University of Dayton--Sustainability Course Offerings
(grey fields: courses that include sustainability; white fields: sustainability courses)

course number	title	course number and title	course description
ASI 320	Cities and Energy	ASI 320: Cities and Energy	An interdisciplinary examination of the influence of energy on the urban environment since the Industrial Revolution, how this relationship has affected every aspect of city life from culture to infrastructure, and prospects for the future of this relationship.
ASI 322	Cities and suburbs: influence of place	ASI 322: Cities and suburbs: influence of place	This interdisciplinary course examines the changing social, political, economic, cultural, ethical, and religious factors that shape life in cities and suburbs. It examines the factors that influence where people choose to live and the conditions that both unite and divide people across urban/suburban regions. Particular consideration is given to issues of social injustice, privilege and oppression, and moral responsibility. The social science domain is emphasized. This course is cross-listed with ASI 323 and ASI 324. Students taking ASI 322 may not receive credit for ASI 323 or ASI 324.
ASI 345	River Leadership curriculum	ASI 345: River Leadership curriculum	Examination of an interdisciplinary topic in social science. Topics developed by faculty holding appointment in the Humanities Fellows Program or in an endowed chair. Specific topics may be used to meet thematic cluster general education requirements. May be repeated as topics change.
BIE 533	Biofuel	BIE 533: Biofuel	The course will provide an overview of the range of fuels derived from biological materials and processes, with a focus on anaerobic digestion, bioethanol and biodiesel and production of synthetic fuel from biological materials. The course will include an overview of the biochemistry of energy production in biological systems, discussions of the economics and environmental sustainability of biofuels, and a review of reactor and separation systems concepts relevant to biofuel production. Prerequisite(s) EGR 202, CHM 123 or consent of instructor.
BIE 560	Biological processes in wastewater engineering	BIE 560: Biological processes in wastewater engineering	Measuring the characteristics of wastewater producted from domestic and industrial sources. Principles of designing and operating microbiological processes for the treatment of wastewater. Mechanism and kinetics of biological reactions emphasized. Prerequisite(s): CHM 124.
BIO 101	Life, environment, and society	BIO 101: Life, environment, and society	An introductory course covering the study of life in all its forms, understanding how life interacts with the environment and the role of biological inquiry in society. Emphasis will be placed on discussing topical issues relevant to evaluating the critical role of the life sciences in society today. Supporting laboratory strongly recommended, but optional. No prerequisite. For non-science majors only.
BIO 101 L	Life, environment, and society lab	BIO 101 L: Life, environment, and society lab	A hands-on approach to the study of life, understanding how life interacts with the environment, and the role of biological inquiry in society. Lab activities will stress an experiential, inquiry-based approach to topics relevant in today's society in an effort to increase student's abilities to critically evaluate modern science media. Laboratory topics are designed to run parallel to lecture topics. Recommended that the laboratory be taken concurrently with BIO 101 lecture. One two-hour laboratory per week. For non-science majors. Corequisite(s): BIO 101.
BIO 152	Concepts of biology II: evoloution and ecology	BIO 152: Concepts of biology II: evoloution and ecology	Study of evolution and ecology. Topics include phylogeny, systematics, and conservation. Core biology course. BIO 151 recommended.
BIO 152 L	Concepts of biology II: evoloution and ecology lab	BIO 152 L: Concepts of biology II: evoloution and ecology lab	An introduction to biological laboratory exercises at the organismal and the system level through a series of observational and experimental exercises in evolution, ecology and behavioral ecology. Core biology course. Corequisite(s): BIO 152.
BIO 310	Ecology	BIO 310: Ecology	Interrelationship of plants, animals, and micro-organisms with the physical-chemical environment: nutrient cycles, energy flow, ecosystems, and factors affecting distribution and abundance of organisms. Core biology course. Prerequisite(s): BIO 152.
