BAE 578 Course Syllabus

BAE 578 – Agricultural Waste Management

Section 601
FALL 2011
3 Credit Hours

Course Description
This course covers principles of managing, handling, treating and applying animal and poultry manures and organic byproducts from an engineering perspective. Topics include waste characterization, descriptions of systems and technology, land application principles, preparation of waste management plans, biochemical/biological processes, and potential impacts to the environment. Assignments include homework, quizzes, projects, and discussions that emphasize problem solving and analysis.

Learning Outcomes

Analyze and evaluate policies, practices and technologies with respect to the balance between agricultural production and environmental protection that is needed to provide food, fiber and fuel to the world's population in a sustainable manner.

Compare production practices and management technologies used for different species and in different regions.

Use appropriate techniques and computer tools to design and analyze systems to manage manure and nutrients from food animal production systems in ways that comply with state and federal requirements.

Communicate effectively and respectfully with peers and the instructor regarding resource use, food animal production and a sustainable environment.

Course Structure
This online course will involve various activities for students. Much of the material is presented as readings while many of the topics have an associated video presentation. While field trips are not possible, there are video tours of some animal production facilities. Homework assignments, quizzes, discussions, group projects and exams are all part of the course.

Instructors
John J. Classen (classen) - Instructor
Email: john_classen@ncsu.edu
Phone: 919-515-6800
Fax: 919-515-7760
Office Location: 179 Weaver Labs
Office Hours: As arranged

Course Meetings
None.

Course Materials
Textbooks
None.

Expenses
None.

Materials
None.

Requisites and Restrictions
Prerequisites
None.

Co-requisites
None.

Restrictions
The course is intended for graduate and advanced undergraduates in biological engineering. Other backgrounds are welcome but all will be expected to do the same work.

General Education Program (GEP) Information

GEP Category
This course does not fulfill a General Education Program category.

GEP Co-requisites
This course does not fulfill a General Education Program co-requisite.

Transportation
This course will not require students to provide their own transportation. Non-scheduled class time for field trips or out-of-class activities is NOT required for this class.

Safety & Risk Assumptions
None.

Grading

Grade Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>Exams</td>
<td>20%</td>
<td>Two semester exams and a final exam which counts twice the value of the semester exams.</td>
</tr>
<tr>
<td>Homework assignments</td>
<td>20%</td>
<td>All homework assignments must be completed using appropriate software; no scanned or hand written material will be accepted. The lowest homework grade will be dropped.</td>
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<tr>
<td>Quizzes</td>
<td>20%</td>
<td>Quizzes will be completed online.</td>
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<tr>
<td>Component</td>
<td>Weight</td>
<td>Details</td>
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<tr>
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<tr>
<td>Discussion forms</td>
<td>20%</td>
<td>Discussion forums will be graded according to the rubric available on the course web site.</td>
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<tr>
<td>Projects</td>
<td>20%</td>
<td>Three group projects will be completed during the semester.</td>
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**Letter Grades**

This Course uses Standard NCSU Letter Grading:

- $97 \leq A^+ \leq 100$
- $93 \leq A \leq 97$
- $90 \leq A^- \leq 93$
- $87 \leq B^+ \leq 90$
- $83 \leq B \leq 87$
- $80 \leq B^- \leq 83$
- $77 \leq C^+ \leq 80$
- $73 \leq C \leq 77$
- $70 \leq C^- \leq 73$
- $67 \leq D^+ \leq 70$
- $63 \leq D \leq 67$
- $60 \leq D^- \leq 63$
- $0 \leq F \leq 60$

**Requirements for Credit-Only (S/U) Grading**

Performance in research, seminar and independent study types of courses (6xx and 8xx) is evaluated as either "S" (Satisfactory) or "U" (Unsatisfactory), and these grades are not used in computing the grade point average. For credit only courses (S/U) the requirements necessary to obtain the grade of "S" must be clearly outlined.

**Requirements for Auditors (AU)**

Information about and requirements for auditing a course can be found at [http://www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.5.php](http://www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.5.php).

**Policies on Incomplete Grades**

If an extended deadline is not authorized by the Graduate School, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular semester in which the student is enrolled (not including summer sessions), or (b) by the end of 12 months if the student is not enrolled, whichever is shorter. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student. The university policy on incomplete grades is located at [http://www.ncsu.edu/policies/academic_affairs/grades_undergrad/REG02.50.3.php](http://www.ncsu.edu/policies/academic_affairs/grades_undergrad/REG02.50.3.php). Additional information relative to incomplete grades for graduate students can be found in the Graduate Administrative Handbook in Section 3.18.F at [http://www.fis.ncsu.edu/grad_publicns/handbook/](http://www.fis.ncsu.edu/grad_publicns/handbook/).

**Late Assignments**
Late assignments will be accepted up to two weeks after the due date for maximum credit of 60%. Assignments submitted after two weeks will receive a grade of zero.

**Attendance Policy**

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Students are expected to contribute to all discussions and be engaged in the course, including responding to emails and announcements.

**Absences**

None.

**Makeup Work**

None.

