

**University of Colorado Boulder**

**Econ 4535 – Natural Resource Economics  
Spring 2023**

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**Lectures:** Tuesday, Thursday, 12:30-1:45 ECON 119

**Office hours:** Tuesday, Thursday 11:00-12:00 (and as need be – just ask!)

**Course Description:** This course in natural resource economics will introduce students to the interlinkages between natural resources and the economic system. Classic allocation problems for renewable and nonrenewable resources will be examined. This course will also consider the fundamental role of institutions in shaping natural resource use. Understanding the incentives faced by users of natural resources will allow us to consider market failures and the important question of whether or not market interventions are justified on economic grounds. Because natural resources play a central role in many current energy and environmental policy debates, this course will also address policy issues related to climate change, renewable energy and the energy transition.

**Course Organization:** This course will be a mix of lecture and discussion, with a calculus-based treatment of natural resource economics problems. The first half of the class will focus on the theory of natural resource economics, with the Midterm covering this material midway through the course. The second half of the class will focus on application of theory to natural resource, energy and environmental policy, with the Final Exam (primarily) covering the material for the last half of the semester. Canvas will be used for course materials and communication.

**Textbook and Reading List:** The required textbook is:

Tom Tietenberg and Lynne Lewis, *Environmental and Natural Resource Economics* 11<sup>th</sup> ed, Prentice Hall, 2018. (9<sup>th</sup> and 10<sup>th</sup> edition are also acceptable – page numbers for those each of these editions are provided on the separate Reading List on Canvas).

Additional readings (journal articles, etc) will also be posted on Canvas.

**Grading:**

Class Participation	10%
Unit assignments	20%
Computational paper	10%
Midterm Exam	30%
Final Exam	30%

**Class Participation:** Students are expected to have read materials prior to class and should be prepared to discuss and answer questions regarding the readings. Lecture and discussion will comprise a large component of our in-class time, and students are expected to attend class and contribute. In addition, there will be a low-stakes question at the end of select weeks (due the following Tuesday in class) that pertains to the chapter readings for that week

**Unit Assignments:** At the end of each of the five units, a unit assignment will be due. This assignment should be worked on with another student with a single submission from the group (alternative arrangements can be discussed with me). The unit assignment consists of three components: First, students will produce a Unit Summary, which is a 3-page review of the material covered in the readings will be required. This is the primary check-up on the readings from the textbook. The document is expected to analyze the unit material covered and discuss open and unresolved questions or debates related to the unit. Second, each unit assignment will also include a calculus-based mathematical problem. Finally, there will also be a computational problem to be solved in Mathematica. I will provide more details when the unit assignment is assigned.

**Computational Paper:** The mathematics required to answer many interesting questions related to natural resources are beyond the scope of the prerequisites for this course. Nonetheless, we will take advantage of the mathematical programming language Mathematica to tackle some of them. Simply follow the link here: <https://oit.colorado.edu/software-hardware/software-catalog/mathematica> to get free access to the software. We will cover a number of examples in class, and for the computational paper you will come up with your own question and answer it using Mathematica.

**Exams:** The exams will be short answer plus numerical problems. I will provide example questions from past exams as study aides prior to the test date. The Midterm Exam will be in class (roughly mid-March) and cover material from Units I-III. The Final Exam is comprehensive, but weighted towards Unit IV-V, and is scheduled for Saturday May 6<sup>th</sup> 1:30-4:00.

### **Tentative Schedule**

The five units for the class are listed below. We will spend the first few lectures covering some overarching introductory ideas before diving into Unit I. I expect to spend approximately 2-3 weeks on each unit, depending on the volume of the material and general class interest in the unit. For each unit, tentative topics are also listed.

