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1. Arizona State University (ASU)

1.1. Course Name: Industrial Ecology and Design for Sustainability (CEE 582)

1.1.1. Course Date: Spring 2010

1.1.2. Course Description: The conceptual, ethical, and practical challenges in the design, manufacture, and life cycle performance of products; environmental evaluation via materials flow analysis and life cycle assessment; global economic, environmental, cultural, and social aspects of competitive and functional product development and manufacture.

1.1.3. **Course Syllabus**

2. University of California, Berkeley

2.1. Course Name: Technologies for Sustainable Societies

2.1.1. Course Date: Spring 2004

2.1.2. Course Description: Must be taken on a satisfactory/unsatisfactory basis.

Description: Exploration of selected important technologies that serve major societal needs, such as shelter, water, food, energy, and transportation, and waste management. How specific technologies or technological systems do or do not contribute to a move toward sustainability. Specific topics vary from year to year according to student and faculty interests.

2.1.3. **Course Description**

2.2. Course Name: Civil Systems and the Environment (CE 268E)

2.2.1. Course Date: Spring

2.2.2. Course Description: This environmental management course applies various environmental and economic analysis methods and tools to products, processes and services. Topics include: life-cycle environmental and economic assessment (LCA), industrial ecology, design for environment, pollution prevention, external cost valuation. Models and software tools for life-cycle economic and environmental inventory, impact, and improvement analysis. Case studies, field trips. All majors are welcome.

2.3. Course Name: Corporate Social Responsibility

2.3.1. Course Date: Spring

2.3.2. Course Description: How can corporations meet the triple bottom line (social, environmental, and economic)? This class will explore current challenges and opportunities facing for-profit companies in areas of corporate responsibility. Through discussions with guest speakers each week, we will examine and critically evaluate contemporary trends in corporate responsibility with respect to environmental protection, community development and employee welfare. We will hear from leaders of companies seeking to integrate social and financial goals in their core operations about how they balance social objectives with responsibility to shareholders and how they communicate a message of corporate social responsibility.

2.4. Course Name: Industrial Ecology (ER 290-4)

2.4.1. Course Description: Industrial ecology, which uses the analogy of ecosystem behavior as a model for sustainable material and energy use practices, is one approach for minimizing the impact of industrial activity on the environment and for developing a vision of industrial activity, which is compatible with sustainable development. This course is designed to provide students with an in-depth exploration of industrial ecology and related concepts such as Design for Environment, Green Manufacturing, Sustainable Product Design, Pollution Prevention, and Eco-Efficiency. We will read selected papers that make major arguments and/or present examples of applications in the field of industrial ecology. Our discussions will focus on how each concept is framed, will critique the underlying assumptions, and explore how each concept is or might be implemented. We will consider how research and application in each area might be designed and review the progress in both research and real-world application of the concepts. The class consists of a combination of lectures, presentations by guest speakers and seminars led by teams of students. Students will also prepare and present a research paper based on the analysis of a specific concept, or case study.

2.5. Course Name: Corporate Environmental Management

2.5.1. Course Date: Spring

2.5.2. Course Description: This course will provide an overview of critical issues in environmental strategy and management for business. Environmental issues increasingly create opportunities and risks for companies. It is critical for business managers to understand environmental problems, how to manage them effectively, and how to generate value from the environmental program within their firm. This course will cover historical compliance concerns, management systems, key topics in product and service design, and current trends in the international debate on sustainability. Understanding these issues will enable a manager to reduce environmental impacts while creating sustainable long-term competitive advantage for the firm. These strategies and tools derive from current trends in strategic

planning, product life-cycle analysis, industrial ecology, natural system economics, product and service design, and the Natural Step. Web tools, dialogue systems and economic perspectives will also be offered. Finally, the class will explore the management of current ethical concerns driven by environmental strategy and indirect firm requirements. In addition, guest speakers will also share their experiences in manufacturing, environmental management and legal disciplines.

2.6. Course Name: Corporate Responsibility in the Global Economy

2.6.1. Course Date: Spring

2.6.2. Course Description: The growth of economic globalization poses a number of unique challenges to managers. Among them is increased public scrutiny of the impact of international trade and investment on working conditions, environmental practices and human rights, especially in the developing world. The purpose of this class is to critically examine how corporations are and should be responding to these challenges. For what should corporations be held responsible? How should they respond to fair and unfair criticisms from non-government organizations? How can companies learn to anticipate and better manage challenges to their social and environmental performance? More broadly, what are the sources of increased political opposition to "globalization" and the role of the World Trade Organization and how should companies respond to domestic political opposition to trade liberalization and the expansion of foreign investment? The class will also explore the related topic of crisis management, domestically as well as internationally. The topics covered in this class will address many of the most important recent controversies surrounding the social and environmental performance of firms in the gobal economy. Cases include Shell in Nigeria, Levi-Strauss and Global Sourcing (human rights) Ashland Oil, Shell and Brent Spar (crisis management), Nike (international labor practices,) Monsanto and GMOs, Beef Hormones (consumer and environmental protection and the WTO) Coneco, (global environmental responsibility), Responsible Care (industry self-regulation). The focus of this class is international in scope with a particular emphasis on developments in corporate responsibility on the part of firms based in the United States and Europe.

