



**Subject: EBGN      Number: 510**

**Course Title: Natural Resource Economics**

**Section:**

**Semester/year: Autumn 2018**

**Instructor or Coordinator: Ian Lange &**

**Contact information Lange (Office/Phone/Email): EH 329/303-384-2430/ilange@mines.edu**

**Office hours Lange: MW 9:30-10:30**

**Class meeting days/times: MW 12:30-1:45**

**Class meeting location: AH 134**

**Teaching Assistant (if applicable):**

**Contact information (Office/Phone/Email):**

**Instructional activity:**  30 hours lecture     hours lab     semester hours

**Course designation:**     Common Core     Distributed Science or Engineering

Major requirement     Elective     Other (please describe  Core for MEE MS/PhD program \_\_\_\_\_)

**Course description from Bulletin:**

**Textbook and/or other requirement materials:**

**Required text: None, we will use journal articles or book chapters given to you in class or posted on blackboard**

**Other required supplemental information: Readings as specified/given on Blackboard**

**Students are welcome to refer to any resource or energy economics textbook, such as International Energy Markets by Dahl (2015) or Environmental Economics: In theory and practice by Hanley, Shogren and White**

**Student learning outcomes: At the conclusion of the class students will...**

1. Optimal renewable and non-renewable resource use
2. Market structure effects on optimal use
3. Basic market structure for fossil fuels
4. Where to find basic data on energy supply and consumption
5. Basic economic thinking/intuition skills

5. How to organize basic information in a paper/presentation
6. How to write/present your thoughts in a clear and concise manner

**Brief list of topics covered:**

1. Optimal harvest of a forest
2. Optimal extraction of a non-renewable resource (coal, oil, minerals, etc)
3. Markets for non-renewable resources
4. Reserves of non-renewables
5. Characteristics of non-renewable resource markets

**Policy on academic integrity/misconduct:** The Colorado School of Mines affirms the principle that all individuals associated with the Mines academic community have a responsibility for establishing, maintaining and fostering an understanding and appreciation for academic integrity. In broad terms, this implies protecting the environment of mutual trust within which scholarly exchange occurs, supporting the ability of the faculty to fairly and effectively evaluate every student's academic achievements, and giving credence to the university's educational mission, its scholarly objectives and the substance of the degrees it awards. The protection of academic integrity requires there to be clear and consistent standards, as well as confrontation and sanctions when individuals violate those standards. The Colorado School of Mines desires an environment free of any and all forms of academic misconduct and expects students to act with integrity at all times.

Academic misconduct is the intentional act of fraud, in which an individual seeks to claim credit for the work and efforts of another without authorization, or uses unauthorized materials or fabricated information in any academic exercise. Student Academic Misconduct arises when a student violates the principle of academic integrity. Such behavior erodes mutual trust, distorts the fair evaluation of academic achievements, violates the ethical code of behavior upon which education and scholarship rest, and undermines the credibility of the university. Because of the serious institutional and individual ramifications, student misconduct arising from violations of academic integrity is not tolerated at Mines. If a student is found to have engaged in such misconduct sanctions such as change of a grade, loss of institutional privileges, or academic suspension or dismissal may be imposed.

The complete policy is [online](#).

**Grading Procedures: Written Report: 30%; HW: 10%; Midterm: 30%; Group Presentation: 30%**

Please note that one of your assignments must be an individual assignment. I will leave it to you to decide which

For the written report,

Write a three page report and two paragraph executive summary of a major policy or current event that is crucial to understanding the market for a natural resource. This can either be individual or in a group.

For the midterm, groups or individuals

(i) DATA ANALYTICS

Find some data on a natural resource, graph it, analyze it, and give a presentation on what the data tells us. Present the findings in a 10 minutes presentation

(i)CONSULTING INTERVIEW PRACTICE

I provide the group/individual with some data and a question related to a natural resource. Each group then has to answer that question with a 10 minute presentation.

For the group presentation, four students will put together a 10 minute presentation on:

- (i)The mineral/energy balance of a country [what resources do they have, consume, export, import, etc] or
- (ii)An evaluation of a proposed piece of energy policy [what is it, merits, drawbacks, who is for/against it] or
- (iii)A report or academic article of interest to the group

Please have the topic of your group's presentation approved by me. The goal behind the presentations is to provide the class with additional information about energy policy outside of my lectures. Presentations will be marked on their clarity, depth of understanding shown, and quality. It is expected that each member of the group will speak during the presentation. In the first meeting, I will provide guidance on giving a presentation.

