solutions that meet specified needs within environmental and economic constraints.
- **Evaluate** manure and waste management practices for contaminant control, environmental impact, and regulatory compliance.
 - **ABET 4:** Analyze and interpret data to draw conclusions.
 - **ABET 6:** Professional responsibility and regulatory awareness.
- **Apply** heat transfer, ventilation, and emission control principles to mitigate air quality and thermal challenges in livestock housing.
 - **ABET 1:** Engineering problem solving.
 - **ABET 4:** Technical analysis and interpretation.

- **Design or recommend** practical, cost-effective solutions that protect surface and groundwater quality while supporting sustainable animal agriculture.
 - **ABET 2:** Engineering design considering sustainability, environmental, and economic constraints.

EVALUATION PROCEDURES AND GRADING CRITERIA

Assignment Policy: Late assignments will be accepted with a 10% penalty per Purdue class day. Assignments must be submitted in hardcopy or digital copy before 5 p.m. to be credited to the day they are received. Late assignments will not be accepted after solutions are posted/handed out/discussed, or after 3 Purdue class days from the due date. Students may help each other with homework, as this helps with team building and comprehension. However, copying and submitting anybody else's work is a violation of Purdue's Honor Pledge.

Exam Policy: Missed exams will receive zero points unless the absence is justified and the instructor is notified prior to the exam date and time. Valid justification is a statement indicating illness, an obituary notice (death in the family or a 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 exam dates and times. The instructor reserves the right to determine whether the excuse is legitimate.

Grading Policy: Students must complete the following four categories of work in this course: homework assignments, quizzes, one midterm exam, and one comprehensive final exam. Graduate students will be required to write a term paper in addition to the coursework listed above. The term paper will be subject to the instructor's approval to ensure appropriate scope and content. The total possible points a student can earn is 100 (100%). The grading procedure planned for the course is as follows:

Graduate	
Homework	20%
Quizzes	10%
Midterm 1	20%
Midterm 2	20%
Final exam	30%
Total	100%

Each student's final letter grade in the course will be determined by the percentage of the total earned points over the total possible points using the following grading scale:

$90\% \leq A \leq 100\%$
$80\% \leq B < 90\%$
$70\% \leq C < 80\%$
$60\% \leq D < 70\%$
$0\% \leq F < 60\%$

Academic Integrity

Students are expected to abide by the academic honesty and ethics described in Purdue's Student Guide for Academic Integrity, available through BrightSpace. Any academic dishonesty will result in an automatic Grade of F and will be reported to the Dean of Students.

POLICIES

General Course Policies

- 1) Assignments are due at or before 11:59 pm on the date provided in the detailed class schedule. Students must submit their work by the deadline to receive full credit. Late submissions will be accepted for up to 48 hrs after the associated deadline, but will be graded at 75% of the earned marks. All work must be communicated effectively and clearly.
- 2) Attendance is expected. Please note that your ability to complete the homework will depend heavily on your attendance in class and lab. Class exercise submissions will only be accepted during the class period in which they are issued. For absences, see Purdue Policies accessible through BrightSpace.
- 3) Cell phones and other electronic devices must be silenced when class is in session. Use of e-readers and/or relevant e-resources is permitted.
- 4) Communication: Email (@purdue.edu email addresses only) and BrightSpace will be the primary means of communication. Please check both frequently for important updates, changes, or other communications.

University Policies

Hyperlinks to the following University policies and statements are provided in Brightspace

- Attendance Policy
- Academic Integrity
- Nondiscrimination Statement
- Class Absences
- Emergency Preparedness
- Violent Behavior Policy
- Use of Copyrighted Materials

Accessibility

Purdue University strives to make learning experiences accessible to all participants. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone at 765-494-1247.

Mental Health/Wellness Statement

If you find yourself beginning to feel some stress, anxiety, and/or feeling slightly overwhelmed, try [WellTrack](#). Sign in and find information and tools at your fingertips, available to you at any time. If you need support and information about options and resources, please contact or see the [Office of the Dean of Students](#). Call 765-494-1747. Hours of operation are M-F, 8 am- 5 pm. If you find yourself struggling to find a healthy balance between academics, social life, stress, etc., sign up for free one-on-one virtual or in-person sessions with a [Purdue Wellness Coach at RecWell](#). Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign-up is free and can be done on BoilerConnect.

If you're struggling and need mental health services, Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact [Counseling and Psychological Services \(CAPS\)](#) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office on the second floor of the Purdue University Student Health Center (PUSH) during business hours. The [CAPS website](#) also offers resources specific to situations such as COVID-19.

Basic Needs Security

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. No appointment is needed, and Student Support Services is available to serve students 8 a.m.-5 p.m., Monday through Friday.

Emergency Preparation

In the event of a major campus emergency, course requirements, deadlines, and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted on BrightSpace or can be obtained by contacting the instructors or TAs via email or phone. You are expected to check your @purdue.edu email regularly.

CLASS SCHEDULE

Week	Topic/Content
1	Introductions, syllabus, course format, course overview Water quality; state of our waters; causes and sources; concepts
2	Fundamental concepts of water quality Biological treatment of wastewaters and solid wastes
3	Identify major pollutants and their sources, environmental fundamentals
4	Manure management introduction
5	Manure storage facility selection, sizing the storage
6	Monitoring and managing the storage facilities, managing livestock wastes
7	Composting
6	Indoor and outdoor air quality, livestock operations
9	Odor estimation and biofiltration design
10	Ventilation
11	Livestock heat and moisture balance
12	Negative and positive pressure, inlet design
13	Psychrometry – dry-bulb and wet-bulb temperature, dew point, moisture
14	Psychrometry – heating, cooling
15	Course review and wrap-up, Projects
16	Project Presentations – final exam

Note: This syllabus is subject to change. The students will be informed of the due date of homework and reports.