2.7. Course Name: Sustainability and the Built Environment (CE 298-009)

2.7.1. Course Date: Spring

2.7.2. Course Description: In the United States, 1/3 of end-use energy and 2/3 of electricity are consumed in 80+ million buildings. Huge direct and indirect environmental consequences are associated with the ways we design, build, operate, maintain and ultimately dispose of buildings. Progress toward a sustainable future cannot ignore the importance of the built environment. This seminar aims to foster a wide-ranging and intellectually substantial exploration of sustainability as it relates to the built environment. Sustainability implies a concern for social justice in the present, for generational equity, and for the value of environmental services. The

built environment is intended to span a range of scales from functional units within buildings to entire urban areas. The seminar will meet once per week for 80 minutes. Each meeting will feature presentations from one or two participants on selected topics, plus associated discussion. Conveners: Bill Nazaroff, Professor, Civil and Environmental Engineering; Arpad Horvath, Assistant Professor, Civil and Environmental Engineering; Ashok Gadgil, Senior Scientist, Lawrence Berkeley National Laboratory. For more information contact Bill Nazaroff (nazaroff@ce.berkeley.edu, 2-1040).

2.8. Course Name: Renewable Energy (ER 120)

2.8.2. Course Date: Spring

2.8.3. Course Description: This course explores the diverse aspects and issues surrounding the development, implementation, economics, policy issues, and local and global impacts of renewable energy. The course develops and examines a highly interdisciplinary set of scientific, engineering, economic, policy, and social science aspects of energy systems. The course advocates clean and efficient energy futures, while at the same time providing a frank analysis of the opportunities, issues, and obstacles for greatly expanded use of renewable energy systems. The project components -- laboratory, practical, policy, and analytic exercises -- will be used to build expertise in many aspects of energy analysis, management, use, and impact.

2.9. Course Name: Nature and Culture: Social Theory, Social Practice and the Environment (GEOG 203)

2.9.1. Course Date: Spring

2.9.2. Course Description: The relationship between human societies and natural environments lies at the heart of geographic inquiry and has gained urgency as the rate and scale of human transformations of nature have grown, often outstripping our understanding of causes and effects. The physical side of environmental science has received most of the emphasis in university research, but the social basis of environmental change must be studied, as well. Recent developments in social theory have much to offer environmental studies, while the latter has, in turn, exploded many formerly safe assumptions about how and what the social sciences and humanities ought to be preoccupied with. This seminar allows students to explore some classics in environmental thought as well as recent contributions that put the field on the forefront of social knowledge today.

3. University of California, Santa Barbara

3.1. Course Name: Industrial Ecology (ESM 282)

3.1.1. Course Description: Introduction to the study of material and energy flows in industrial and consumer activities and their effects on the environment. Explores the concept of industrial ecosystems and teaches tools like life cycle assesment and material flow analysis.

3.1.2. Course Syllabus

4. University of California, Irvine

4.1. Course Name: Environmentally Sustainable Manufacturing

4.1.1. Course Description: Multidisciplinary approach to environmentally sustainable manufacturing with a focus on green cell phone design as a case study. The course is comprised of engineering, economic, public policy and industrial ecology aspects. Design, manufacture, policy and environmental impact will be reviewed as a function of the entire life-cycle of the materials from extraction through disposal or recycling. Prerequisites: Senior standing Engineering, Industrial Ecology or Public Policy

4.1.2. Course Syllabus

4.2. Course Name: Green Materials: Science, Technology and Society

4.2.1. Course Description: Minimizing toxic hazards associated with material components of consumer products is essential for reducing the burden of disease associated with occupational exposures and environmental pollution. This course introduces the foundational concepts, methods, approaches and case studies in "green" materials adoption.

4.2.2. Course Syllabus

5. University of California, Davis

5.1. Course Name: Green Engineering Design and Sustainability

5.1.1. Course Description: Prerequisite: upper division standing; restricted to Civil Engineering and Civil Engineering/Materials Science and Engineering majors only. Application of concepts, goals, and metrics of sustainability, green engineering, and industrial ecology to the design of engineered systems. Life-cycle analyses, waste audit and environmental management systems, economics of pollution prevention and sustainability, and substitute materials for products and processes.

6. University of San Francisco

6.1. Course Name: Industrial Ecology and Sustainability

6.1.1. Course Description: Analysis of material and energy flows in industrial and ecological systems as a basis for enhancing eco-efficiency and sustainability practices.

6.1.2. Course Listing

6.2. Course Name: Applied Ecology

6.2.1. Course Description: Application of ecological principles to environmental management issues, including natural disturbance regimes, watershed management, and rare species.

6.3. Course Name: Energy Resources and the Environment

6.3.1. Course Description: Examination of present and future energy trends from national and global perspectives, including fossil fuels, renewable energy sources, electricity supplies and global change.

7. University of Southern California

7.1. Course Name: Industrial Ecology (ISE 576)

7.1.1. Course Description: Concepts and methods to analyze the environmental impacts of industrial systems, including life-cycle assessment, material flow analysis, design for environment and sustainable consumption.

