

# SYLLABUS: ENVIRONMENTAL ECONOMICS

## ECON 335: SEC DL1 (SPRING 2021)

### ADMINISTRATIVE DETAILS

**INSTRUCTOR:** William (Bill) McNaught

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### OBJECTIVE

Students will learn:

- ▶ *more about microeconomics,*
- ▶ *more about environmental science and*
- ▶ *how economic theory and environmental science can jointly help protect the environment and foster sustainable development.*

### MATERIALS

#### PRINCIPAL TEXT

- [WM] William McNaught, *Postmodern Environmental Economics, Top-Hat Publishers, 2019*

This textbook will not be available in the bookstore. The book is being published online to keep costs down, something the instructor knows is important to students. Much of the course's content is drawn from the book. Students will need a Top-Hat account to take the midterm and final exams on-line using Top-Hat's examination system.

#### BLACKBOARD

Articles posted to Blackboard are for student use only and should not be distributed elsewhere

- [RA1] R. Attfield, *Environmental Ethics, 2014*: Chapter 1, "Environmental Problems and Humanity" and Chapter 2, "Some Central Questions"
- [RA2] R. Attfield, *Environmental Ethics, A Very Short Introduction, 2018*: Chapter 1, "Origins", Chapter 2, "Some Key Concepts", Chapter 3, "Future Generations", Chapter 4, "Principles for Right Action," Chapter 5, "Sustainability and Preservation," Chapter 7, "Environmental Ethics and Religion) and Chapter 8, "Ethics of Climate Change"
- [RC] R. Carson, *Silent Spring, 1962*: Chapter 2, "The Obligation to Endure" and Chapter 3, "Elixirs of Death"
- [CG] J. Chevalier and P. Geoffron, *The New Energy Crisis, 2019*: Chapter 1, "The New Energy Crisis"
- [EC] *The Economist*: August 8, 2015: "A Modern Ark", "If All Else Fails", "Hotter than August" and "Second Best Solutions"; July 15, 2017, "It's Not the Heat, It's the Cupidity"; August 18, 2017, "The Lives of Others"; August 3, 2019, "On the Brink"; August 17, 2019, "Higher Tide"; May 30, 2020, "Softening the Blow"; September 12, 2020 "Learning to Live With It" and September 29, "A Greener Horizon"
- [EPBCS] R. Eden, M. Posner, R. Bending, E. Crouch, J. Stanislaw, *Energy Economics, 1981*: Chapter 2, "Economic Growth and Energy Demand" and Chapter 10, "The World Energy Market"
- [JF] J. Francis, *Scientific American, October 6, 2020*, "MELTDOWN" and "Rough Weather Ahead"