**Additional Excuses Policy**

None.

**Academic Integrity**

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Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at [http://www.ncsu.edu/policies/student_services/student_discipline/POL11.35.1.php](http://www.ncsu.edu/policies/student_services/student_discipline/POL11.35.1.php)

**Academic Honesty**


**Honor Pledge**

Your submission of any test or assignment indicates "I have neither given nor received unauthorized aid on this test or assignment."

**Electronically-Hosted Course Components**

This course may involve electronic sharing or posting of personally identifiable student work or other information with persons not taking or administering the course. Students will be asked to sign a consent allowing disclosure of their personally identifiable work. No student is required to sign the consent as a condition of taking the course. If a student does not want to sign the consent, he or she has the right to ask the instructor for an alternative, private means of completing the coursework.

**Electronically-hosted Components:** Some project work may be visible to individuals outside of the NCSU system. However, no evaluation of this work, including comments or grades, is available to unauthorized persons.

**Accommodations for Disabilities**

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, student must register with the Disability Services Office ([http://www.ncsu.edu/dso](http://www.ncsu.edu/dso)) located at 1900 Student Health Center, Campus Box 7509, 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation at [http://www.ncsu.edu/policies/academic_affairs/courses_undergrad/REG02.20.1.php](http://www.ncsu.edu/policies/academic_affairs/courses_undergrad/REG02.20.1.php).
### Non-Discrimination Policy

NC State University provides equality of opportunity in education and employment for all students and employees. Accordingly, NC State affirms its commitment to maintain a work environment for all employees and an academic environment for all students that is free from all forms of discrimination. Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or NC State University policy and will not be tolerated. Harassment of any person (either in the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or NC State University policy and will not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. NC State’s policies and regulations covering discrimination, harassment, and retaliation may be accessed at [http://policies.ncsu.edu/policy/pol-04-25-5](http://policies.ncsu.edu/policy/pol-04-25-5) or [http://www.ncsu.edu/equal_op](http://www.ncsu.edu/equal_op). Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

### Course Schedule

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Dates</th>
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<tbody>
<tr>
<td><strong>Introductions</strong> — 08/17/2011 - 08/21/2011</td>
<td></td>
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<tr>
<td>Introductions: course content; course mechanics; syllabus, personal background</td>
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<tr>
<td>Assignment: Post self-introduction; Self test-Course Mechanics; Course Pre-test</td>
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<tr>
<td><strong>Food animal production systems</strong> — 08/22/2011 - 08/28/2011</td>
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<tr>
<td>Basics of food animal production</td>
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<tr>
<td>Assignment: Quiz-Animal Production; Discussion forum: Our Food System</td>
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<tr>
<td><strong>CAFO regulations</strong> — 08/29/2011 - 09/04/2011</td>
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<tr>
<td>Regulations related to CAFOs</td>
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<tr>
<td>Assignment: Discussion forum: effect of regulations on environment and business; Production Practices and Regulations project assigned (due 9/26)</td>
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<tr>
<td><strong>Manure production and characteristics</strong> — 09/05/2011 - 09/11/2011</td>
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<tr>
<td>Manure production and characteristics; physical / chemical properties of manure</td>
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<tr>
<td>Assignment: Quiz-Physical Properties, Characteristics</td>
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<tr>
<td><strong>Manure storage and treatment design</strong> — 09/12/2011 - 09/18/2011</td>
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<tr>
<td>Manure storage and treatment; planning and sizing structures</td>
<td></td>
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<tr>
<td>Assignment: HW-Storage Design</td>
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<tr>
<td><strong>Microbiology, nutrient cycles</strong> — 09/19/2011 - 09/25/2011</td>
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<tr>
<td>Microbiology, nutrient cycles, pathogens</td>
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</tbody>
</table>
Assignment: Quiz - Microbiology & Nutrient Cycles; Production Practices and Regulations project due

**Nutrient management — 09/26/2011 - 10/02/2011**

Nutrient loss calculations; land requirements
Assignment: HW-Nutrient Utilization

**Land Application — 10/03/2011 - 10/09/2011**

Nutrient management; land application
Assignment: HW-Nutrient Production, Availability and Land Application; Critical Literature Analysis Project assigned

**Exam 1 — 10/12/2011 - 10/17/2011**

Exam covering material in first half of semester.


Environmental issues: water, soil, air, particulates, and odor
Assignment: Discussion Forum: Emissions and Impacts Related to Food Animal Production

**NRCS design software, AWM — 10/24/2011 - 10/30/2011**

Manure storage and treatment; NRCS design software, AWM
Assignment: HW- AWM Design

**Limitations of design software — 10/31/2011 - 11/06/2011**

Comparison of hand calculations and software solutions
Assignment: Critical literature analysis project due


Composting systems, processes and design
Assignment: Discussion forum: Composting and Organic Agriculture; HW - Composting Systems; Design project assigned


New manure treatment technologies, goals and costs
Assignment: Quiz-Alternative Treatment Technologies

**Exam 2 — 11/21/2011 - 12/02/2011**

Exam covering material in second half of semester