BIO 310L	Ecology lab	BIO 310L: Ecology lab	Measurement of population, community, and environmental variables in terrestrial and aquatic systems. The lab is field-based using local ecological resources. One three-hour laboratory per week and weekend field trips. Corequisite(s): BIO 310.
BIO 320	Marine biology	BIO 320: Marine biology	Introduction to the diversity of marine life including the physical-chemical environment. Prerequisite(s): Permission of instructor. . Corequisite(s): BIO 320L.
BIO 320L	Marine biology lab	BIO 320L: Marine biology lab	Examination of marine organisms and processes. Laboratory work conducted on UD campus and at off-campus field sites in the southern United States or Hawaii. Prerequisite(s): Permission of instructor. Corequisite(s): BIO 320.
BIO 359	Sustainability and the biosphere	BIO 359: Sustainability and the biosphere	Study of the principles of sustainability. All areas of sustainability will be covered with emphasis on ecological facets of sustainability. Discussion of loss of habitat and biodiversity in the context of sustaining natural resources for future generations. Prerequisite(s): BIO 152 or SCI 230.
BIO 395	Global environmental biology	BIO 395: Global environmental biology	Presentation of the biological and ecological principles needed for the critical discussion and evaluation of current global issues related to human impact on the environment. Ecological data on the current extinction crisis and sustainable solutions will be addressed. No credit toward a biology major or minor. Prerequisite(s): BIO 101, BIO 151 or SCI 230.
BIO 407	Plant diversity and ecology	BIO 407: Plant diversity and ecology	Lecture course addressing plant diversity and ecology. Course includes an overview of plant systematics and aspects of plant anatomy, population ecology, community ecology, ecosystem ecology, and global ecology. Prerequisite(s): BIO 310.

Undergraduate course numbers: 100 - 499; Graduate course numbers: 500 +

University of Dayton--Sustainability Course Offerings
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BIO 407L	Plant diversity and ecology Lab	BIO 407L: Plant diversity and ecology Lab	Field laboratory course addressing plant diversity and ecology. Includes a series of field labs focused on plant identification, followed by labs focused on quantitatively assessing plants, plant communities, and ecosystems. Labs will take place in a variety of natural areas. Corequisite(s): BIO 407.
BIO 409	Ecological restoration	BIO 409: Ecological restoration	Principles and practices of ecological restoration. The course presents the rationale and knowledge needed to understand, appreciate, plan and perform ecological restoration. Prerequisite(s): BIO 310.
BIO 409L	Ecological restoration lab	BIO 409L: Ecological restoration lab	Practical applications of the principles of ecological restoration to a variety of ecosystems. One three-hour laboratory per week. Corequisite(s): BIO 409.
BIO 452	Biology of rivers and lakes	BIO 452: Biology of rivers and lakes	The biological interrelationships of organisms in rivers, streams, lakes and ponds including biodiversity, ecological/evolutionary adaptations and structure of aquatic ecosystems. Prerequisite(s): BIO 310.
BIO 452L	Biology of rivers and lakes lab	BIO 452L: Biology of rivers and lakes lab	Laboratory and field exercises emphasizing the biological, chemical and physical attributes of freshwater ecological systems. One three-hour laboratory or field trip per week. Corequisite(s): BIO 452.
BIO 459	Environmental Ecology	BIO 459: Environmental Ecology	The application of current ecological knowledge and principles toward the study of human impact on the environment. Emphasis on ecosystem dynamics, applied ecology, disturbance ecology, and approaches to solving global environmental problems. Prerequisite(s): BIO 310.
BIO 459L	Environmental Ecology lab	BIO 459L: Environmental Ecology lab	Analytical approach to studying applied ecology and human impact on the environment. Emphasis on laboratory and field approaches to solving environmental problems through the use of ecological principles. One three-hour laboratory per week. Corequisite(s): BIO 459.
BIO 489	Mycology	BIO 489: Mycology	Introductory course stressing the interrelationship between fungi and the rest of the biological world. Emphasis on the basic biology and ecology of fungi, decomposition, species interactions, plant pathology and medical mycology. Prerequisite(s): BIO 152.