- [RF] R. Frank, *Microeconomics and Behavior*, 2010: Chapter 17, "Externalities, Property Rights and the Coase Theorem"
- [AG] A. Gore, *An Inconvenient Sequel: Truth to Power*: "Basic Science, Part 1"; "Basic Science, Part 2"; "Consequences", "Introduction"; "Pollution Monitoring"; "Renewable Power"
- [DG] D. Grinspoon, *Earth in Human Hands*, 2016, Chapter 1, "Listening to the Planets"
- [HSW] N. Hanley, J. Shogren, and B. White, *Introduction to Environmental Economics, Second Edition*, 2013: Chapter 3, "Valuing the Environment: Concepts"; Chapter 4, "Valuing the Environment: Methods"; Chapter 11, "Economics of Water Pollution"; Chapter 12, "Biodiversity" and Chapter 13, "Non-renewable Natural Resources and Energy"
- [FI] F. Incropera, *Climate Change: A Wicked Problem*, 2015: Chapter 2, "Earth's Climate System"; Chapter 3, "Greenhouse Gases"; Chapter 4, "Global Warming"; Chapter 5, "Consequences of Global Warming"; Chapter 7, "Public Policy Options"; Chapter 8, "Politics of Global Warming" and Chapter 9, "Dissenting Opinions"
- [EK] E. Kroll, "The Sixth Extinction?", *New Yorker*, May 25, 2009
- [GM] N. Gregory Mankiw, *Principles of Microeconomics*, 2012: Chapter 7, "Consumers, Producers and Efficiency of Markets"; Chapter 10, "Externalities"; Chapter 11, "Public Goods and Common Resources" and Chapter 17, "Oligopoly"
- [MK] M. Mann and L. Kump, *Dire Predictions*, 2015: "Climate Change Basics"; "Climate Change Projectione"; "Impacts of Climate Change"; "What's Up With the Weather (and the Climate!)"
- [MT] M. Mann and T. Toles, *The Madhouse Effect*, 2016: Chapter 3, "Why Should I Give a Damn", Chapter 4, "Stages of Denial", Chapter 5, "The War on Climate Science", Chapter 7, "Geoengineering or 'What Could Possibly Go Wrong?'" and Chapter 9, "Return to the Madhouse: Climate Change in the Age of Trump"
- [KM] K. Marvel, *Scientific American*, October 6, 2020, "How Hot, Exactly, Is It Going to Get?"
- [AM] A. McMichael, *Climate Change and the Health of Nations*, Chapter 3, "Climatic Choreography of Health and Disease"
- [MBN] R. L. Miller, D. K. Benjamin and D. North, *The Economics of Public Issues, 18<sup>th</sup> Edition*, 2014: Chapter 9, "Are We Running Out of Water?"; Chapter 25, "Save That Species" and Chapter 26, "Greenhouse Economics"
- [DN] D. Newton, *World Energy Crisis*, 2012: Chapter 1, "Background and History"
- [NM] D. North and R. L. Miller, *The Economics of Public Issues, 7<sup>th</sup> Edition*, 2017: Chapter 20, "Economics of Animal Extinction" and Chapter 21, "Economics of Oil Pollution"
- [JR] J. Rennie, *Scientific American*, October 6, 2020, "Sorting Fact from Fiction"
- [JS1] J. Sachs, *The Age of Sustainable Development*, 2015: Chapter 1, "Introduction to Sustainable Development"; Chapter 3, "A Brief History of Economic Development"; Chapter 6, "Planetary Boundaries"; Chapter 7, "Social Inclusion"; Chapter 12, "Climate Change" including 'Consequences of Human-Induced Climate Change', 'Mitigation of Greenhouse Gas Emissions to Limit Global Warming' and 'Adaptation'; Chapter 13, "Saving Biodiversity" including 'What Is Biodiversity', 'Biodiverstiy Under Threat' and 'Oceans and Fisheries' and

Chapter 14, "Sustainable Development Goals" and *Common Wealth, 2008*: Chapter 3, "The Anthropocene"; Chapter 4, "Global Solutions to Climate Change" and Chapter 5, "Securing Our Water Needs"

- [JS2] J. Schwartz, *Scientific American, October 6, 2020*, "Underwater"
  - [SR] J. Stiglitz and J. Rosengard, *Economics of the Public Sector, 4<sup>th</sup> Edition, 2015*: Chapter 3, "Market Efficiency", pages 61-69; Chapter 5, "Public Goods and Publically Provided Private Goods" and Chapter 11, "Evaluating Public Expenditure"
  - [TL] T. Tietenberg and L. Lewis, *Environmental and Natural Resource Economics, 10<sup>th</sup> Edition, 2015*: Chapter 3, "Evaluating Tradeoffs"; Chapter 5, "Dynamic Efficiency and Sustainable Development"; Chapter 7, "Energy: The Transition from Depletable to Renewable Resources"; Chapter 8, "Recyclable Resources: Minerals, Paper, Bottles and E-Waste"; Chapter 9, "Water: A Confluence of Renewable and Depletable Resources"; Chapter 11, "Storable Renewable Resources: Forests"; Chapter 12, "Common-pool Resources: Commercially Valuable Fisheries"; Chapter 14, "Economics of Pollution Control"; Chapter 18, "Toxic Substances and Environmental Justice" and Chapter 20, "The Quest for Sustainable Development"
  - [GW] G. Walker, *Environmental Justice, 2012*: Chapter 1, "Understanding Environmental Justice"
  - [PW] P. Wigner, *Extinction: A Very Short Introduction, 2019*: Chapter 1, "Why Extinctions Happen" and Chapter 2, "Extinctions Today and Efforts to Stop Them"
  - [JW] J. Worland, *Time, July 27, 2020*: "Defining Year"
- Summaries of video lectures from the Teaching Company (not copyrighted):
- January 19: Prof. Richard Wolfson's lecture "Tale of Three Planets"
  - February 26: Prof. Richard Wolfson's lecture "Is the Earth Warming?"
  - March 1: Prof. Richard Wolfson's lecture "Impacts of Climate Change"
  - March 3: Prof. Richard Wolfson's lecture "Ice Ages and Beyond"
  - April 5: Prof. Richard Wolfson's lecture "Energy-Resources and Alternatives"
  - April 7: Prof. Richard Wolfson's lecture "Energy and Climate"
  - April 16: Prof. Scott Solomon's lecture "What Darwin Knew and Why It Still Matters"
  - April 19: Prof. Eric Strauss's lecture "Biodiversity Decline and Restoration Ecology"

