

**LOM4325/5325**  
**Environmental Sustainability and Business Operations**  
**Fall, 2016**

**Class Meets:** Wednesdays 6:55 p.m. - 9:35 p.m.

**Instructor:** Dr. Joseph Martinich

**Office:** 235 Express Scripts Hall

**Office Hours:** 6:00-6:45 p.m. W. Other times possible: I am on campus almost every day from at least 9:30 a.m. - 4:00 p.m., but I may be in meetings or off-campus for some reason, so it is a good idea to email me to make sure I am available before you make a special trip to campus.

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**Prerequisites:** LOM 3320 or LOM 5320, or consent of the instructor.

**Required Book:** Ray C. Anderson, *Business Lessons from a Radical Industrialist*, St. Martin's Press, New York, 2011. Note: This book was originally published as *Confessions of a Radical Industrialist*, St. Martin's Press, New York, 2009. Either version is fine.

**Recommended Books (see book report discussion below):**

Edward Humes, *Force of Nature: The Unlikely Story of Wal-Mart's Green Revolution*, Harper Business, New York, 2011

Daniel Esty and Andrew Winston, *Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value, ....*, Yale University Press, New Haven CT, 2006.

**Free Supplemental Publications:**

1. Rossi, Mark S. and Ann Blake, *Plastics Scorecard: Evaluating the Chemical Footprint of Plastics*, Clean Production Action, 2014.

2. Energy Audit Materials, ASHRAE

3. *Risky Business: The Economic Risks of Climate Change in the United States*, Risky Business Project, 2014.

4. *The 3% Solution: Driving Profits Through Carbon Reduction*, CDP and the World Wildlife Fund, 2013.

5. *Power Forward 2.0: How American Companies Are Setting Clean Energy Targets and Capturing Greater Business Value*, WWF, Ceres, Calvert Investments, David Gardner &

Associates, 2014.

**Other Supplemental Materials:** There will be notes/power point slides on MyGateway for most of the topics covered.

<b>Grading:</b>	Exam	15 %
	HW/article reviews/class disc.	25 %
	Environmental Profile Report	15 %
	Book Report	10-12 %
	Group/Term Project Report	35-38 %

**Drop Policy:** An "excused" drop will be given if you drop on or before October 14. If you drop after October 14 you will receive an "excused" or "failing" grade according to your grade at the time you drop. After November 11 dropping will not be allowed except for documented serious illness or comparable extraordinary circumstances (a low grade is not an acceptable excuse).

**Classroom Courtesy:** I realize that I should not have to tell you these things, and I apologize to those of you for whom this is unnecessary, but in the past few years I have noticed a significant increase in bad classroom manners and inconsiderate behavior. So please adhere to the following rules. Repeated violations of these will be grounds for reducing your course grade, and you will be reported to the Office of Homeland Security as a threat to national learning.

- 1) Turn off your phones and pagers before entering class; do not talk on the phone in class.
- 2) Come to class **on time**. In those rare cases where being late is unavoidable, please enter the classroom quietly and take a seat as close to the door as possible. If the class period is more than half done, don't bother coming to the class.
- 3) Open beverage cans and bottles and snack bags before class starts. If you eat during class, please do so quietly.
- 4) Keep talking to your neighbor to a minimum. If you are confused about something in class, please ask me - that is my job and I'm happy to answer course-related questions, such as, "Should I turn off the lights in the restroom?"

**Academic Dishonesty:** Academic dishonesty of any form will not be tolerated. Except for the group project ALL GRADED WORK (exam, homework, book reports, papers) SHOULD BE DONE BY YOU ALONE and be in your words, not someone else's words. Any examination, homework, or paper found not to be the student's own work will be given a grade of zero and the student will be reported to the appropriate officials for disciplinary action. GROUP PROJECT REPORTS should be the work only of the group members. Any group report found not to be the group's own work will be given a grade of zero and the students will be reported to the appropriate officials for disciplinary action. (Note: working with, and discussing ideas with, other people, including other members of the class is fine, and even encouraged, but when it comes time to preparing the final report, all of the report should be done only by the group members.)

All written homework and reports should be **IN YOUR OWN WORDS**. DO NOT simply piece together material/excerpts from other sources (books, articles, web sites). Ideas, claims, and facts used from a source should clearly be indicated with a citation or footnote, and a list of the references you used should be given at the end of the paper/report. Exact quotes from sources should be used sparingly and for a good purpose, and they should be **clearly marked in quotation marks**, with a precise citation, including the page number (or web address) of the source document.