**Coursework Return Policy:** The goal is to get coursework feedback within two weeks.

**Absence Policy** (e.g., Sports/Activities Policy): Please notify me ahead of time if you will be absent for tests or the final.

**Homework:**

- Homework must be turned in before it is due to be graded – plan ahead.
- Exams: If you will be absent during a scheduled exam, you should schedule a make-up time before you leave.

**Common Exam Policy** (if applicable):None

**Students with Disabilities:** In guidance put forth by the Department of Justice and the Office for Civil Rights, it is incumbent upon us as an institution to ensure that students know where to seek assistance for disability-related accommodations or information. Inclusion of a disability support statement in syllabi is a national best practice and standard supported by ADA enforcement agencies and AHEAD (Association on Higher Education and Disability), as part of a multi-pronged approach to supporting an inclusive culture on campus.

As such, please include the following statement (*italicized*) in your course syllabi at Mines. Additionally, please make sure to underscore the statement pertinence and directive as part of your course welcome.

*Disability Support Services - The Colorado School of Mines is committed to ensuring the full participation of all students in its programs, including students with disabilities. If you are registered with Disability Support Services (DSS) and I have received your letter of accommodations, please contact me at your earliest convenience so we can discuss your needs in this course. For questions or other inquiries regarding disabilities or academic accommodations, I encourage you to visit [disabilities.mines.edu](http://disabilities.mines.edu) for more information.*

***Discrimination, Harassment and Title IX*** - All learning opportunities at Mines, including this course, require a safe environment for everyone to be productive and able to share and learn without fear of discrimination or harassment. Mines' core values of respect, diversity, compassion, and collaboration will be honored in this course (More information can be [found here](#)) and the standards in this class are the same as those expected in any professional work environment. **Discrimination or harassment of any type will not be tolerated.** As a participant in this course, we expect you to respect your instructor and your classmates. As your instructor, it is my responsibility to foster a learning environment that supports diversity of thoughts, perspectives and experiences, and honors your identities. To help accomplish this:

- Course rosters are provided to the instructor with the student's legal name. I will honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records.
- If something is said or done in this course (by anyone, including myself) that made you or others feel uncomfortable, or if your performance in the course is being impacted by your experiences outside of the course, please report it to:
  - Me (if you are comfortable doing so)
  - Wellness Center- Counseling (<https://www.mines.edu/counseling-center/>)
  - Speak Up (<https://www.mines.edu/speak-up/>)- Anonymous Option

In this course, we will cultivate a community that supports survivors, prevents interpersonal violence, and promotes a harassment free environment. Title IX and Colorado State law protects individuals from discrimination based on sex and gender in educational programs or activities. Mines takes this obligation seriously and is committed to providing a campus community free from gender and sex-based discrimination. Discrimination, including sexual harassment, sexual violence, stalking, and domestic violence, is prohibited and will not be tolerated within the Mines campus community. If these issues have affected you or someone you know, you can access the appropriate resources here: <http://www.mines.edu/title-ix/>. You can also contact the Mines Title IX Coordinator, Karin Ranta-Curran, at 303-384-2558 or [krcurran@mines.edu](mailto:krcurran@mines.edu) for more information.

It's on us, all of the Mines community, to engineer a culture of respect

### **Detailed Course Schedule:**

1. Week 1 (August 20): **Introduction to Course and the Profession of Economics**  
No class Wednesday, August 22<sup>nd</sup> due to MEE Kickoff Event
2. Week 2 (August 27): **Basics of Mineral and Energy Markets**
3. Week 3 (September 3): **Basics of Macro**  
No class Monday, September 3<sup>rd</sup> due to Labor Day
4. Week 4 (September 10): **Optimal Extraction of Renewable & Non-Renewable Resources**  
Krautkraemer (Section 1 and 2; p 2065-2069); Hotelling

Brown (Section 3.2, p 887-889)

5. Week 5 (September 17): **Variants on the Hotelling Model**

Anderson, Kellogg, and Salant; Slade and Thille

**Written Report Due September 19<sup>th</sup>**

6. Week 6 (September 24): **Reserves of Non-renewables**

Krautkraemer (Section 5; p 2087-2091); Aguilera et.al.