## **COURSE POLICIES**

### Prerequisites

The instructor assumes that all students have completed an introductory course in microeconomics, either GMU's Econ 103 or possibly NVCC's Eco 202. The course with Chapter 2 of the textbook which gives a quick review of microeconomic theory. Students who find this material challenging should contact the instructor for other materials presenting a simpler description of how markets work.

### Class Sessions

The course is organized as if it were meeting on campus using a M-W-F schedule in order to help students allocate their scarce time to ensure they are keeping up with the course content before being overwhelmed with preparing for either of the exams or writing the term paper(s). This fully online version of the course has been developed out of the Spring 2019 course the instructor was scheduled to teach on campus until the

pandemic forced it into an online delivery mode. The course was given fully online in the Fall so hopefully all the "bugs" in it are now fixed. This material has grown as the instructor has taught this course for the past 9 semesters and new evidence about global warming emerges almost daily. Due to copyright limitations the instructor will not be able to show some videos he had used in previous semesters in class, but he will substitute detailed notes and occasionally some diagrams from these videos instead of showing them in class. (The instructor is already pushing copyright restrictions posting so many book chapters on Blackboard.)

The readings for each session are extensive for an undergraduate course but the instructor will post lecture notes for each session that summarize the main points from these readings to ease the reading burden on students. Any students planning on continuing their education beyond Mason's undergraduate courses should become accustomed to facing reading lists like this in all their graduate courses. If a student decides to write an extra credit paper on any session topic, he or she should review all this material for this topic in order to write a paper that might receive an A grade.

#### Extra Help

Students needing extra help should email their questions to the instructor at either [wmcnaught08@gmail.com](mailto:wmcnaught08@gmail.com) or [wmcnaugh@gmu.edu](mailto:wmcnaugh@gmu.edu). If a student cannot get sufficient help through an email exchange, an extra session could be scheduled at the Economics Department on campus.

#### Honor Policy

The instructor graduated from the U. S. Air Force Academy so believes strongly in academic integrity. Students using someone else's work without proper attribution in their term papers will be reported to GMU's Honor Council.

#### Disability Policy

The instructor is disabled himself and will make reasonable accommodations for all disabled students who provide him with GMU paperwork attesting to their disability.

### **GRADES**

Grades will be determined through two graded exams and a short paper. Additionally, students may write an extra credit paper and receive extra credit for answering the study questions at the end of each assigned chapter in the textbook. Each student's numerical score for the course will be calculated as the average of the three highest scores on both tests and both papers plus up to 8 additional points of extra credit for answering the study questions in the textbook. For example, a student with an 87 on the midterm, an 85 on the final exam and an 84 on the required paper (the average course grades last semester) would have an average of 85.3. If he or she wrote an extra credit paper that received a grade of 87 (slightly above last semester's average) the 84 grade would be dropped and the average would climb to 86.3. If the student received 5 points for extra credit (also last semester's average), the course score would be either 90.3 or 91.3.

Letter grades will be awarded based on a student's numerical score calculated as described above using the traditional grade scale of 90-100 A, 80 to 89 B, etc. Within each letter range the instructor will award some "+"s and "-"s. For example, an 81 would be a B- and a 98 would be an

A+. Using the example in the previous paragraph, a student would receive an A- whether an EC paper was written or not. However, a student who had already received scores of 87 and 84 might still wish to write an EC paper to guard against a calamitous collapse on the final exam, essentially using the EC paper as insurance.

### Exams

The Top-Hat exams will combine fill-in, multiple-choice and short-answer questions. Fill-in and multiple-choice questions will test students' knowledge of key economic terms presented in the assigned readings. Each short-answer question will ask students to summarize one of the economic or environmental concepts mentioned in the readings. Students will take their tests at home on their laptops using Top Hat's proprietary on-line testing system. Fill-in and multiple choice questions will be graded automatically by the Top-Hat testing system. The instructor will review students' answers to the short answer questions himself to assign grades for this section of the exam. Study guides helping students prepare for both tests will be posted to Blackboard a couple of sessions before each exam. The study guide for the midterm is already posted to Blackboard. The final will cover only the material presented in class sessions after the midterm. Special take-home exams will be provided to students who do not buy a Top Hat subscription.