7.1.2. Course Syllabi: Fall 2007, Fall 2009

8. University of Colorado at Boulder

8.1. Course Name: Sustainable Solutions Consulting (ENVS 3001)

8.1.1. Course Description: Introduces students to green design, industrial ecology, and life cycle analysis. Students use basic techniques of environmental auditing to analyze the CU-Boulder campus. Prereq., any two-semester science sequence. Restricted to junior and senior ENVS majors.

9. University of Colorado at Denver

9.1. Course Name: Business and the Natural Environment (BUSN 6830)

9.1.1. Course Description: This course examines some of the ways that companies are finding to reduce their impact on the environment.

9.1.2. Course Syllabi: Fall 2008

10. Yale University

10.1. Course Name: Industrial Ecology

10.1.1. Course Description: This research seminar pursues state-of-the-art investigation of inter-firm resource sharing in developing countries. Prerequisites are two completed industrial environmental management courses and/or special permission from the instructor.

10.1.2. Course Listing

10.1. Course Name: Industrial Ecology

10.1.1. Course Description: Industrial ecology is an organizing concept that is increasingly applied to define the interactions of today's technological society with natural and altered environments. Technology and its potential for change are central to this subject, as are implications for government policy and corporate response. The course discusses how industrial ecology serves as an environmentally related framework for technology, policy, and resource management in government and society.

11. University of Florida

11.1. Course Name: Principles of Industrial Ecology

11.1.1. Course Description: The linkage of industrial activity with environmental and social sciences. Corporate environmental management and environmental ethics. Resources, laws, and economics. Environmental accounting. Industrial product and process design and life-cycle assessments. Case studies of corporate environmental policies.

11.1. Course Name: Sustainable Construction

11.1.1. Course Description:

With the tremendous growth in the international construction market, more and more companies are doing business across the international dateline. Under the World Trade Organization and Washington Accord treaties, construction industry professionals can practice their profession outside their country of citizenship. These agreements present corporations and individuals with ever-expanding national and international construction opportunities, but they need to understand how the construction industry operates on a global basis.

11.1.2. Course Syllabus

12. Illinois Institute of Technology

12.1. Course Name: Industrial Ecology

12.1.1. Course Description: Under the MBA concentration program of Sustainable Enterprise.

13. Berea College

13.1. Course Name: Introduction to Sustainability and the Environment

13.1.1. Course Description: The concept of sustainability is explored as it relates to human-dominated and natural ecosystems at spatial scales from local to global. The major environmental problems facing the United States and the world are evaluated in terms of interactions among ecological, social, economic, and spiritual factors. Emphasis is placed on understanding the methods by which sustainability is evaluated and actions that can be taken to increase the sustainability of a community or society. Local ecosystems will be used as a context for learning. Three lectures or laboratory/field exercises each week. Practical Reasoning (PR).

14. University of Maine

14.1. Course Name: Industrial Ecology and Life Cycle Assessment

14.1.1. Course Description: Industrial Ecology and Life Cycle Assessment. This course introduces students to the theory and applications of environmental life cycle assessment (LCA) in engineering, corporate and government decision situations. Students will review cases, do problem sets, learn how to use LCA software, and conduct a project in LCA software package.

14.1.2. Course Syllabus

15. Harvard University

15.1. Course Name: Toward an Industrial Ecology for New Caofeidian

15.1.1. Course Description: Our intent for the studio is to interrogate the nature of sustainable urban strategies, and imbue the urban plan with both architectural and ecological values, but also to interrogate the nature of those values, and understand them in relation to both natural and artificial necessities. This studio will focus on developing these ecological imperatives into a culturally responsive and critical architecture, and will seek to project new relationships between ecology and culture forward through a set of exercises that will build in complexity and detail.

15.1.2. Course Syllabus: Fall 2009

15.2. Course Name: Industrial Ecology and Green Design

15.2.1. Course Description: This course provides an in-depth examination of the emerging field of Industrial Ecology; a systems view of the flow of materials through industry. The course investigates how government policy, looked at from a systems perspective, could affect public and private initiatives to achieve efficient reductions in the net wastes of the industrial system through the more efficient use of materials including the reuse of industrial wastes and products at the end of their useful lives as feedstocks. Policy issues which bear on the ability of the industrial system to adapt to a more ecological approach - technology, economics, information, regulation, the law and organization - are considered in order to understand better the extent to which they act both as incentives and as barriers to innovation. Drawing on case materials and site visits, class members will participate in exercises designed to develop an understanding of the systems approach to problem-solving generally and to waste minimisation in industry particularly. Changes in approach to the design and implementation of public policy that might lead to a better integrated industrial ecology will be an important focus of the seminar.

15.2.2. Course Syllabus

16. Massachusetts Institutes of Technology

16.1. Course Name: Systems Perspectives on Industrial Ecology

16.1.1. Course Description: This course examines quantitative techniques for life cycle analysis of the impacts of materials extraction, processing use, and recycling; and economic analysis of materials processing, products, and markets. Student teams undertake a major case study using the latest methods of analysis and computer-based models of materials process.

16.1.2. Course Syllabus: Spring 2006

17. Tufts University

17.1. Course Name: Introduction to Industrial Ecology

17.1.1. Course Description: An introduction to some basic concepts and tools of industrial ecology. Similarities, differences, and interactions of industrial systems and ecological systems. Topics include Life-Cycle Assessment (LCA), Material Flow Analysis (MFA), Economic Input-Output (EIO) models, industrial symbiosis, industrial ecosystems, and Earth Systems Engineering. Prerequisite: Math 12, Junior standing or consent.

