

**ENVIRONMENTAL BIOLOGY AND ECOLOGY
CEES 4324 / CEES 5324**

Instructor: Robert W. Nairn, PhD
Office: CEC 301C
Phone: 405-325-3354
Email: nairn@ou.edu
Office hours:* T 1200-1300; R 0930-1030
*Appointments available upon 24-hour advanced request

Teaching Assistant: Nick Shepherd
Office: CEC S9
Phone: 918-527-6599
Email: nick.shepherd@ou.edu
Office hours:* W 1200-1300; R 1330-1430
*Appointments available upon 24-hour advanced request

Prerequisites: Senior or graduate standing
Credit hours: 4 semester hours
Lecture location: 119 Carson Engineering Center
Lecture times: Tuesday and Thursday 1030-1145
Laboratory location: 328 Carson Engineering Center
Laboratory times: Tuesday 0800-1020

Course description

CEES4324 and CEES5324 are advanced undergraduate and graduate level courses emphasizing applied environmental biology, microbiology, ecology, and toxicology. The courses examine the biological and ecological foundations of the multidisciplinary fields of environmental science and engineering. In general, the interactions of humankind with ecological and biogeochemical systems and processes are examined to help answer questions regarding both human impacts on the biosphere and the effects of environmental biology on human society. The diversity and importance of organisms involved in solid and liquid waste reduction are presented.

Course objectives

- To develop a comprehensive and holistic understanding of the biological and ecological foundation of environmental science and engineering.
- To critically analyze the many interactions of humankind with biological processes, species, and systems.
- To examine the consequences of various environmental impacts (i.e., natural and xenobiotic pollutants, exotic species, habitat destruction or alteration, etc.) on the biological integrity of ecosystems.
- To evaluate the application of natural biogeochemical, ecological, and microbial processes to mitigate the effects of environmental stress.

Course format

The lecture portions of CEES4324 and CEES5324 consist of two 75-minute sessions per week that will be roughly evenly divided into presentation of new material, discussion, and individual and/or team activities. Review and open question/answer sessions will be conducted as necessary.

The laboratory portion consists of a required weekly two-hour and twenty-minute laboratory period. Laboratory will not meet all weeks of the semester. Laboratory projects will be completed within small teams during the laboratory periods. Laboratories may include both field and indoor laboratory components and are an important core component of this class. They may include field trips, biological and biochemical analyses, ecological studies, and calculations/data analysis. Students are reminded to dress appropriately for field trips and be prepared for adverse weather conditions. Open-toed shoes and shorts are inappropriate attire for field and laboratory work. No food and drink are allowed in the laboratory. No laboratory textbook is required but laboratory handouts will be distributed in class or through Canvas course management software.

Required text

Vaccari, D.A., P.F. Strom and J.E. Alleman. 2006. *Environmental Biology for Engineers and Scientists*. Wiley Interscience, 931 pages. **Available online through OU Libraries.**

Supplemental texts

Because of the diverse background of environmental science and engineering students, some students may find the following resources helpful. All titles are available in OU Libraries.

Maier, R.M, I.L. Pepper and C.P Gerba. 2000. *Environmental Microbiology*

Odom, E.P. 1993. *Ecology and Our Endangered Life Support Systems*

Freedman, B. 1995. *Environmental Ecology*

Sparling, D.W. 2016. *Ecotoxicology Essentials: Environmental contaminants and Their Biological Effects on Animals and Plants*

Course management

We will be using Canvas course management software in this course, <http://canvas.ou.edu/>. Most class information will be disseminated via Canvas and email. Students are encouraged to submit questions to the instructor via email at any time. Responses will be made as quickly as possible. It is the responsibility of each student to regularly access their OU email account.

Class policies

Codes of behavior: Each student should acquaint her or his self with the University's codes, policies, and procedures involving academic misconduct, grievances, sexual and ethnic harassment, and discrimination based on physical handicap. Any instance of classroom disruption will be dealt with in a prompt and serious manner.

Cell phones and other electronic devices: Although note-taking on laptops or other devices is permitted, use of any electronic device for anything other than course-related work is prohibited. **Turn off cell phone ringers/beepers during class time and completely refrain from text messaging.** All electronic devices must be stored out of view to both the students and instructor during class lectures and

discussions. If you must leave your cell phone engaged for some reason, please discuss this with the instructor.

Reasonable accommodation: Any student in this course who has a disability that may prevent the full demonstration of his or her abilities should contact Dr. Nairn personally as soon as possible so an appropriate contact may be provided to discuss accommodations necessary to ensure full participation and facilitate your educational opportunities. For more information, please visit <http://www.ou.edu/drc.html>. The OU policy states:

"The University of Oklahoma is committed to the goal of achieving equal educational opportunity and full participation for students with disabilities. Consistent with the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act of 1990, as amended, The University of Oklahoma ensures that no "qualified individual with a disability" will be excluded from participation in, be denied the benefits of, or otherwise be subjected to discrimination solely on the basis of disability under any program or activity offered by The University of Oklahoma. Accommodations on the basis of disability are available by contacting the Disability Resource Center in Room 166, Goddard Center (405) 325-4173/TDD or (405) 325-3852 Voice."