### Paper(s)

The required paper should be from 4 to 5 pages (double-spaced) and present the student's understanding of how economics can help mitigate the most important environmental issue of our time, global warming (a.k.a. climate change.) A suggested outline for this paper is also posted on Blackboard. Students are advised the instructor is a liberal Democrat, but students defending the environmental policies of the Trump Administration will not receive lower grades if they use good scientific and economic reasoning supporting their positions. The grades for both the required and extra credit papers will be primarily based on their *economic* analysis. Students who incorporate graphs and pictures from the course readings into their paper usually receive higher grades. The required paper is due on April 28<sup>th</sup>.

Students also may write a second paper for extra credit; this paper should also be from 4 to 5 pages. Students may use the extra credit paper to replace any of the other three graded assignments although in the past many students have written an extra credit paper in order to skip the final exam and start the summer break early. Good EC topics are:

- ◆ **Benefit-Cost Analysis (February 15<sup>th</sup> and February 17<sup>th</sup> sessions);**
- ◆ **Energy (April 5<sup>th</sup> and 7<sup>th</sup> sessions);**
- ◆ **Environmental Ethics and Environmental Justice (April 26<sup>th</sup> and April 28<sup>th</sup> sessions);**
- ◆ **Evolution and Biodiversity (April 16<sup>th</sup> and 19<sup>th</sup> sessions);**
- ◆ **Externalities (February 19<sup>th</sup> and February 22<sup>nd</sup> sessions) or**
- ◆ **Sustainable Development (April 5<sup>th</sup> and 28<sup>th</sup> sessions).**

A good extra credit paper will incorporate material from all the readings, but also use the student's best friend google to explore other perspectives beyond those presented in this syllabus. Students who wish to write an EC paper on some other topic, perhaps the recent spread of fires in the Amazon rain forest, Australia and California should clear the topic with the instructor. Outlines for the above topics will be posted to

Blackboard. The EC paper is due on or before the day of the final exam, May 3<sup>rd</sup>. Students should submit their papers to the instructor's home email address ([wmcnaught08@gmail.com](mailto:wmcnaught08@gmail.com)), but may also send them to his GMU address ([wmcnaugh@gmu.edu](mailto:wmcnaugh@gmu.edu).) If they use the GMU address, they should use "Student Name/Econ 335 Paper" for their subject heading. If a paper is late without prior permission from the instructor, 2 points will be deducted from the grade for each day that a paper is late.

## **SCHEDULE**

### **JAN 25: COURSE OVERVIEW**

REQUIRED READING: WM (Chapter 1)

### **JAN 27: THE ANTHROPOCENE (PART 1)**

REQUIRED READING: JS1 (The Anthropocene)

RECOMMENDED READING: RC (The Obligation to Endure)

### **JAN 29: THE ANTHROPOCENE (PART 2)**

REQUIRED READING: DG (Chapter 1, pages 22-38)

RECOMMENDED READING: DG (Chapter 1, pages 38-56)

NOTE: Summary of Prof. Richard Wolfson's lecture "Tale of Three Planets" posted to Blackboard in lieu of showing the lecture video in class

### **FEB 1: MICROECONOMICS REVIEW**

REQUIRED READING: WM (Chapter 2)

### **FEB 3: ECONOMIC EFFICIENCY (PART 1)**

REQUIRED READING: WM (Chapter 5)

RECOMMENDED READING: GM (Consumers, Producers and Efficiency of Markets)

### **FEB 5: ECONOMIC EFFICIENCY (PART 2)**

REQUIRED READING: SR (Market Efficiency, pages 61-69)

RECOMMENDED READING: [econlib.org/library/Enc/Efficiency.html](http://econlib.org/library/Enc/Efficiency.html)

### **FEB 8: OVERVIEW OF MARKET FAILURES**

REQUIRED READING: WM (Chapter 6)

### **FEB 10: PUBLIC GOODS (PART 1)**

REQUIRED READING: WM (Chapter 7)

RECOMMENDED READING: GM (Public Goods and Common Resources)

### **FEB 12: PUBLIC GOODS (PART 2)**

REQUIRED READING: SR (Public Goods and Publically Provided Private Goods)