*Exceptions/clarifications:*

1. You **can and should use published sources** (books, articles, government reports, etc. that are either in print or on web sites) to help you learn and do your graded work. However, use of important ideas, facts, etc., and especially exact wording or close paraphrasing of statements from these sources, should be **CLEARLY CITED** in your paper/report/homework. Citations should always give the title of the article/book, journal (if appropriate), name(s) of author(s), date of publication, page numbers on which the complete article appears (e.g., pp. 482-495), name and location of publisher (if book or technical report); for web-based sources give the **complete web address** and **date that it was accessed**. Note: Wikipedia is fine as a starting point to get an overview of a topic, but it **should not** be a primary source of information and not be considered an authoritative source (of course, if specific ideas or quotes are used from Wikipedia, then they should be clearly cited).

2. Outside assistance with grammar, wording, spelling, organization, and clarity of writing, as well as preparation of power point slides and other stylistic details (e.g., from the writing lab) will be allowed, but the assistance should be limited to the style and clarity of the presentation and should not address the detailed content/substance of the report. Having someone else read and critique the report in terms of clarity, depth of coverage, completeness, etc., is acceptable (in fact, recommended), but they should keep comments regarding content at a general level, and they should not assist directly in writing or rewriting the content of the report/homework.

**Disabilities:** Please inform me of any physical disabilities that could affect your learning. I am happy to make reasonable accommodations to improve the learning environment, but I need to know about them in order to help. If, during the semester, you are experiencing a serious emotional trauma, please inform me of this before taking an exam or major assignment is due; once an exam is taken the grade must be counted and no "retake" is possible.

## **DUE DATES**

## Short Topic Reports/Homework

You will be assigned short research reports and other homework. The specific topics and due days will be given at the times they are assigned. Except for numerical problems, all homework should be typed and **double-spaced** with one inch margins. Neatness counts; prepare your homework as if you were presenting it to the CEO.

**Environmental Profile Report** (Due 6:55 p.m. September 28; 4% penalty for each calendar day late)

**YOU MUST RECEIVE WRITTEN APPROVAL FROM THE INSTRUCTOR (by email) OF YOUR DESIRED ORGANIZATION TOPIC**

This report should focus on a specific implementation of environmental improvements by an organization. In this report you should explain what the organization did, how and why it did what it did, and it is **very important** to provide clear quantitative information about results (specifically related to costs, profits, environmental impacts); **do not** tell me that the sources did not provide information about results: **select an organization for which such information is available**. If possible, use multiple sources of information; give a detailed list (citations) of all sources used. You may want to contact the organization directly for information. The environmental improvements on which you report should be fairly recent: ideally those done after 2010, although slightly earlier improvements could be used if they are especially interesting and detailed. The paper should be 4-8 pages in length; it should be **IN YOUR WORDS**; do not simply piece together quotes from various sources. You are to synthesize and organize the information and present it in a clear, well-organized manner.

I would recommend using an internet or library search to get a list of possible organizations to use and to make sure there is sufficient detailed information available to satisfy the assigned requirements. Then select two or three organizations and email your preference(s) to me for approval. The sooner you get approval, the more likely you will get your first choice.

**Book Report** (Due 6:55 p.m. October 12; 4% penalty for every calendar day late)

**IF YOU SELECT OPTION 2, YOU MUST RECEIVE WRITTEN APPROVAL FROM THE INSTRUCTOR (by email) OF YOUR BOOK SELECTION.**

You have two options for the book you use. Option 1: Report on either the Esty & Winston book (*Green to Gold*) or the Hume book (*Force of Nature*); Option 2: A book other than the ones in option 1. **If you choose option 2, you can earn up to an additional 2% credit for your course grade**. For option 2, the book you select should address either: (1) environmental issues related to organizations and their operations; (2) environmental issues at a public policy/societal level; or (3) a scientific treatment of some environmental issue(s) (e.g., the science of global warming, water pollution, air pollution, etc.). I would recommend using an internet or library search to get

a list of possible book titles; then select 2-3 titles and email your preference(s) to me for approval. The sooner you get approval, the more likely you will get your first choice.

Book reports should be 3-6 pages in length, typed and double-spaced. The report should include: (1) a complete citation of the book; i.e., name of author(s), title of book, name of publisher, year and location of publication; (2) a substantive **summary** of the book's contents (synthesized in your own words) - **do not** make it read like a shopping list; and (3) an evaluation and critique of the book: How useful was the material presented? How well was it presented? How could it be improved? Should this book be included in the course? Justify and explain your critique. This report should be **IN YOUR WORDS**; do not use book reports or reviews from other sources.