7. Week 7 (October 1): **Hedging in Commodities Markets**

8. Week 8 (October 8): **Midterm Presentations**

9. Week 9 (October 15): **Basics of Contract Theory**

No class Monday, October 15th for Fall Break

10. Week 10 (October 22): **Exploration & Drilling Incentives in Oil**

Lin; Redlinger & Lange

**HW due on October 24**

11. Week 11 (October 29): **Resource Cycles and Curses**

Sachs and Warner; Brunnschweiler and Bulte

12. Week 12 (November 5): **Legal Issues in Resource Markets**

Stigler; Libecap and Smith; Ringlund et. al

13. Week 13 (November 12): **Mines Opening/Closing**

Slade and Marmer; Jordan

14. Week 14 (November 19): **Class Decision/What do you want?**

No class Wednesday, November 21 for Thanksgiving Break

15. Week 15 (November 26) and Week 16 (December 3): **Class Presentations**

## **Readings**

List of Readings (In Order):

Gardner Brown. Renewable Natural Resource Management and Use without Markets. Journal of Economic Literature Vol 38, No. 4 (Dec 2000)pp 875-914

<http://www.jstor.org/stable/2698664>

Jeffrey A. Krautkraemer. Nonrenewable Resource Scarcity. Journal of Economic Literature, Vol. 36, No. 4 (Dec., 1998), pp. 2065-2107

<http://www.jstor.org/stable/2565047>

Harold Hotelling. The Economics of Exhaustible Resources. The Journal of Political Economy, Vol. 39, No. 2 (Apr., 1931), pp. 137-175  
<http://www.jstor.org/stable/1822328>

Anderson, Soren T., Ryan Kellogg, and Stephen W. Salant, Hotelling Under Pressure. NBER working paper #20280  
<http://www-personal.umich.edu/~kellogg/NBERw20280.pdf>

Peter Hartley and Kenneth Medlock III. A Model of the Operation and Development of a National Oil Company. Energy Economics, Vol 30, No. 5 (September 2008), pp 2459-2485.  
<http://ideas.repec.org/a/eee/eneeco/v30y2008i5p2459-2485.html>

Margaret Slade and Henry Thille. Whither Hotelling: Tests of the Theory of Exhaustible Resources. Annual Review of Resource Economics (2009), pp 239-259  
[http://www.economics.ubc.ca/files/2013/05/pdf\\_paper\\_margaret-slade-whitherhotelling.pdf](http://www.economics.ubc.ca/files/2013/05/pdf_paper_margaret-slade-whitherhotelling.pdf)

Roberto F. Aguilera, Roderick G. Eggert, Gustavo Lagos C.C. and John E. Tilton. Depletion and the Future Availability of Petroleum Resources. The Energy Journal. Vol 30 (1) , 141-174

Cynthia Lin. Strategic decision-making with information and extraction externalities: A structural model of the multi-stage investment timing game in offshore petroleum production. Review of Economics and Statistics, 95 (5), (2013) 1601-1621.  
[http://www.des.ucdavis.edu/faculty/Lin/oil\\_investtiming\\_struc\\_paper.pdf](http://www.des.ucdavis.edu/faculty/Lin/oil_investtiming_struc_paper.pdf)

Michael Redlinger & Ian Lange (2016) Effects of Stricter Environmental Regulations on Resource Development  
<http://econbus.mines.edu/working-papers/wp201611.pdf>

J.D. Sachs and A.M. Warner, Natural resource abundance and economic growth, NBER Working Paper No. 5398, 1995.  
<http://www.nber.org/papers/w5398.pdf>

Christa N. Brunnschweiler and Erwin H. Bulte. The resource curse revisited and revised: A tale of paradoxes and red herrings. Journal of Environmental Economics and Management. Vol 28, No 3 (2008), 248-264.  
<http://www.sciencedirect.com/science/article/pii/S0095069608000193>

Gary Libecap & James Smith. 2002. The Economic Evolution of Petroleum Property Rights in the United States. Journal of Legal Studies, Vol. 31(2), pages S589-608.  
<http://www.icer.it/docs/wp2002/libecap25-02.pdf>

George J. Stigler. The Theory of Economic Regulation. Bell Journal of Economics, Vol. 2 No 1 (1971), pages 3-21.  
<http://www.jstor.org/stable/3003160>

Margaret Slade & Vadim Marmar. 2017. Investment and Uncertainty With Time to Build: Evidence from Entry into U.S. Copper Mining  
[https://econ2017.sites.olt.ubc.ca/files/2017/11/pdf\\_paper\\_margaret-slade-timetobuild.pdf](https://econ2017.sites.olt.ubc.ca/files/2017/11/pdf_paper_margaret-slade-timetobuild.pdf)

Brett Jordan. 2017. "Can We Dig It? An Empirical Study of Environmental Attitudes and Social License to Operate in Mineral Extraction".

<https://brettwjordan.files.wordpress.com/2016/09/dig-empirical-study-5.pdf>

*Note: You must be accessing the links through the CSM server in order to view them.*