### **FEB 15: BENEFIT-COST ANALYSIS (PART 1)**

REQUIRED READINGS: WM (Appendix D)

### **FEB 17: BENEFIT-COST ANALYSIS (PART 2)**

REQUIRED READINGS: SR (Evaluating Public Expenditure)

### **FEB 19: EXTERNALITIES (PART 1)**

REQUIRED READINGS: WM (Chapter 8)

RECOMMENDED READING: GM (Externalities)

**FEB 22: EXTERNALITIES (PART 2)**

REQUIRED READING: RF (Externalities, Property Rights and the Coase Theorem)

RECOMMENDED READING: EC (The Lives of Others) and WM (Chapter 3)

**FEB 24: THE PHYSICS OF GLOBAL WARMING**

REQUIRED READINGS: WM (Chapter 13.2 and 13.3), MK (Climate Change: The Basics), FI (Earth's Climate System) and FI (Global Warming)

RECOMMENDED READINGS: JS2 (Planetary Boundaries) and FI (Greenhouse Gases)

NOTE: Summary of Prof. Richard Wolfson's lecture "Is the Earth Warming?" posted to Blackboard in lieu of showing the lecture video in class

**FEB 26: THE ECONOMICS OF GLOBAL WARMING**

REQUIRED READINGS: WM (Chapter 13.5) and MBN (Greenhouse Economics)

RECOMMENDED READING: EC (Hotter Than August)

**MAR 1: THE CONSEQUENCES OF GLOBAL WARMING**

REQUIRED READINGS: FI (Consequences of Global Warming, MT (Why Should I Give a Damn), JF (Rough Weather Ahead) and KM (How Hot, Exactly, Is It Going to Get?)

RECOMMENDED READING: EC (Higher Tide), EC (Learning to Live with It), JS2 (Underwater), JS1 (Consequences of Human-Induced Climate Change), JF (MELTDOWN) and AM (Climatic Choreography of Health and Disease)

NOTE: Summary of Prof. Richard Wolfson's lecture "Impacts of Climate Change" posted to Blackboard in lieu of showing the lecture video in Class and Study Guide for Midterm posted to Blackboard

**MAR 3: STRATEGIES TO COMBAT GLOBAL WARMING**

REQUIRED READINGS: JS1 (Mitigation of Greenhouse Gas Emission), JS2 (Underwater), EC (Softening the Blow) and MT (Geoengineering or What Could Possibly Go Wrong?)

RECOMMENDED READINGS: EC (If All Else Fails) and EC (Second Best Solutions)

NOTE: Summary of Prof. Richard Wolfson's lecture "Ice Ages and Beyond" posted to Blackboard in lieu of showing the lecture video in class

**MAR 5: GLOBAL WARMING AND PUBLIC POLICY (PART 1)**

REQUIRED READINGS: WM (Chapter 17); FI (Public Policy Options), FI (Politics of Global Warming), and MT (Return to the Madhouse: Climate Change in an Age of Trump)

RECOMMENDED READINGS: JS1 (Global Solutions to Climate Change), EC (It's Not the Heat, It's the Cupidity), EC (A Greener Horizon) and JW (Defining Year)

**MAR 8: GLOBAL WARMING DENIAL**

REQUIRED READINGS: FI (Dissenting Opinions), MT (War on Climate Science), MT (Stages of Denial) and JR (Sorting Fact from Fiction)

**MAR 10: VALUING THE ENVIRONMENT**

REQUIRED READING: WM (Chapter 4) and HSW (Valuing the Environment: Concepts)

RECOMMENDED READING: HSW (Valuing the Environment: Methods)

**MAR 12: MIDTERM EXAM**

NOTE: Students will take the midterm using the Top-Hat examination system on their personal computers at a time the instructor will designate

**MAR 22: RENEWABLE RESOURCES**

REQUIRED READING: WM (Chapter 9)

**MAR 24: FISHERIES**

REQUIRED READING: WM (Chapter 9: Section 9.2), TL (Common-Pool Resources: Commercially Valuable Fisheries)

RECOMMENDED READINGS: JS2 (Oceans and Fisheries)

**MAR 26: FORESTS**

REQUIRED READING: WM (Chapter 12), TL (Storable Renewable Resources: Forests) and EC (On the Brink)

RECOMMENDED READINGS: JS2 (Deforestation)