**Term Project** (Written reports are due at noon on FRIDAY December 2; 5% penalty for every calendar day late. Oral reports will be given on November 16 and November 30. )

*Options:* There are three options for the term project: (1) A policy "white paper"/report that addresses an important environmental issue or problem of public importance in which you provide a clear and complete description of the problem and issues, and then provide compelling, data/evidence-supported recommendations; (2) An in-depth discussion/tutorial addressing the scientific or technological aspects of an important environmental problem, process, or product; the topic for this cannot be the same as the book you used for your book report or the company used in your environmental profile; or (3) a field project at an actual organization, whereby you analyze one or more of their products/operations and make (and justify) recommendations for "profitable" environmental improvements. **Because option (3) is probably more difficult and time-consuming than options (1) and (2), the instructor will normally grade this option more generously, and in some cases may even award bonus points to individuals/groups who do an especially outstanding job.**

*Team Size:* Options (1) and (2) should either be done alone or as a two-person team. Option (3) should be done as a team of up to three people. You are to give me a **written statement** listing the proposed topic/site and the members of the team (for option 3), by no later than **September 23** (preferably sooner). (There will be a 1 % per day penalty against your term project grade for each day late in submitting your proposed topic.) Submit only one statement per team.

**Proposals (topics), regardless of the option you select, must be approved by the instructor (by email).**

*Deliverables:* There are two deliverables for each option: (1) Each person/team is to provide a 15-25 page written report (The report should be typed and double-spaced; the page limit does **not** include appendices, tables, pictures, references, or other attachments.) (2) Each person/team should also provide a 20-35 minute in-class oral presentation about their project. I would expect that you would use PowerPoint or some other visuals as part of the presentation; copies of the visuals should be provided to the instructor before the presentation. Feedback you receive from the oral presentation should be used to improve your written report.

The written report should have a cover page that contains only the title, group member names,

and date of the paper (**so there should be blank space for my comments**). Also, be sure to **number the pages**. **STAPLE** the pages together; **do not** put it in a plastic cover with a tube sleeve (if you have many appendices or attachments, you may put it in a 3-ring binder, but it should still have a cover page inside where I can write comments). The written report should be well-organized, grammatically correct, and ideas should flow smoothly (not jump around or sound like a shopping list). If the project is done by a team the report should read as if it were written by one person, and not seem like disjointed pieces.

The oral presentation should be at a more general level and provide a meaningful summary of what you did (although important details should be provided), while the written report should provide more details and a more complete discussion than the oral report. **The written report should NOT simply repeat the oral presentation, and it should be a STAND-ALONE report (i.e., someone should be able to read the written report and get all the information you want to convey even if they did not see your oral presentation, so it should contain all the important data, tables, pictures, etc. provided in your oral presentation).**

### **Option 1: A Policy White-Paper**

This option is intended for those students who anticipate a career in public service or the public policy arena. For this option you are to do an in-depth study of an important environmental issue. You should explain and discuss clearly what the environmental issue/problem is, what the causes of the problem are, who is affected by it and how, and what can/should be done to address the problem. It is important that the report look at different sides of the issue. Your report should propose clear, precise, and realistic recommendations, and they must be justified and be convincing to skeptical readers. As such, you should “anticipate” and address likely questions of skeptics, and convincingly defend your proposals. It is likely that the 25 page limit will be constraining.

### **Option 2: Science/Technology Report**

For this option you are to research and then write a report on the scientific or technological aspects of an important environmental problem, process, or product. Some examples of topics are the science of air pollution, water pollution, global climate change, waste disposal issues; or technology and products, such as how wind turbines work, solar photovoltaic electricity, integration/coordination of sustainable energy sources (i.e., how would they best fit as a portfolio/complement each other), lighting technology (incandescent, fluorescent - various kinds, CFL, LED); how bio-fuels are made and how they reduce environmental impact; recycling technologies, re-manufacturing technology, electric vehicles, fuel cells, the science and chemistry of how common materials (steel, aluminum, plastics, paper etc.) are made using recycled material; how they can be used to substitute for virgin materials, what limitations there are, and what the environmental and financial impacts are; the science, environmental impact, and economics of composting, especially comparison with landfill waste decomposition or waste-to-energy methods; co-generation of energy and energy recovery and reuse. Your report should be written (and orally presented) in a way that an average, intelligent non-scientist would understand it.

### Option 3. Field Project

For the field project you are to act as a *pro bono* lean and green consultant. The site you use for the project must be a site you actually visit (possibly multiple times) specifically for the project. (You cannot simply write about some previous experience you had or know about at an organization.) For this option you can earn up to an additional 3% credit toward your course grade.