17.1.2. Course Listing

18. Michigan State University

18.1. Course Name: Introduction to Industrial Ecology

18.1.1. Course Description: An introduction to some basic concepts and tools of industrial ecology. Similarities, differences, and interactions of industrial systems and ecological systems. Topics include Life-Cycle Assessment (LCA), Material Flow Analysis (MFA), Economic Input-Output (EIO) models, industrial symbiosis, industrial ecosystems, and Earth Systems Engineering. Prerequisite: Math 12, Junior standing or consent.

18.1. Course Name: Ecology, Law and Economics

18.1.1. Course Description: Review and integrate principles of ecology, fundamentals of law, and principles of economics into a conceptual model that describes interrelations among the natural system, the economy, and the state. Analyze and assess the legal-economic natural resource and environmental policies in the context of the integrated model. Relate the ecology-law-economics model to emerging paradigms of sustainable development, ecological economics, industrial ecology, and the Natural Step.

19. University of Michigan

19.1. Course Name: Industrial Ecology and System Analysis and Sustainability

19.1.1. Course Description: Both are the core courses of the Graduate Certificate Program in Industrial Ecology

19.2. Course Name: Industrial Ecology: Theory and Practice

20. Michigan Technological University

20.1. Course Name: Environmentally Conscious Design & Manufacturing

20.1.1. Course Description: Engineering for the Environment. Knowledge and skills that prepare engineers to address environmental quality and sustainability in their professional design and decisions.

20.1.2. Course Syllabus

20.2. Course Name: Industrial Ecology

20.2.1. Course Description: Students interested in studying sustainability, industrial ecology, life cycle engineering, environmentally conscious manufacturing, and/or pollution prevention can take classes and conduct their research with an interdisciplinary team of faculty at Michigan Tech. Students interested in this subject

area can therefore obtain their graduate degree(s) in Environmental Engineering, Chemical Engineering, Mechanical Engineering, or Environmental Policy.

21. Dartmouth University

21.1. Course Name: Industrial Ecology

21.1.1. Course Description: By studying the flow of materials and energy through industrial systems, industrial ecology identifies economic ways to lessen negative environmental impacts, chiefly by reducing pollution at the source, minimizing energy consumption, designing for the environment, and promoting sustainability. The objective of this course is to examine the extent to which environmental concerns have affected specific industries, to evaluate the benefits of prevention over compliance, and to discern where additional progress can be made. With the emphasis on technology as a source of both problems and solutions, a broad spectrum of industrial activities is reviewed, ranging from low-design high-volume commodities to high-design low-volume products. Student activities include a critical review of various articles, participation in class discussions, and a term project in design for the environment.

21.1.2. Course Syllabus

22. Princeton University

22.1. Course Name: Methods in Science, Technology and Environmental Policy

22.1.1. Course Description: This course presents a set of basic theories, methods and tools for use in the analysis of policy issues involving science, technology and the environment. Topics include: order-of-magnitude estimation; risk assessment and risk communication; uncertainty analysis; evaluation of air, land and water pollution and industrial ecology. The goal of the course is to develop a theoretical and operational understanding of these techniques through a combination of lectures, exercises, and the examination of a diverse set of real-world case studies. The course will culminate with the in-depth analysis of a particular real-world environmental problem. The student should leave the course with an increased understanding of how technical information can be used to inform policy decisions and the confidence to do so.

22.1.2. Course Syllabus

23. Rutgers University

23.1. Course Name: Industrial Ecology

23.1.1. Course Description: This graduate seminar course explores the powerful industrial ecology analogy, testing the blossoming field's claim that it is a framework for implementing sustainable development. Industrial ecology takes a systematic view

of the use and environmental implications of materials, energy, and products in industrial societies. It attempts, in practical terms, to bridge the disciplines of economics and ecology. It exploits the ecological analogy by placing industrial activity in its environmental context and by drawing on nature as a model. It relies on microeconomics for a theory of agency and to explain the behavior of actors in industrial ecosystems.

23.1.2. Course Syllabus

23.2. Course Name: Green Buildings

23.2.1. Course Description: This graduate seminar focuses on the green building phenomenon. It provides a multidisciplinary, rigorous, and practical introduction to green building.

23.2.2. Course Syllabus

24. Clarkson University

24.1. Course Name: Industrial Ecology

24.1.1. Course Description: A class option for the Minor in Environmental Science & Policy program.

25. Columbia University

25.1. Course Name: Industrial ecology of Earth resources

25.1.1. Course Description: A course offered by the School of Engineering and Applied Science, with concentration in Water Resources and Climate Risks.

26. Rochester Institute of Technology

26.1. Course Name: Industrial ecology

26.1.1. Course Description: Offered in the Golisano Institute for Sustainability. Industrial ecology is the study of the interaction between industrial and ecological systems. Students in this course learn to assess the impact and dependency of production systems on the natural environment by mastering life-cycle assessment tools, concepts in biomimicry and principles of sustainability. (A minimum of four credits in calculus (or higher); 1016-319 Data Analysis I (or equivalent); 1016-320 Data Analysis II (or equivalent); any one of the following: physics, chemistry or biology; research experience and graduate standing recommended; exceptions are by permission of Instructor.) Class 4, Credit 4 (W)

27. Ohio State University

27.1. Course Name: Industrial ecology

27.1.1. Course Description: Introduction to the principles and methods of life cycle environmentally conscious design, manufacturing, services, supply chain management, refurbishment, and recycling.

