

# MAT 108 Environmental Issues: A Mathematical Modeling Approach

## Fall 2009 Syllabus

**Instructor:** Dr. Jan Pearce

**Office:** 304-B Draper Hall  
(859) 985-3569

**E-mail:** [pearcej@berea.edu](mailto:pearcej@berea.edu)



**C.P.O.:** 1815

**Office** T 12:00 P.M. – 12:50 P.M.

**Hours:** R 12:00 P.M. – 12:50 P.M. and 3:00-3:50 P.M.  
(except on days of 3 pm convos)  
or by appointment

Feel free to send e-mail for appointments at other and/or additional times on MWF

### The MAT 108 Course Description

The state of the planet will be discussed from differing points of view. Local and global issues such as air, land, and water pollution; energy production and consumption; forest, wetland and other resource management; as well as waste disposal will be considered. Mathematical models will be developed and explored on the computer in order to make predictions and to consider solutions regarding the environmental problems that face our world. This course may be used to fulfill the quantitative reasoning requirement. This course is designed to meet the Practical Reasoning Quantitative (PRQ) and the Active Learning (ALE) Requirements.

*Prerequisite:* Completion or waiver of developmental mathematics or the consent of the instructor is required.

### The Course Goals

- To better understand and to critically examine current major local and global environmental issues.
- To become familiar with mathematical modeling of environmental data using the computer as a tool.
- To develop skills in formulating, solving, and interpreting appropriate environmental models.
- To help to awaken ourselves to civic responsibilities and help empower ourselves to act.
- To gain experience in effectively communicating mathematical ideas.

### The Course Home Page

Our course home page is located at <http://faculty.berea.edu/pearcej/MAT108/>. Use this page as a resource to find this syllabus, course readings, homework, and other course-related information.

### Required Texts:

- The modeling text we will use is the third edition of *Environmental Issues: An Introduction to Sustainability* by Robert L. McConnell and Daniel C. Abel, ISBN-10: 0131566504 and ISBN-13: 9780131566507, published by Prentice Hall, 2008. This text does a nice job of describing environmental issues while interweaving mathematical modeling.
- Our second text is *Dire Predictions: Understanding Global Warming* by Michael Mann and Lee R. Kump. ISBN-10: 0136044352 and ISBN-13: 9780136044352, published by Prentice Hall, 2009.
- There will also be selected readings from a wide variety of sources.

## Technology Policies

Much of the work in this course will require use of the computer, so these policies are designed to help students better understand how to be effective in a technology-rich environment.

- **Laptop and Software:** Each student is required to bring his or her appropriately equipped laptop to class everyday except when otherwise announced.
- **Unapproved Technology:** The in-class use of unapproved technology will not be tolerated and in certain cases will constitute a violation of academic honesty. For example, no games are ever acceptable and communication programs, such as e-mail or instant messaging programs, are only acceptable for classwork during class, so must otherwise be disabled before class. Likewise, cellular phones and pagers must be disabled before class. To help students to appreciate the gravity of this policy, each and every in-class use of unapproved technology will result in a 1% reduction of the student's homework assignment grade.
- **Citing:** Team participation is a proven and useful means by which students can learn material. In addition, much information is easily accessible by searching the web. Students are encouraged to appropriately use information from other students, the web, and other resources. However, any information used from other students or any other resource **MUST BE CITED**. (See below for more information on this serious topic.)
- **Email and Web:** On the other hand, electronic communication programs are useful when used appropriately, so each student is required to use the course web page to access assignments and to use a Berea College e-mail account to facilitate electronic communication outside of class.
- **Backups:** All students are expected to back-up their work, which includes assignments, quizzes and exams daily. The best way to do this is to store a copy of all work on a DVD, CD, flash drive, or some other media, and **not in another location on their laptop**. The normally understanding instructor will not be at all sympathetic to loss of electronic work, so it is the student's responsibility to protect his/her work from such heartbreaking loss.
- **Exceptions:** Exceptions to any of these technology policies will be considered on an individual case-by-case basis but will only be granted under extremely unusual circumstances.