BIO 509	Ecological restoration	BIO 509: Ecological restoration	Principles and practices of ecological restoration. The course presents the rationale and knowledge needed to understand, appreciate, plan and perform ecological restoration. Prerequisite(s): Graduate status.
BIO 596	Special topics: Biodiversity	BIO 596: Special topics: Biodiversity	Consideration of recent developments in biological thought and procedure. Prerequisite(s): Permission of department chairperson.
BIO 596	Current biology problems (Macrobiology networks)	BIO 596: Current biology problems (Macrobiology networks)	Consideration of recent developments in biological thought and procedure. Prerequisite(s): Permission of department chairperson.
BIO 601	Special topics: ecological	BIO 601: Special topics: ecological	Development, presentation, and discussion of topics in specialized areas of biology. Required of graduate students each semester.
CEE 560	Biological processes in wastewater engineering	CEE 560: Biological processes in wastewater engineering	Measuring the characteristics of wastewater produced from domestic and industrial sources. Principles of designing and operating microbiological processes for the treatment of wastewater. Mechanisms and kinetics of biological reactions emphasized. Prerequisite(s): CHM 124 and (CEE 434 or CME 406) or equivalent.
CEE 562	Physical and chemical water and wastewater treatment processes	CEE 562: Physical and chemical water and wastewater treatment processes	Principles and design of physical and chemical unit processes to treat water and wastewater. Industry pretreatment technologies and the basis for their development. Prerequisite(s): CHM 124 and (CEE 434 or CME 406) or equivalent.
CEE 595	Special problems-CEE-Waste and wastewater engineering	CEE 595: Special problems-CEE-Waste and wastewater engineering	Special assignments in civil engineering subject matter to be arranged and approved by the student's advisor and the department chair.
CEE 595	Special problems-CEE-LEED building design	CEE 595: Special problems-CEE-LEED building design	Special assignments in civil engineering subject matter to be arranged and approved by the student's advisor and the department chair.
CHM 200	Chemistry and society	CHM 200: Chemistry and society	Course for nonscience majors. The application of chemical principles to the examination of issues such as environmental quality, disease, hunger, synthetic materials, and law enforcement. Depending upon background and experience, a student needing a laboratory course may enroll in either CHM 115L or CHM 123L. Prerequisite(s): One year of high school chemistry or equivalent.
CHM 234	Energy resources	CHM 234: Energy resources	The chemical and geological aspects of formation, production, and benefits/costs (including environmental impacts) of energy derived from fossil fuels (coal and hydrocarbons), biofuels (e.g., ethanol production), radioactive materials (nuclear power), and renewable sources (e.g., geothermal, hydro, wind, and solar power). Prerequisite(s): CHM 123, CHM 124. Corequisite(s): GEO 208.
CHM 313L	Organic chem lab	CHM 313L: Organic chem lab	Major topics in organic chemistry including synthesis, mechanisms, stereochemistry, and spectroscopy. Required of all chemistry majors and students in the life sciences. Prerequisite(s): CHM 124.
CHM 314L	Organic chem lab	CHM 314L: Organic chem lab	Common separation, purification, and analytical techniques including chromatography and spectroscopy. One three-hour laboratory each week. Corequisite(s): CHM 313.
CME 430	Chemical Engineering Design I	CME 430: Chemical Engineering Design I	Study of basic design concepts, safety and health issues, capital cost estimation, manufacturing cost estimation, basic economics and profitability analysis, materials of construction, materials selection and process vessel design. Prerequisite(s): CME 203.

Undergraduate course numbers: 100 - 499; Graduate course numbers: 500 +

University of Dayton--Sustainability Course Offerings
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CME 431	Chemical Engineering Design II	CME 431: Chemical Engineering Design II	Project-based study of principles of process design and economics, use of process flowsheet simulators, short-cut design procedures, process optimization, and plant layout. Prerequisite(s): CME 306, CME 365, CME 430, CME 465.