28. The University of Findlay

28.1. Course Name: Pollution Prevention and Industrial ecology

28.1.1. Course Description: This course addresses the methods and cost-benefit analysis of proactive pollution prevention approaches and waste minimization programs. Case studies are used in conjunction with federal, state and proprietary reference materials to guide students through the implementation of customized pollution prevention programs. Life cycle analysis, assessment of wastes released in related production infrastructure and other aspects of industrial ecology are introduced.

29. Southwestern Oklahoma State University

29.1. Course Name: Industrial Ecology for Environmental Scientists

29.1.1. Course Description: Provides students with an overview and broad understanding of ecology principles as applied to an industrial setting. The course begins with an overview of general ecological principles such as ecosystem components and structures, biogeochemical cycles, energy flows, and properties of populations. The course concludes with a consideration of industrial ecology principles such as sustainability, pollution prevention, life cycle assessment and waste minimization.

30. University of Oklahoma

30.1. Course Name: Industrial Ecology

30.1.1. Course Description: Projects focus on comprehensive evaluation of critical systems to increase performance, reduce waste, and identify opportunities for long-term sustainable development on multiple spatial scales.

31. Carnegie Mellon University

31.1. Course Name: Industrial Ecology and Sustainable Engineering Design

31.1.1. Course Description 12-712: The student successfully completing this course will have a solid understanding of the emerging discipline of sustainable engineering. The student will be able to list the historical factors that led to the birth of this discipline, list the most important fundamental principles behind it, and discuss alternatives viewpoints about the discipline by several authors. He or she will also be able to solve several types of problems estimating the human impact on global systems.

31.1.2. Course Description 12-713: As a follow-up to the course Introduction to Sustainable Engineering, which examined human impacts on global systems and the need for change, this course focuses on solutions to the problems. The student successfully completing this course will understand some of the ways in which human development can be altered to be in harmony with natural earth systems. Specifically, he or she will be able to solve problems in engineering design that can help development while minimizing long-term damage to the environment. The student will also be able to discuss trade-offs in considering different types of solutions.

32. Kettering University

32.1. Course Name: Environmentally Conscious Design and Manufacturing

32.1.1. Course Description: This is a multi-disciplinary course that provides students with the perspective and skills (economic, managerial, ethical, scientific, and engineering) needed to critically examine environmental issues in product design and manufacturing and to arrive at viable solutions to these problems. Emphasis is placed on solutions that reduce costs and improve environmental performance. The course is open to engineering, science and management undergraduate and graduate students and focuses on examples of environmental issues related to the goods and services produced by Kettering University's industrial co-operative education partners. The course uses case studies to introduce new concepts to students which are then reinforced through group discussion, guest speakers, laboratory experiences and other activities.

32.1.2. Course syllabus

33. University of South Carolina

33.1. Course Name: Technology-Environment Interaction

33.1.1. Course Description: Industrial ecology (IE) focuses on impacts to the natural world from the massive expansion in the rate and scale of human transformation of the earth following the industrial revolution. Concepts and tools trace the impacts of industrial and service operations on natural ecosystems, humans and natural resources. Industrial ecology views these impacts as resulting from the interaction of underlying complex technological, social, economic and legal systems. IE is a heavily interdisciplinary field involving science and technology (engineering), public policy, economics and business operations.

33.1.2. Course syllabus

34. Rice University

34.1. Course Name: ENST204 Environmental Sustainability: The Design and Practice of Community Agriculture (Community Garden)

34.1.1. Course Description: The course introduces the fundamental of community garden design and practice. Responsibilities will center on developing and improving the Rice Community Garden. The semester will begin with a short series of lectures by successful growers from the Houston community. A strong emphasis will be on learning and applying ecological principles to the practice of community agriculture.

34.2. Course Name: ENST313 Sustainable Design

34.2.1. Course Description: This course will explore sustainable design from initial sustainable facility concepts and team organizations, to enlisting community support and process assessment. The course will develop into details about sustainable design, lessons learned processes and outcomes.

35. Texas State University

35.1. Course Name: TECH4368 Environmentally Sustainable Design and Construction

35.1.1. Course Description: Environmentally sustainable practices used in building design and construction. The LEED system will be used to guide the course, which covers aspects of sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and the CAD design process.

35.2. Course Name: TECH5382 Industrial Ecology

35.2.1. Course Description: Industrial pollutants and their relationship to governmental law and regulation are covered in this technical course. Course includes: evolution and current trends of industrial ecology; storage, transportation, disposal of hazardous industrial products, by-products and waste; air and water quality standards; environmental legislation; and regulations that apply to industrial systems.

36. University of Houston - Clear Lake

36.1. Course Name: 6333 Industrial Ecology

36.1.1. Course Description: Systems analysis of manufacturing processes and engineering design in environmental context; life cycle assessment (mass/energy balances, impact and risk assessment, design for environment); environmental accounting; decision analysis/design tools; case studies; term projects.