Adjustments for pregnancy/childbirth related issues: Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact Dr. Nairn as soon as possible to discuss. Generally, modifications will be made where medically necessary and similar in scope to accommodations based on temporary disability. For commonly asked questions, please see <http://www.ou.edu/eoo/faqs/pregnancy-faqs.html>.

Title IX resources: For any concerns regarding gender-based discrimination, sexual harassment, sexual misconduct, stalking, or intimate partner violence, the University offers a variety of resources, including advocates on-call 24/7, counseling services, mutual no contact orders, scheduling adjustments and disciplinary sanctions against the perpetrator. Please contact the Sexual Misconduct Office 405-325-2215 (8-5, M-F) or OU Advocates 405-615-0013 (24/7) to learn more or to report an incident.

Religious observances: It is the policy of the University to excuse the absences of students that result from religious observances and to reschedule examinations and additional required classwork that may fall on religious holidays, without penalty.

Academic misconduct: It is the responsibility of each student to be familiar with the definitions, policies and procedures concerning academic misconduct. **Instances of academic misconduct and classroom disruption will be dealt with in a serious and appropriate manner.** The Academic Misconduct Code is available at <http://integrity.ou.edu/>

By accepting this syllabus, all students agree to the following contract: "As a member of The University of Oklahoma, I understand that enrollment creates special obligations beyond those attendant upon membership in the general society. In addition to the requirement of compliance with the general law, I assume the obligation to comply with all University policies and campus regulations. I understand that behavior that it considered, by the instructor; to be a disruption or obstruction of teaching will not be tolerated. I further understand that if my behavior is considered to be of such a nature, I will be asked to leave the classroom and may be formally charged under The University of Oklahoma Student Code of

Responsibilities and Conduct and, if so, will be subject to appropriate sanctions under Title 17 of the Code. I also agree to uphold the academic integrity of The University of Oklahoma. I understand that any incidents of academic misconduct discovered by the instructor will be handled in accordance with the Academic Misconduct Code.”

For every assignment, students are encouraged to adhere to the *Integrity Pledge* as provided by the Student Government Association and Faculty Senate: “On my honor, I affirm that I will neither give nor receive inappropriate aid in the completion of this exercise.”

A special note on plagiarism: Submission of written documents is a substantial component of student evaluation in this course. All students are encouraged to familiarize themselves with information on plagiarism available at <http://integrity.ou.edu/>. Be sure to examine this information, including the videos, tutorial and document entitled "Nine Things You Should Already Know about Plagiarism" (http://integrity.ou.edu/files/nine_things_you_should_know.pdf).

The University subscribes to the online plagiarism-detection service Turnitin.com. Turnitin is integrated into the course management system. Papers submitted automatically generate an originality report indicating passages identical to other student papers or Internet sources. Further information is available from the integrity website.

Assignments and grading: Assignments, examinations, or projects worth less than 10 percent of a student's grade may be assigned at any time prior to pre-finals week and may be due during pre-finals week. However, no assignments, examinations, or projects may be due on the last two days of pre-finals week. Assignments, take-home examinations, in-class examinations, or projects worth more than 10 percent of a student's grade have been scheduled at least 30 days prior to the first day of finals and must be due or given prior to pre-finals week. Any assignment that is to take the entire semester to complete (the team semester project in this course) may be accepted or presented during pre-finals week and this syllabus explicitly states that the assignment can be turned in prior to pre-finals week. Special requests made by students for an extension of assignment deadlines into pre-finals week may be granted subject to the discretion of the instructor.

Making up work: Only Provost-approved university-sponsored activities such as scholarly competitions, fine arts performances, academic field trips, and legally required activities, such as emergency military service and jury duty, are covered by these guidelines. If notice is given two class periods before an exam or quiz (excluding pop quizzes), the instructor will make every effort to find a reasonable accommodation. Students missing an exam because of jury duty must be allowed an accommodation by OU policy. Students missing class due to illness must be supported by a certified note of illness. Student’s missing any assignment or exam for other reasons not specified herein will be subjected to a failing grade for said assignment.

Student responsibilities and expectations

Attendance/Participation: Attendance at all class sessions and participation in discussions is expected of all students, except when **prior** arrangements have been made with the instructor. Absences for illness or family emergencies will be accommodated if attempts to contact the instructor occur **before class begins**. Lecture sessions will begin promptly - **be on time!** It is part of your grade.

In addition, in-class discussions will play a critical role in our evaluation of ecological engineering science. It is expected that **all students ask and answer questions**, participate in class conversations and debate topics of interest. Those students who do not volunteer in these conversations will be called upon to answer instructor-initiated questions. Remember, it is part of your grade.