CME 560	Biological processes in wastewater engineering	CME 560: Biological processes in wastewater engineering	Measuring the characteristics of wastewater produced from domestic and industrail sources. Principles of designing and operating microbiological processes for the treatment of wastewater. Mechanisms and kinetics of biological reactions emphasized. Prerequisite(s): CHM 124.
CME 562	Physical and chemical water and wastewater treatment processes	CME 562: Physical and chemical water and wastewater treatment processes	Designing of physical and chemical unit processes to treat wastewater originating primarily from industrial sources. Industry pretreatment technologies and the basis for their development. Prerequisite(s): CHM 123; CME 465, or permission of instructor.
CME 563	Hazardous water engineering	CME 563: Hazardous water engineering	The fundamental principles of the design and operation of hazardous waste remediation processes. Characterizing contaminated sites and conducting treatability studies to select remediation strategies. Prerequisite(s): CHM 123; CME 465, or permission of instructor.
CME 575	Fundamentals of air pollution engineering II	CME 575: Fundamentals of air pollution engineering II	Review of the concepts of air pollution engineering; aerosols; removal of particles from gas streams; removal of gaseous pollutants from effluent streams; optimal air pollution control strategies. Prerequisite(s): CME 574 or permission of instructor.
ECO 435	Economics of the environment	ECO 435: Economics of the environment	Introduction to the economics of the global environment including an analysis of market failure as a cause of environmental degradation. Topics covered include cost-benefits analysis, criteria for public investment, regulation of the environment, and the sustainable global environment. Prerequisite(s): ECO 203.
ECO 485	Urban and Regional economies	ECO 485: Urban and Regional economies	Treatment of certain theoretical concepts such as location theory and theories of land use and land rent; an economic interpretation for the existence of cities; applying economic analysis to the problems of traffic congestion, pollution, race, poverty, and urban sprawl. Prerequisite(s): ECO 203.
EGR 103	Engineering Innovation	EGR 103: Engineering Innovation	First year multi-disciplinary innovation projects primarily geared towards skill development in the areas of requirements analysis, creativity, conceptual design, design and problem-solving processes, prototyping, teamwork, and project communications. Application to the development of a new product or technology meeting societal needs. This course is part of the Integrated Engineering Core for all engineering students.
EGR 330	Engineering design and appropriate technology	EGR 330: Engineering design and appropriate technology	An experiential course in appropriate technology and engineering design which spans the winter and summer semesters and includes language preparation, cultural immersion, selected readings, and discussions on appropriate technology and a six to sixteen week summer service-learning experience focused on technical or engineering related work in a developing country. Prerequisite(s): Junior or senior status; permission of instructor.
ENG 342	Literature and environment	ENG 342: Literature and environment	Examination of nature and environment in literature, focusing on literary representations of nature; nature writing; fiction and ecocritcism; the environment and the literary imagination. Prerequisite(s): ENG 100 or ENG 100B or ENG 200H or ASI 110 equivalent.
GEO 103	Principles of geography	GEO 103: Principles of geography	The study of spatial processes that shape the Earth's physical and cultural environment through a survey of major branches of physical and human geographic inquiry.
GEO 109	Earth, environment, and society	GEO 109: Earth, environment, and society	This course examines the complex relationship between natural geologic processes and their effects on human society. The course will examine fundamental geologic processes and associated hazards (such as earthquakes, tsunamis, volcanic eruptions, flooding) while also assessing human impacts such as pollution, energy industry and land-use planning. This course provides an opportunity to discuss, from a geologic perspective, the ramifications of and potential solutions to problems associated with utilization of Earth’s resources. Laboratory optional but not required. No prerequisite.
GEO 109L	Earth, environment, and society lab	GEO 109L: Earth, environment, and society lab	Course to accompany GEO 109. Two hours each week.
GEO 208	Environmental geology	GEO 208: Environmental geology	Envirionmental Geology is the study of the relationship of geologic factors to natural hazards and the problems of water supply, pollution, erosion, land use, and earth resource utilization. Laboratory optional.