Unit I. Extraction of non-renewable resources  
Mineral products  
Oil and gas  
Groundwater

Unit II. Extraction of renewable resources

Fisheries  
Forestry  
Agriculture

Unit III. Property rights and institutions  
Open access  
Common property  
The Resource Curse and economic growth

Midterm Exam (mid March)

Unit IV. Natural resource policy  
Regulating externalities  
Property rights approaches

Unit V. Climate change and the Energy Transition  
Costs of climate change  
Climate policies  
Energy transition and renewables  
Power sector

Final Exam (Saturday May 6<sup>th</sup> 1:30-4:00pm)

### **Important Stuff**

## CLASSROOM BEHAVIOR

Both students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote or online. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. For more information, see the [classroom behavior](#) policy, the [Student Code of Conduct](#), and the [Office of Institutional Equity and Compliance](#).

## REQUIREMENTS FOR COVID-19

As a matter of public health and safety, all members of the CU Boulder community and all visitors to campus must follow university, department and building requirements and all public health orders in place to reduce the risk of spreading infectious disease. CU Boulder currently requires COVID-19 vaccination and boosters for all faculty, staff and students. Students, faculty and staff must upload proof of vaccination and boosters or file

for an exemption based on medical, ethical or moral grounds through the MyCUHealth portal.

The CU Boulder campus is currently mask-optional. However, if public health conditions change and masks are again required in classrooms, students who fail to adhere to masking requirements will be asked to leave class, and students who do not leave class when asked or who refuse to comply with these requirements will be referred to Student Conduct and Conflict Resolution. For more information, see the policy on classroom behavior and the Student Code of Conduct. If you require accommodation because a disability prevents you from fulfilling these safety measures, please follow the steps in the “Accommodation for Disabilities” statement on this syllabus.

If you feel ill and think you might have COVID-19, if you have tested positive for COVID-19, or if you are unvaccinated or partially vaccinated and have been in close contact with someone who has COVID-19, you should stay home and follow the further guidance of the Public Health Office ([contacttracing@colorado.edu](mailto:contacttracing@colorado.edu)). If you are fully vaccinated and have been in close contact with someone who has COVID-19, you do not need to stay home; rather, you should self-monitor for symptoms and follow the further guidance of the Public Health Office ([contacttracing@colorado.edu](mailto:contacttracing@colorado.edu)). In this class, if you are sick or quarantined, a simple email to me will suffice and we'll work from there.

## ACCOMMODATION FOR DISABILITIES

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the [Disability Services website](#). Contact Disability Services at 303-492-8671 or [dsinfo@colorado.edu](mailto:dsinfo@colorado.edu) for further assistance. If you have a temporary medical condition, see [Temporary Medical Conditions](#) on the Disability Services website.

## PREFERRED STUDENT NAMES AND PRONOUNS

CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.

## HONOR CODE

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the [Honor Code](#). Violations of the Honor Code may include, but are not limited to: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. All incidents of academic misconduct will be reported to Student Conduct & Conflict Resolution ([honor@colorado.edu](mailto:honor@colorado.edu)); 303-492-5550). Students found responsible for violating the [Honor Code](#) will be assigned resolution outcomes from the Student Conduct & Conflict Resolution as well as be subject to academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found on the [Honor Code website](#).

## SEXUAL MISCONDUCT, DISCRIMINATION, HARASSMENT AND/OR RELATED RETALIATION

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. University policy prohibits sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, protected-class discrimination and harassment, and related retaliation by or against members of our community on- and off-campus. These behaviors harm individuals and our community. The Office of Institutional Equity and Compliance (OIEC) addresses these concerns, and individuals who believe they have been subjected to misconduct can contact OIEC at 303-492-2127 or email [cureport@colorado.edu](mailto:cureport@colorado.edu). Information about university policies, [reporting options](#), and support resources can be found on the [OIEC website](#).

Please know that faculty and graduate instructors have a responsibility to inform OIEC when they are made aware of any issues related to these policies regardless of when or where they occurred to ensure that individuals impacted receive information about their rights, support resources, and resolution options. To learn more about reporting and support options for a variety of concerns, visit [Don't Ignore It](#).

## *Religious Holidays*

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. See the [campus policy regarding religious observances](#) for full details.