## The Attendance Policy

Class lectures, discussions, and in-class modeling work are considered to be a vital key to success in this course. It is the hope of the instructor that class sessions are both informative and useful, therefore attendance is expected at each class session unless a specific exception is made. If you are sick with flu-like symptoms, the Center for Disease Control (CDC) recommends that you stay home for at least 24 hours after your fever is gone except to get medical care or for other necessities. Therefore, please do not come to class if you show flu-like symptoms. Instead, e-mail me from your room and go to health services immediately. When you return to class, bring paperwork showing that you sought medical attention that day and your absence will be excused. Students who come late, leave early, or fail to fully participate during the class will be considered absent for that portion of the period, and such partial absences will accumulate. The final grade may be lowered by one third of a letter grade for each unexcused absence beyond the third. Thus, it is the responsibility of the student to contact the instructor about each absence from class. This should be done via email, as soon as possible, and if at all possible before the absence occurs. Students who miss class are held responsible for all of the material covered, assigned, and collected during their absence. Quizzes will be announced and/or occasionally "popped," and because I will drop the lowest quiz grades before computing your overall quiz score, so under nearly all circumstances, make-up quizzes will not be given.

## System of Evaluation

### Maximum Final Grading Scale

Grade $\geq$ 93 %	A
90% $\leq$ Grade $<$ 93 %	A-
87% $\leq$ Grade $<$ 90 %	B+
83% $\leq$ Grade $<$ 87 %	B
80% $\leq$ Grade $<$ 83 %	B-
77% $\leq$ Grade $<$ 80 %	C+
73% $\leq$ Grade $<$ 77 %	C
70% $\leq$ Grade $<$ 73 %	C-
67% $\leq$ Grade $<$ 70 %	D+
63% $\leq$ Grade $<$ 67 %	D
60% $\leq$ Grade $<$ 63 %	D-
Grade $<$ 60 %	F

Evaluated Items	Points	Grading Percentages
Test 1	100	~16.7 % *
Test 2	100	~16.7 %
Project Work	100	~16.7 %
Quiz Total	100	~16.7 %
Assignments	100	~16.7 %
Final Exam	200	~33.3 %



\* The lowest 100 points of the exam and quiz grade items will be dropped as explained below.

Please refer to the GRADING section of the current Berea College Catalog for the College-wide interpretations of these letter grades.

### Grading Policies

For the benefit of the students in the class, all course grade computations are continually updated by the instructor, so students may check frequently on their in-progress course grade during the term. Any questions/concerns regarding grading of any component of the course are to be addressed to the instructor **only**.

\* After having completed all work prior to the comprehensive exam and before dropping any points or receiving any bonuses, students who satisfy all of the following conditions have the option to not take the final and instead have the grade they have at that point be the final course grade:



- They have completed **all** coursework and quizzes and exams.
- They have not been excessively tardy to or absent from class.
- They have not had any noted incidents of disruptive behavior.
- They have a B- or better on their work based on the grading scale above.
- They are satisfied with their grade
- So that all are in agreement, this decision must be discussed in advance with the instructor.



For all students taking the comprehensive final exam, the lowest score earned on one 100 point exam score, quiz total or assignment item will be dropped before computing the final grade. If the lowest percentage score is earned on the 200 point comprehensive exam, then one half of the comprehensive exam score will be dropped. Note that the project grade may not be dropped.



The instructor may raise the grade of students who have demonstrated significant improvement in their performance. *This is the sole discretion of the instructor, but a student is welcome to bring this possibility to his/her attention.*

## The Homework Bonus



Homework assignments will be assigned on a near-daily basis, since doing relevant work thoughtfully and conscientiously is one of the keys to success in this course. Through homework students get the needed practice of application of the concepts. Because the instructor desires to strongly encourage a diligent effort on homework, students who turn in each of their assignments with no more than two assignments submitted late, will be awarded an additional 5% on the assignment grade!

## The Tests and Quizzes

Two tests and frequent short quizzes will be given in this course. Quizzes will be given nearly every class day. Quiz questions will include questions relating to the reading assignment for that lesson. Students will take these quizzes individually at the start of the class period. After everyone has completed taking the quiz individually, students will take the quiz again in groups, coming to consensus on the answers to each of the questions. Thus, evidence that you have engaged and retained the information you have read will be reflected in your quiz scores. By keeping track of group and individual scores separately, you will have measures of your ability to listen and to learn from others as well.

The most likely time of the two tests will be:

- Exam 1: Thursday, October 8
- Exam 2: Thursday, November 12
- Comprehensive Exam: Thursday, December 16

Problems that appear on the tests will be more varied in nature, ranging from homework-like problems to problems that require a deeper synthesis of ideas and from true or false questions to short-answer questions.

## The Comprehensive Final Exam

The comprehensive exam will be held during class on the last day of classes, which is Thursday, December 16th, and a final project will be due during the scheduled final exam week. More information will be given on both.

## On Assignment Collection

All written work should be neat, organized, and should show sufficiently many steps to demonstrate a clear understanding of the techniques used. Homework is due at the beginning of class on the announced date due. If a student must miss class due to either a sickness or a planned absence, homework is still expected to be submitted on time. Homework is posted on the web and may be requested in advance.