37. James Madison University

37.1. Course Name: ISAT320 Fundamentals of Environmental Science and Technology I

37.1.1. Course Description: This provides the student with a basic understanding of environmental pollution, processes and control technologies. The course begins with a review and extension of the basic sciences supporting environmental sciences. Water and wastewater quality, management, and treatment are then addressed, culminating in independent team projects in this area.

37.2. Course Name: ISAT321 Fundamentals of Environmental Science and Technology II

37.2.1. Course Description: This course continues to build on the student's basic understanding of environmental pollution, processes and control technologies. The course considers solid and hazardous waste and its management, discusses the principles of environmental risk assessment, and addresses air quality analysis and management, culminating in independent team projects in this area.

37.3. Course Name: ISAT410 Sustainable Energy Development

37.3.1. Course Description: This course is concerned with science and the applications of solar and other renewable technologies, e.g., solar thermal electric, photovoltaics, wind power, biomass-derived alcohols, solar hydrogen and ocean thermal energy conservation energy storage systems and materials, combined renewable-conventional systems for peaking and load management and alternative energy sources for transportation will be studied.

37.3. Course Name: ISAT422 Industrial Environmental Management

37.3.1. Course Description: This course addresses environmental issues faced by industry, including such topics as waste management, chemical inventories, pollution prevention and discharge permitting. Industrial ecology is introduced as an approach to the development of a sustainable industry society, including treatment of life cycle analysis, design for environment, environmentally conscious manufacturing and ISO 14000.

37.4. Course Name: ISAT423 Environmental Remediation

37.4.1. Course Description: This course will examine chemical, physical, economic and regulatory aspects of the remediation of contaminated soil and groundwater. Topics include chemical properties of major contaminants, environmental site assessment, remediation design, and current and emerging remediation technologies and their limitations in soil and groundwater restoration.

37.5. Course Name: ISAT428 Industrial Ecology

37.5.1. Course Description: Industrial ecology, the "science of sustainability" seeks to encourage the development of a sustainable industrial society. This course introduces and examines this relatively new field of inquiry and practice. The course addresses various practical topics which are associated with industrial ecology, including life

cycle assessment, design for environment and environmentally conscious manufacturing.

37.6. Course Name: ISAT/GEOG429 Sustainability: An Ecological Perspective

37.6.1. Course Description: This course examines present global environmental impacts and efforts made to change production and consumption patterns towards those that reduce impact on ecosystems or promote increased ecosystems health. The focus lied in understanding the basic resources of productivity including soils, agriculture systems, agro-forestry, forestry and aquatic environments and applying solutions on a personal and community level.

37.7. Course Name: ISAT451 Biotechnology in Industry and Agriculture

37.7.1. Course Description: This course illustrates the applications of biotechnology in agriculture and industry, linking scientific discoveries to business and manufacturing practices. Topics include pharmaceutical product development, genetic engineering in agriculture, bio-technology in food processing and regulatory issues.

38. University of Virginia

38.1. Related Course Name: Green Engineering

39. University of Washington

39.1. Course Name: Sustainability and Design for Environment

39.1.1. **Course Syllabus**

40. University of Wisconsin - Madison

40.1. Course Name: Environment Strategy and Sustainability

40.1.1. **Courses browser**

41. University of Vermont

41.1. Course Name: Economics of Sustainability

41.1.1. **Program Curriculum**

42. Mount Royal College, Canada

42.1. Course Name: ENVS2201 Introduction to Industrial Ecology

42.1.1. Course Description: The major ideas and tools of industrial ecology will be introduced. Industrial ecology "focuses on the potential role of the industry in reducing environmental burdens throughout the product life cycle, from the extraction of raw materials, to the production of goods, to the use of those goods and to the management of the resulting wastes" (Journal of Industrial Ecology). Topics covered will include: environmental concerns, risk assessment, global budget and cycles, industrial processes, life cycle assessment, design for environment, pollution prevention, and zero emission strategies.

42.2. Course Name: ENVS4415 Industrial Ecology Project

42.2.1. Course Description: Student will undertake an applied project in an area of industrial ecology under the supervision of a faculty member. Each student will be required to present the results of their project as a seminar.

43. Tsinghua University, China

43.1. Website link

44. Wuhan University, China

44.1. Website link

45. Nanjing University, China

45.1. Website link

46. Aalborg University, Denmark

46.1. Course Name: Politics of Sustainable Development

46.1.1. Course Description: The course discusses the various actors and the changing agendas in the world of environmental policy and politics. The aim is to explore the interaction between economic, political, and social ideologies and structures influencing sustainable management of resources. The main sources of political conflict and tensions, particularly between the North and the South, are introduced.

47. University of Technology of Troyes, France

47.1. Course Name: Industrial Ecology

47.2. Course Name: Materials Life Cycle Management

47.3. Course Name: Ecological Planning, "clean" technologies and recycling

47.4. Course Name

48. Technische Universitat Munchen and Nanyang Technological University of Singapore

48.1. Website Link

49. University of Kaiserslautern

49.1. Website Link

50. Norwegian University of Science and Technology

50.1. Course Name: TVM4162 Industrial Ecology

50.1.1. Course Description: The course shall give students an overview of theory, analytical methodology and practical challenges in the field of industrial ecology. Emphasis is given to the understanding of how environmental assessment and improvements are carried out with support from systems analytical methods such as material flow analysis, risk analysis, life cycle analysis, energy analysis, cost/benefit analysis and eco-efficiency analysis.