GEO 208L	Environmental geology lab	GEO 208L: Environmental geology lab	Laboratory course to accompany GEO 208. This lab is designed to provide practical exercises that will enhance a student’s understanding of how human beings interact with the geological environment. Lab activities will take an experiential, inquiry-based approach to topics relevant in past, present, and future societies. One two-hour laboratory per week concurrently run with the GEO 208 lecture course. Prerequisite(s): GEO 208 (or co-requisite).
GEO 234	Energy resources	GEO 234: Energy resources	The chemical and geological aspects of formation, production, and benefits/costs (including environmental impacts) of energy derived from fossil fuels (coal and hydrocarbons), biofuels (e.g., ethanol production), radioactive materials (nuclear power), and renewable sources (e.g., geothermal, hydro, wind, and solar power).
GEO 309	Surface and groundwater hydrology	GEO 309: Surface and groundwater hydrology	This course is designed to provide a science or engineering student with the fundamental concepts and principles central to the study of water as a resource. This will include an examination of all components of the hydrologic cycle including surface-water hydrology and management, groundwater hydrogeology, and water resource management. Prerequisite(s): (GEO 109 or GEO 218) or permission of instructor.
GEO 309L	Surface and groundwater hydrology lab	GEO 309L: Surface and groundwater hydrology lab	Laboratory exercises to accompany GEO 309. Three hours per week.

Undergraduate course numbers: 100 - 499; Graduate course numbers: 500 +

University of Dayton--Sustainability Course Offerings
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GEO 450	Applied GIS	GEO 450: Applied GIS	Concepts and implementation of project design and analysis in geographic information systems (GIS). Students will learn the practice of GIS as a tool for spatial analysis, and as it applies in professional disciplines. The course will stress database design and present skills for data input, query analysis, and data output using GIS.
GEO 455	Remote Sensing	GEO 455: Remote Sensing	Introduction to principles and concepts of remote sensing, a sophisticated technology of earth observation that provides fundamental data for global environmental investigation. Prerequisite(s): GEO 208 or permission of instructor.
GEO 550	Applied GIS	GEO 550: Applied GIS	Introduction to principles and concepts of Remote Sensing, a sophisticated technology of earth observation that provides fundamental data for global environmental investigation. Prerequisite(s): GEO 307 or Permission.
GEO 555	Remote Sensing	GEO 555: Remote Sensing	This course covers the fundamentals of Geographic Information Systems (GIS) technology and how it is being applied in such diverse fields as physical sciences, social/political sciences, planning, marketing, health, criminal justice, natural resources, and engineering. Students will learn the processes to collect, organize, analyze and display geographic data obtained from sources such as address geocoding, GPS, CD-ROM and World Wide Web sites. However, the emphasis of the course will be on data preparation and visualization based on sound knowledge of basic principles of cartographic design. Some preliminary data analysis techniques will be introduced but it is not an emphasis of the course. Each student will complete a series of mini projects that illustrate the typical steps in a GIS project. Major topics include: representation of geography, coordinate systems and map projections, principles of basic cartography, thematic mapping, data acquisition using GPS, geocoding, basic editing, and basic data management and exploration.
GEO 560	Advanced applications of GIS	GEO 560: Advanced applications of GIS	Building upon GEO 450 / GEO 550, this course aims to broaden students' understanding of GIS theories and emphasize advanced spatial analysis, modeling and visualization methodologies. Based on an applied approach, this course will use a variety of projects to illustrate these techniques. Prerequisite(s): GEO 450 / GEO 550 Applied GIS.
HSS 302	Global and Cultural nutrition	HSS 302: Global and Cultural nutrition	Study of the social, cultural and environmental factors relating to dietary behaviors and best practices to addressing nutrition-related needs. Prerequisite(s): HSS 295.
