

ESM 282: Pollution Prevention

Syllabus, Spring 2017

Time & Room: Mon & Wed, 10:00-11:15am, BH1510
 No class on 5/29 (Memorial Day)
 Final report: Is due on Wednesday, June 7, 10am
 Instructor: Roland Geyer, BH3426, extension 7234, geyer@bren.ucsb.edu
 Office hours: By appointment

Book recommendations:

- Material Concerns: Pollution, Profit and Quality of Life
 Tim Jackson, 1996, Routledge, London, UK
- Prosperity without Growth: Economics for a Finite Planet
 Tim Jackson, 2011, Routledge, London, UK

Date	Topics & Readings
Session 1: Introduction	
Wed, 4/5	Topics: <ul style="list-style-type: none"> • Industrial ecology • Pollution control vs. pollution prevention
Session 2: Pollution prevention principles	
Mon, 4/10	Topics: <ul style="list-style-type: none"> • Dematerialization • Substitution • Reuse & recycling Reading: <ul style="list-style-type: none"> • Frosch & Gallopoulos (1989) Strategies for Manufacturing, Scientific American 261(3):144-152
Session 3: Does the sharing economy prevent pollution	
Wed, 4/12	Topics: <ul style="list-style-type: none"> • Car Sharing • Car use, transportation modes, vehicle production Reading: <ul style="list-style-type: none"> • Martin & Shaheen (2011) Greenhouse Gas Emission Impacts of Car-sharing in North America, IEEE Transactions on Intelligent Transportation Systems 12(4): 1074-1086
Session 4: ALCA versus CLCA	
Mon, 4/17	Topics: <ul style="list-style-type: none"> • Attributional life cycle assessment (ALCA) • Consequential life cycle assessment (CLCA) Reading: <ul style="list-style-type: none"> • Plevin, Delucchi, Kreutzig (2014) Using ALCA to estimate climate change mitigation benefits misleads policy makers, JIE 18(1): 73-83

Session 5: Net green	
Wed, 4/19	<p>Topics:</p> <ul style="list-style-type: none"> • The elusive benchmark product • Green products that grow demand • Green products that increase consumption • Net green <p>Reading:</p> <ul style="list-style-type: none"> • Zink & Geyer (2016) There is no such thing as a green products, Stanford Social Innovation Review, Spring 2016: 26-31
Session 6: Is vehicle light-weighting net green?	
Mon, 4/24	<p>Topics:</p> <ul style="list-style-type: none"> • Vehicle light-weighting through material substitution • ALCA of vehicle light weighting • CLCA of vehicle light weighting <p>Reading:</p> <ul style="list-style-type: none"> • Geyer, Zink & Palazzo (2016) Life cycle assessment: Science or Accounting?
Session 7: Are bio-based polymers net green?	
Wed, 4/26	<p>Topics:</p> <ul style="list-style-type: none"> • Polymer types • Production, use, disposal • Fossil-fuel-based polymers • Bio-based polymers <p>Reading:</p> <ul style="list-style-type: none"> • Plastics – the Facts 2015 (2015) Plastics Europe, Brussels, Belgium • Optional: Kuczenski & Geyer (2010) Life cycle assessment of yogurt cups made from PS and Ingeo PLA, UCSB on behalf of Stonyfield
Session 8: The industrial ecology of the automobile	
Mon, 5/1	<p>Topics:</p> <ul style="list-style-type: none"> • Leaded gasoline • Biofuels • Powertrains • Lightweight materials <p>Reading:</p> <ul style="list-style-type: none"> • Geyer (2016) The Industrial Ecology of the Automobile, Chapter 18 in: Taking Stock of Industrial Ecology, Clift & Druckman (Eds.), Springer, Berlin, Germany
Session 9: Common misconceptions about recycling	
Wed, 5/3	<p>Topics:</p> <ul style="list-style-type: none"> • Recycling material multiple times is better than once • Closed loop recycling is better than open-loop recycling • The distinction between closed and open loops is useful • Recycling displaces primary production one to one <p>Reading:</p> <ul style="list-style-type: none"> • Geyer, Kuczenski, Zink & Henderson (2015) Common Misconceptions about Recycling, Journal of Industrial Ecology 20(5): 1010-1017