51. Leiden University, Delft University of Technology and Erasmus University of Rotterdam

51.1. Video

51.2 Website Link

52. Utrecht University

52.1. Course Name: GEO4-2301 Sustainable Science: An Introduction

Being part of the Master Course on Sustainable Development (SD), this course aims at providing an integrated systems perspective on SD-related issues. We start with the interactions between human societies and their environment from a historical perspective, culminating in the global quest for a (more) sustainable development. Then, some key concepts and methods of the natural sciences are dealt with, such as conversation laws and entropy. Next, we explore some relevant models and insights to be gained from the life sciences, such as evolution, resilience and vulnerability and the demographic transition. This is continued with an analysis of human-environment interactions in (early) agrarian and (later) industrial societies, as part of the evolution of social-ecological systems. Some models and insights from economic science on the

development of industrial economies are presented; a few basic, relevant notions from psychology and sociology are introduced. The course will end with a presentation of discussion on Global Change (or World) models and how they are / can be used in meaningful exploration of possible future development and policy strategies (via scenarios) and possible policies.

52.2. Website Link

53. Technical University of Bialystok

53.1. Website Link

54. National University of Singapore

54.1. Course Name: Urban Metabolism

54.1.1. Course Description: For the purpose of this study, we propose to focus on the building block as the level of analysis and will estimate the materials flows and in-use stock in a specified building block system in a selected study area. We will map the built environment – residential, commercial and transportation tocks – and then quantify specific types of building materials, water and energy demanded by those structures. Based on this assessment we can determine strategies for dematerializing and decarbonizing the future built environment. We will also assess the current disposal and other end-of-life options for materials from building blocks when they are decommissioned, and will examine which of these materials could be mined for reuse in planned developments. The end result will be an assessment of total material and energy flows for city building blocks, strategies to dematerialize and decarbonizes future building blocks, and an initial estimate of the feasibility of "urban mining" in this high density urban environment. This study is an important component of the 'umbrella research' on sustainable high density living. It will complement our understanding of how density cities can be more sustainable by looking at them the resource and use and recovery angle. Together with the other five studies, it will present a holistic perspective of how urban sustainability can be articulated in high density environments. The project will demonstrate scenarios of resource use and management in a high density context using industrial ecology concepts, with the view to re-look land use planning from the perspective of resource conservation and climate change concerns. The ultimate aim is to seek ways to integrate the thinking of resource use in land use planning to minimize, conserve and recover scarce resources to achieve a more sustainable built environment.

55. Polytechnic University of Catalonia

55.1. Website Link

56. Universitat Autonoma de Barcelona, Spain

56.1. Course Name: 40427 Industrial Ecology I

56.2. Course Name: 40428 Industrial Ecology II

56.3. Course Description Link

57. Universitat de Valencia, Spain

57.1. Website Link

58. Chalmers University of Technology, Sweden

58.1. Course Name: Sustainable Development

58.1.1. Course Description: The course will apply a systems perspective to give insight in which restrictions and possibilities that follows from a sustainable development. The focus is on the societal turnover of energy and materials and hence on possible solutions.

58.2. Course Name: Industrial Ecology Seminar

58.2.1. Course Description: Throughout the first year, a seminar series is held in which the students present and discuss recent findings and results reported in scientific literature and elsewhere.

58.3. Course Name: Environmental Management

58.3.1. Course Description: The course gives knowledge to analyze, evaluate, and plan the work of a company from an environmental point of view, and it gives knowledge of the opportunities and limitations of different methods of analysis.

58.4. Course Name: Applied Industrial Ecology

58.4.1. Course Description: The course aims at giving knowledge about the energy and material flows in the industrial society and knowledge about relevant tools like Sustainable Flow Analysis (SFA) and Material Flow Analysis (MFA). The course is based on projects.

58.5. Course Name: Life Cycle Assessment

58.5.1. Course Description: The course aims at an analyst's competence in Life Cycle Assessment, providing understanding of methods to assess the environmental impact of products in a life cycle perspective. The course gives the theoretical background for Life Cycle Assessment as a method, ability to use this tool and knowledge about its application areas and limitations.

59. Royal Institute of Technology, Sweden

59.1. Course Name: Methods in Industrial Ecology

59.1.1. Course Description: Several methods and tools for achieving a more sustainable future have been developed within separate disciplines and for somewhat different purposes. Examples of such tools include environmental impact assessment (EIA), strategic environmental assessment (SEA0, life cycle assessment (LCA), positional analysis (PA), cost-benefit analysis (CBA), material intensity per unit service (MIPS) analysis, total material requirement (TMR) analysis, ecological footprint (EF), energy analysis, Materials Flow Analysis (MFA). At the Department we continuously develop and use these tools in different projects.