Homeworks: Homework assignments will include calculation and short essay questions. Students are encouraged to discuss homework assignments within small groups but **material submitted for grading must be based on individual effort**. See the academic dishonesty policy above. **Late homework will not be accepted. There is no such thing as late homework for grading purposes – if it is not turned in on time; you will receive a zero (no exceptions).**

Homework submission will be accepted through the Dropbox on Canvas according to the due date/time posted on the Dropbox. Typically, the due date is one week after initial posting to allow adequate time for you to inquire about the questions presented. **Homework must be neatly prepared.** It is up to you to convince the instructors that you know what you are talking about. **This will generally require good organization, well-developed discussions that feature complete sentences and clearly boxed answers when numerical results are presented.** Scanned copies of hand-written calculations are acceptable if they meet these requirements. Homework submissions that are illegible or otherwise difficult to follow will not be reviewed or graded. *You should keep a copy of all homework submissions, some will not be returned.*

Teams: Based on student status and information provided, the instructor will assign individual students to teams. Teams will be maintained for both the laboratory and lecture portions of the class. Students are expected to work with their teams throughout the semester, especially on laboratory experiments, Readiness Assessment Tests, and in-class assignments. **Peer evaluations** will be conducted periodically throughout the semester to ensure that all individual team members are participating equitably in team assignments. If problems are identified, immediate action will be taken to address these issues.

Readiness Assessment Tests (RATs): Approximately weekly, RATs will be conducted. They are unannounced and will be in the multiple-choice format and **based solely on the assigned readings for the entire week**. Students will first take an individual RAT, then the same RAT will be completed as a team. Individual students will have the opportunity to appeal team results if necessary. After the RAT, opportunities to apply the knowledge gained will be provided. Individual student scores for RATs will be based equally upon both individual and team results for each RAT.

Laboratory: Laboratory periods will be used for bench-scale and field experiments. Attendance during the laboratory portion of the class is mandatory. Laboratory activities are organized as team projects and are graded. Grades will be based on three written laboratory report submissions and peer evaluations. Refer to the schedule below and guidelines on Canvas.

Examinations: Exams will be a closed-book, in-class tests, including calculations, short answer, multiple choice, and essay questions. The final exam will be a comprehensive test of major topics and of calculations previously done in homeworks and exams. See below for important dates regarding exams.

Grading policy

Assignments and exam questions will provide sufficient instruction as to what is expected of students. Students are expected to read the textbook and other reading assignments before classes, to understand the main concepts of the readings and lectures, and to solve applied environmental biology and ecology problems based on examples given in the textbook and during lectures. If you are having difficulties performing at this level, please visit during office hours for additional assistance.

Grading will be conducted as follows:

Participation	50
Homework (~12 HWs)	150
Readiness Assessment Tests (~12 RATs)	150
Laboratory (3 LRs x 100)	300
Exam #1 (biology and microbiology)	100
Exam #2 (ecology)	100
<u>Final Exam*</u> (toxicity plus overall course comprehension)	<u>150</u>
TOTAL	1000

*Final Exam: 0800-1000, Wednesday December 13

Schedule (Subject to change)

Week	Days	Topic	Related Readings	Laboratory Schedule	Major Deliverables/ Other Info.
1	22-Aug	Introduction, Substances of Life, The Cell	1, 2, 3, 4	No Lab	
	24-Aug				
2	29-Aug	Energy and Metabolism, Genetics	5, 6	No Lab	
	31-Aug				
3	05-Sep	Plants, Animals, Humans No class Thursday	7, 8, 9	Phenol biodegradation (0 and 2 days)	Lab data -T and R
	07-Sep				
4	12-Sep	Microbial Groups, Microbial Activity	10, 11	Phenol biodegradation (7 and 9 days)	Lab data -T and R
	14-Sep				
5	19-Sep	No class Tuesday Human Health Microbiology	12	Phenol biodegradation (14 days)	No class but lab on T
	21-Sep				
6	26-Sep	No class Tuesday Microbial Transformations	13	No Lab	LR1 Due (F)
	28-Sep				
7	03-Oct	Exam #1 Ecology	14	No Lab	
	05-Oct				
8	10-Oct	Ecosystem Ecology/ Biogeochemistry	15	Habitat Assessment/ Rapid Bioassessment	Field Lab
	12-Oct				
9	17-Oct	Biomonitoring and Bioassessment	US EPA pages	Habitat Assessment/ Rapid Bioassessment	Field Lab
	19-Oct				
10	24-Oct	Ecosystem Applications, Ecological Engineering	15 Mitsch & Jorgensen	Habitat Assessment/ Rapid Bioassessment	Field Lab)
	26-Oct				
11	31-Oct	Biological Applications	16	No Lab	LR2 Due (F)
	02-Nov				
12	07-Nov	Exam #2 Toxicity	17	No Lab	
	09-Nov				
13	14-Nov	Toxin Fate and Transport, Pharmakokinetic models	18	Bioassay Toxicity Testing	
	16-Nov				
14	21-Nov	Dose-Response Relationship No class Thursday	19	Bioassay Toxicity Testing	Eat turkey - Dr. Nairn's b-day!
	23-Nov				
15	28-Nov	Toxicology, Specific Toxicity	20, 21	Bioassay Toxicity Testing	
	30-Nov				
16	05-Dec	Human Health and Ecological Risk Assessments	22	No Lab	LR3 Due (F)
	07-Dec				
	13-Dec	Final Exam, 0800-1000			