Session 10: Supply loops and their constraints	
Mon, 5/8	<p>Topics:</p> <ul style="list-style-type: none"> • Supply loops and their constraints • Steel section case study <p>Reading:</p> <ul style="list-style-type: none"> • Geyer & Jackson (2004) Supply Loops and Their Constraints: The Industrial Ecology of Recycling and Reuse, California Management Review, 46(2): 55-73
Session 11: Extended producer responsibility	
Wed, 5/10	<p>Topics:</p> <ul style="list-style-type: none"> • Theory of extended producer responsibility • Case studies: Cell phones, mattresses <p>Reading:</p> <ul style="list-style-type: none"> • Geyer & Blass (2010) The economics of cell phone reuse and recycling, Journal of Advanced Manufacturing Technologies, 47(5-8): 515-525 • Geyer, Kuczenski, Trujillo (2015) Assessing the Greenhouse Gas Savings Potential of Extended Producer Responsibility for Mattresses and Boxsprings in the United States, Journal of Industrial Ecology, 20(4): 917-928
Session 12: The economics of resource efficiency	
Mon, 5/15	<p>Topics:</p> <ul style="list-style-type: none"> • Cost consequences of waste reduction • Supply chain coordination <p>Reading:</p> <ul style="list-style-type: none"> • Reiskin et al. (2000) Servicizing the Chemical Supply Chain, Journal of Industrial Ecology, 2(2&3): 19-31
Session 13: Are efficiency improvements net green?	
Wed, 5/17	<p>Topics:</p> <ul style="list-style-type: none"> • IPAT equation • Absolute vs. relative decoupling <p>Reading:</p> <ul style="list-style-type: none"> • Dahmus (2014) Can efficiency improvements reduce resource consumption? Journal of Industrial Ecology, 18(6): 883-897
Session 14: Does water recycling reduce water consumption?	
Mon, 5/22	<p style="text-align: center;">Guest speaker: Joe Palazzo, PhD student, Bren School</p> <p>Topics:</p> <ul style="list-style-type: none"> • Water reuse and recycling • Causal inference methods and challenges
Session 15: Elissa Loughman, Senior Manager, Product Responsibility, Patagonia	
Wed, 5/24	<p style="text-align: center;">Guest speaker: Elissa Loughman, Senior Manager, Product Responsibility, Patagonia</p> <p>Reading:</p> <ul style="list-style-type: none"> • Patagonia's footprint chronicles: http://www.patagonia.com/eu/enGB/footprint/ • The Higg Index: http://apparelcoalition.org/the-higg-index/

Session 16: How can households prevent pollution?	
Wed, 5/31	<p>Topics:</p> <ul style="list-style-type: none"> • Carbon footprint of households <p>Reading:</p> <ul style="list-style-type: none"> • Druckman & Jackson (2016) Understanding households as drivers of carbon emissions, Chapter 9 in: Taking Stock of Industrial Ecology, Clift & Druckman (Eds.), Springer , Berlin, Germany
Session 17: What is sustainable consumption?	
Mon, 6/5	<p>Topics:</p> <ul style="list-style-type: none"> • Drivers of consumption • Consuming what versus how much <p>Reading:</p> <ul style="list-style-type: none"> • Jackson (2005) Live better by consuming less? Is there a “double dividend’ in sustainable consumption?, JIE 9(1-2): 19-36
Session 18: Pollution prevention and economic growth	
Wed, 6/7	<p>Topics:</p> <ul style="list-style-type: none"> • Is economic growth necessary? • Is absolute decoupling possible? <p>Reading:</p> <ul style="list-style-type: none"> • Jackson (2009) Chapters 4 & 5 in: Prosperity without Growth, Earthscan, London, UK