59.2. Course Name: Waste Management

59.2.1. Course Description: Waste is considered to be the world's most unnecessary problem. A large amount of waste means a high degree of inefficiency with raw material and energy. At the same time our consumption society produces more and more products with less and less life span, increasing the demand of new materials and more energy production. In order to break this trend, an efficient waste management based on the waste hierarchy is essential in all parts of the society. At Industrial Ecology we focus on a system approach of waste management, meaning that we look into all aspects of sustainability when working with a waste problem. A lot of our research is directed to the top of the waste hierarchy meaning waste prevention and recirculation. We also focus on real life problems, often using municipalities or small and medium sized companies as case studies, both in Sweden and abroad.

59.3. Course Name: Water Management

59.3.1. Course Description: The area includes integrated water management, water footprints, etc.

59.4. Course Name: Environmental technology

59.4.1. Course Description: In order to solve different environmental problems connected with emissions to air, water and soil from for example an industrial production plant there are a very large number of technical possibilities. Important strategies that can used are changing the raw materials, changing the production processes and using different process external solutions (so called "end of pipe solutions"). Very often it is necessary to use more than one strategy to solve a problem. For each alternative strategy there are a number of technical alternatives and especially the different process external solutions are numerous. Which environmental technical solution to choose depends on many factors – present emission situation (total flows, concentrations, running conditions etc), what is to be separated (dissolved substances, particles, gas phase substances etc.), requirements concerning cleaning efficiency, running stat=bility and accessibility, economy and other factors. In order to solve an emission problem it is therefore important to get a good understanding of the production process causing the problem. During the years

many Master theses project s have been connected to different companies and production plants, for instance pulp and paper production, surface coating and pharmaceutical production. Also a number of municipality wastewater treatment projects as well as leachate treatment projects have been performed.

60. Swiss Federal Institute of Technology, Switzerland

60.1. Website Link

61. Mahidol University, Thailand

61.1. Website Link

62. Cranfield University, United Kingdom

62.1. Course Name: Environmental Management for Business

62.1.1. Course Description: Accredited by Chartered Institution of Water and Environmental Management (CIWEM), this course integrates interests and applications from business to economics and policy development and review. This includes a range of environmental management tools such as environmental auditing and environmental Management systems, as well as analysis of current legal, policy and strategic frameworks, and global issues such as climate change. Graduates will be able to develop and implement best practice strategies in the public and private sectors.

62.2. Course Name: Sustainable Manufacturing

62.2.1. Course Description: Developed with leading organizations, this innovative New Masters course will provide you with the ability to combine the manufacturing and sustainability knowledge required to lead projects that will promote renewable material use, lower energy use and minimize waste.

63. Sheffield Hallam University, United Kingdom

63.1. Website Link

64. The University of Birmingham, United Kingdom

64.1. Course Name: Sustainable Construction

64.1.1. Course Description: The module aims to provide the student with an understanding of the environment and resource implications of construction activity within the context of sustainable development. It considers the theoretical and methodological basis of approaches designed to quantify the impacts associated with choices made at different stages of the construction life cycle, as well as tools designed to evaluate relative environmental and sustainable performance.

64.2. Course Name: Sustainable Development

64.2.1. Course Description: The carbon cycle, its impact on climate, and the need to change this by introducing hydrogen and fuel cell technologies will be covered. The influence of Government legislation on technology and growth of sustainable business will be emphasized. In the second term, the module introduces the technology associated with recycling. Established technologies such as metal, paper and glass recovery will be contrasted with newer approaches. Good and bad examples such as doorstep sorting will be described from around the UK and the world. The packaging problem will be evaluated. A particular example of lead-acid batteries will be studied in depth. Processes and practices will be investigated. There will be a coursework project on Resource Recycling. The overall movement of materials within the environment will be addressed during the second semester. An assignment on the mass and energy flows in cities will be carried out.

65. Yokohama National University, Japan

65.1. Course Name: Industrial Ecology of the Automobile

65.1.1. Course Description: The automobile is of great interest to industrial ecology, because automobiles are so much a part of people's lives, yet can also produce demonstrable stresses on the environment. This makes the automobile and its environmental attributes an ideal case study. In our case study, we will explore the experience of designing the automoibile with the environment in mind. What choices are desirable? What are difficult to implement? Where is more research needed? Based on the weekly reading assignments, students will prepare a short response paper to be submitted at the beginning of each class. Students are required to participate in class discussions on the basis of careful reading of the assigned materials. This class provides students an opportunity to develop the fundamental working skills required for professionals working in the international fields.

66. Curtin University of Technology, Australia

66.1. Course Name: Industrial Ecology 603

66.1.1. Course Description: Origin and application for eco-industrial parks. Theory and practical application of industrial metabolism and substance flow analysis, including ecological footprint analysis and materials input analysis. Global sustainability models and road maps including natural step and natural capitalism. Role of

technology and consumption for achieving sustainable development. Students are to attend a three-hour lecture once every three weeks.

66. Postgraduate School of Industrial Ecology

66.1.1. Training Description: PSIE is a series of research training courses to develop the research skills and knowledge of early stage researchers in Industrial Ecology. PSIE targets Ph.D. candidates, young researchers and faculty members from throughout Europe who want to address sustainable production and consumption in their research. The series teaches participants cutting-edge research methods in Industrial Ecology and provides the skills and knowledge to implement research programs in sustainable production and consumption.