**MAR 29: COMMON RESOURCES**

REQUIRED READING: GM (Public Goods and Common Resources)

**MAR 31: NON-RENEWABLE RESOURCES (PART 1)**

REQUIRED READING: WM (Chapter 10)

RECOMMENDED READING: TL (Dynamic Efficiency and Sustainable Development)

**APR 2: NON-RENEWABLE RESOURCES (PART 2)**

REQUIRED READING: HSW (Non-renewable Resources and Energy)

**APR 5: ENERGY (PART 1)**

REQUIRED READING: WM (Chapter 11) and DN (Background and History)

RECOMMENDED READING: CG (New Energy Crisis), AG (Renewable Energy) and HSW (Non-renewable Natural Resources and Energy) and TL (Energy: The Transition from Depletable to Renewable Resources)

NOTE: Summary of Prof. Richard Wolfson's lecture "Energy-Resources and Alternatives" posted to Blackboard in lieu of showing video in class

**APR 7: ENERGY (PART 2)**

REQUIRED READING: GM (Oligopoly), EPBCS (World Energy Market)

RECOMMENDED READINGS: EPBCS (Economic Growth and Energy Demand) and DN (Problems, Controversies and Solutions)

NOTE: Summary of Prof. Richard Wolfson's lecture "Energy and Climate" posted to Blackboard in lieu of showing video in class

**APR 9: WATER AS A RESOURCE**

REQUIRED READINGS: WM (Chapter 12) and JS1 (Securing Our Water Needs)

RECOMMENDED READINGS: TL (Water: A Confluence of Renewable and Depletable Resources) and MBN (Are We Running Out of Water?)

**APR 12: ECONOMICS OF POLLUTION**

REQUIRED READING: TL (Economics of Pollution Control) and NM (Economics of Oil Pollution)



**APR 14: WATER POLLUTION**

REQUIRED READINGS: HSW (Economics of Water Pollution)

RECOMMENDED READINGS: WM (Chapter 10) and NM (Economics of Oil Pollution)

**APR 16: EVOLUTION**

REQUIRED READING: JG (Bare Bones of Natural Selection)

NOTE: Summary of Prof. Scott Solomon's lecture "What Darwin Knew and Why It Still Matters" in lieu of showing video in class

**APR 19: BIODIVERSITY**

REQUIRED READINGS: WM (Chapter 18); JS1(What is Biodiversity), PW (Why Extinctions Happen) and HSW (Biodiversity)

RECOMMENDED READINGS: EC (A Modern Ark); PW (Extinctions Today and Efforts to Stop Them); MBN (Save That Species) and NM (Economics of Animal Extinction) and EK (The Sixth Extinction?)

NOTE: Summary of Prof. Eric Strauss's lecture "Biodiversity Decline and Restoration Ecology" posted to Blackboard in lieu of showing video in class

**APR 21: SOLID WASTES AND RECYCLING**

REQUIRED READINGS: WM (Chapter 16) and TL (Recyclable Resources: Minerals, Paper, Bottles and E-Waste)

**APR 23: TOXIC SUBSTANCES**

REQUIRED READINGS: TL (Toxic Substances and Environmental Justice)

RECOMMENDED READINGS: RC (Elixirs of Death)

**APR 26: ENVIRONMENTAL ETHICS**

REQUIRED READINGS: RA2 (Origins), RA2 (Some Key Concepts), and RA2 (Principles for Right Action)

RECOMMENDED READING: RA (Future Generations) and WM (Appendix C: Introduction to Ethical Philosophy)

**APR 28: ENVIRONMENTAL JUSTICE**

REQUIRED READINGS: WM (Chapter 20), RA2 (Future Generations) and GW (Understanding Environmental Justice)

RECOMMENDED READINGS: RA2 (Environmental Ethics and Religion)

NOTE: Study Guide for Final posted to Blackboard and required paper on climate change due

**APR 30: SUSTAINABLE DEVELOPMENT**

REQUIRED READINGS: WM (Chapter 19), RA1 (Environmental Problems and Humanity) and TL (The Quest for Sustainable Development)

RECOMMENDED READINGS: JS1 (A Brief History of Economic Growth), RA2 (Sustainability and Preservation) and TL (Dynamic Efficiency and Sustainable Development)

NOTE: Grades for required papers posted to Blackboard, extra credit papers due

**MAY 3: FINAL EXAM**

NOTE: Students will take the final exam on their lap-tops at home using the Top Hat examination system