As part of your analysis and report, you should use at least one of the analysis tools that we will cover (e.g., energy audit, waste audit, process map/diagram, resource flow matrix, etc.). You should (1) describe/explain the product, process, or facility that you analyzed, (2) analyze it, including collecting and presenting any necessary data, (3) identify and describe problems, deficiencies, or areas of improvement, (4) devise recommendations/solutions that will improve the product/process/facility, and (5) justify/defend your recommendations, especially by providing estimates of the financial and environmental impacts. I WOULD MUCH RATHER YOU FOCUS ON ONE OR TWO PROBLEMS/AREAS and perform detailed, in-depth analysis and provide DETAILED SOLUTIONS to them, than to mention and “solve” superficially ten or fifteen problems. **Your report should make a compelling case for action. You should describe the current situation and why it is a problem. Give precise recommendations of what to do and why this will make things better. Don’t speak in generalities and hand wave; clearly state what are the costs, what are the benefits (use estimates if necessary, but clearly state your assumptions), what obstacles might have to be overcome. Whatever solutions you recommend, they should be clearly explained and justified (i.e., you need to convince me and the organization’s executives that your recommendations are economically and environmentally beneficial and technically sound and feasible).**

You can decide how you want the paper prepared, but the paper should read as if it were written by a single person (i.e., it should flow smoothly), rather than being pieced together with very different writing styles. So it may be a good idea to have a single group member put the final draft together.

**Tentative Topic Schedule** (This can and probably will change during the semester)  
I recommend you read the entire Ray Anderson book during the first two weeks of class.

<u>Week</u>	<u>Topics and Reading</u>
1	Introduction & Overview; Environmental Facts & Myths; Environmental Impacts of Business Decisions; National and Global Environmental Issues
2	Why environmental “break-downs” occur. Market Economics; Externalities; Market Failures and Corrective Measures
3	Principles and methods to identify, design, evaluate, and implement financially effective environmental improvement actions; environmental analysis tools: audits; process map/diagram; resource flow matrix; waste disposition matrix; environmental cost audit and scorecard
4	Introduction to Energy; Energy Audits
5	Energy and Energy Efficiency in Facilities. Alternative energy sources: solar, wind, bio-mass, co-generation, etc.
6	Energy efficiency in business operations, transportation.
7	Waste audits, waste analysis; disposal, recycling ( <b>Environmental profile reports due Sept. 28</b> )
8	Resource reduction, re-use, recycling, replacement ( <b>Book Reports Due: Oct. 12</b> )
9	Water, hazardous materials, pollution and other environmental considerations; Thinking “Big-picture”: Supply-chain and Life-Cycle Assessment (LCA);
10	Product Design; Design for the Environment; Environmental Products; Extended Producer Responsibility; Marketing based on environmental image
11	Implementation; Creating a lean and green culture and infrastructure
12	RRR Industries and supply chains; alternative energy; careers and business opportunities in environmental fields and industries
13-14	<b>In-class Presentations of Term Projects (November 16 and November 30)</b>
15	Local, Regional, National and Global Environmental Issues and Policies
	<b>Final/Take-home Exam Due at 5 p.m. Monday, December 12</b>

## Useful Websites and Organizations

CDP (Carbon Disclosure Project) [www.cdp.net](http://www.cdp.net)

Eco-Advantage [www.eco-advantage.com](http://www.eco-advantage.com)

Energy Information Administration [www.eia.gov](http://www.eia.gov)

Environmental product Declarations [www.environdec.com](http://www.environdec.com)

Global Reporting [www.globalreporting.org](http://www.globalreporting.org)

Greenability Magazine [www.greenabilitymagazine.com](http://www.greenabilitymagazine.com)

GreenBiz.com [www.greenbiz.com](http://www.greenbiz.com)

International Energy Agency [www.iea.org](http://www.iea.org)

The Recycling Partnership [www.recyclingpartnership.org](http://www.recyclingpartnership.org)

The Rocky Mountain Institute [www.rmi.org](http://www.rmi.org)

Steel Recycling Institute: [www.recycle-steel.org](http://www.recycle-steel.org)

St. Louis-Jefferson Solid Waste District: [www.swmd.net](http://www.swmd.net)

Trucost [www.trucost.com](http://www.trucost.com)

U.S. Dept. of Energy [www.energy.gov](http://www.energy.gov)

U.S. Energy Information Agency [www.eia.gov](http://www.eia.gov)

U.S. EPA: [www.epa.gov](http://www.epa.gov)

Lots of resources on EPA site, e.g., an example of LCA is given on  
<http://www.epa.gov/dfe/pubs/solder/lca/lfs-lca-execsum.pdf> <http://www.epa.gov>

U.S. Geological Survey (great data source on minerals/metals, especially recycling)  
[www.usgs.gov](http://www.usgs.gov)