Late homework will be accepted for reduced credit up until the homework assignment is returned, and late work must be labeled as late. Written or printed homework assignments may be turned in before class or at the instructor's office, but should typically NOT be sent through the CPO, attached in e-mail, or given to a student assistant. A selection of the homework problems will be graded for credit, and homework submissions not meeting the above standards may receive reduced credit.

## The Class Atmosphere

The members of this class constitute a learning community. Learning in such a community best takes place in an atmosphere in which instructor and the students treat everyone with mutual respect. Students need not always raise their hands in order to ask questions or to make comments, but they should not interrupt the instructor or fellow students in doing so. Students typically find the atmosphere set by the instructor to be a sometimes playful and nearly always relaxed one, but students will still need to work hard and consistently both in and out of class in order to do well. If at anytime you have thoughts, comments, or suggestions about how the class atmosphere could be improved or made into one which is more supportive of your learning, please come by or drop me a note about it. I welcome such suggestions.



### On Teamwork

Learning to work in teams effectively is strongly encouraged. The work on our service project will be specifically designed for teamwork, and on some homework assignments you can choose to work alone or in a team. All homework assignments must clearly include all of the authors' names at the top of each page. On any homework assignment in which half or more of the work was completed in a team, a single copy of the homework submission should be handed in with all of the team's participants listed as authors. Teams can generally consist of one, two, or three members due to the nature of the work in this course. Unless otherwise stated, teams shall not consist of more than three members for most work. On any homework assignment where less than half of the work was completed in a team, individual homework assignments should be handed in with the author acknowledging all of the help received for each problem. This includes significant help received from the instructor or in the Math/CS Lab Consultants. Note that the instructor or a Math/CS Lab Consultant may help with homework or labs, and while this help should not be acknowledged as co-authorship, it should still be mentioned. This is meant to be a sharing process; do not "give credit" to other students who have not attempted to contribute to the work or to the team's work, because it is ultimately not a help for the student who did not contribute to the work. Thoughtful practice, not (even mindful) copying, is ultimately the best way to learn. Note that on all team-completed homework assignments, students must describe the roles played by each author on the homework submission.

*Warning:* Please be careful to conform to these standards for teamwork, since they are designed to encourage good learning practices. (Furthermore, copying another person's work or otherwise failing to adhere to these standards may even result in a charge of academic dishonesty.)

## Plagiarism and Academic Honesty

Plagiarism is the use of anyone else's work or ideas without adequate citation. It is a sin which is both easy to commit and easy to avoid. Ideas taken from other people include those from published or unpublished books, articles, websites, TAs, or friends' homework. **The best way to avoid plagiarism is to cite ALL your sources!** If you are not sure whether or not to cite a source, you should cite it! Simply put, plagiarism is not only cheating, it is stealing because it constitutes theft of someone else's ideas. It is a serious offense, and Berea College takes it seriously. **Plagiarism will not be tolerated!** At the first offense, the student will receive an F for that assignment. At the second offense, the student will fail the course. In addition, ALL offenses of plagiarism will be reported to the Associate Provost for Academic Services as detailed in the Berea College *Student Handbook*.

## Service Learning Component

In this course we will be working with the Kentucky Environmental Foundation and the City of Berea on environmentally related issues. One of our major goals will be to model the carbon footprint of the City of Berea. The nature of other service-related work will be decided in class discussion. The culmination of the project will be demonstrations at a campus-wide fair. More information on this will be forthcoming soon.

## Additional Support and Disability Accommodation



The teaching assistant, Rutendo Mwaramba, will be able to answer questions about the mathematical and computational content in the course during consultations in the Math/CS Lab. Located in Hutchins Library room 230, the Math/CS Lab is open Sunday through Thursday from 7:00 to 9:15 PM (except on evenings of convocations when it closes early). Students are strongly encouraged to make use of the help available in the Math/CS Lab, as well as in the instructor's office hours. Missed labs may be made up in Math/CS lab, but the student who wishes to make up the lab must email the TA sufficiently in advance so that the TA will know what equipment to bring. Best results are obtained trying to solve problems alone or in a group before asking for help, so in either place, students should be prepared to show what they have already tried.

Topics in this course build throughout the course, so students should be sure to do their best to keep up with the class, so as to not get behind and possibly forever lost. No question to which one does not know the answer is "dumb" unless it goes unanswered because it remained unasked.

Any student who has a disability that may prevent him/her from fully demonstrating his/her abilities should contact Carol Barnett, PhD, LCSW, the Disability Services Coordinator at (859) 985-3212 to discuss accommodations necessary to ensure his/her full participation in this course.