HST 342	Environmental history of the americas	HST 342: Environmental history of the americas	Comparison and contrast of the histories of conservationism and environmentalism in the United States, Canada and Latin America. Prerequisite(s): HST 103 or ASI 110 or equivalent.
HST 359	History of american city planning	HST 359: History of american city planning	Historical analysis of efforts by Americans to shape the urban environment, focusing on the emergence of the discipline and profession of city planning. Includes examination of U.S. planning theories developed within a larger Atlantic community. Prerequisite(s): HST 103 or ASI 110 or equivalent.
HST 499	Food Justice	HST 499: Food Justice	Specific subtitles and descriptions to be announced in the composite and posted in the History department office. Prerequisite(s): HST 103 or ASI 110 or equivalent.
MEE 420	Energy efficient buildings	MEE 420: Energy efficient buildings	Provides knowledge and skills necessary to design and operate healthier, more comfortable, more productive, and less environmentally destructive buildings. A specific design target of E/3 (typical energy use divided by three) is established as a goal. Economic, thermodynamic, and heat transfer analyses are utilized. Extensive software development. Prerequisite(s): MEE 410.
MEE 456	Energy systems engineering	MEE 456: Energy systems engineering	This course is aimed at providing fundamental knowledge of thermodynamics, fluid mechanics, and heat transfer in context of Energy Systems Engineering. A Just-in-Time approach to learning and applying these topics will be used. Projects will anchor all class activities. In addition to providing knowledge and experience of thermodynamics, fluid mechanics, and heat transfer, this course seeks to provide students the analysis skills necessary to determine the importance of energy conversion technologies, with special emphasis on energy efficiency and renewable energy (tidal, hydroelectric, wind, solar and geothermal). Corequisite(s): MEE 410.
MEE 457	Building energy information	MEE 457: Building energy information	The focus of the course is the collection and analysis of energy data sets to reduce energy consumption and/or energy demand. Students will typically utilize monthly energy data from multiple buildings, real time energy data, and building energy audit data. Students will disaggregate/aggregate data to develop energy use benchmarks, identify priority buildings/actions for energy reduction, identify problems, and estimate savings. Programming in Matlab and an introduction to sql dbase management are covered. Corequisite(s): MEE 410.
MEE 461	Solar energy engineering	MEE 461: Solar energy engineering	This course will cover the theory, design and application of two broad uses of solar energy: (i) direct thermal and (ii) electrical energy generation. The majority of the course will focus on thermal applications, with emphasis on system simulation and design for buildings and other systems. This course will expose students to the development and use of solar design and simulation tools. Most of the tools will be implemented in Excel and TRNSYS, but students are welcome to use other software tools such as Engineering Equation Solver, (EES) or MATLAB. Some of the class time will be devoted to demonstrate the development and use of these tools to solve homework problems. Corequisite(s): MEE 410.

Undergraduate course numbers: 100 - 499; Graduate course numbers: 500 +

University of Dayton--Sustainability Course Offerings
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MEE 462	Geothermal energy engineering	MEE 462: Geothermal energy engineering	This course will cover the theory and design of three broad uses of geothermal energy: (i) heat pump applications, (ii) direct uses, and (iii) electrical energy generation. The majority of the course will focus on heat pump applications, with emphasis on ground heat exchanger simulation and design for buildings and other systems. Closed-loop, open-loop, and hybrid geothermal heat pump systems will be examined. Heating, cooling, and electricity generating applications using hot geothermal reservoirs will also be discussed. This course will expose students to the development and use of geothermal design and simulation tools. Most of the tools will be implemented in Excel, but students are welcome to use other software tools such as Engineering Equation Solver (EES) or MATLAB. The course notes explain the development and use of these tools, which will be used to solve homework problems. Corequisite(s): MEE 410.
MEE 463	Wind energy engineering	MEE 463: Wind energy engineering	Introduction to wind energy engineering, including wind energy potential and its application to power generation. Topics include wind turbine components; turbine fluid dynamics and aerodynamics; turbine structures; turbine dynamics, wind turbine controls; fatigue; connection to the electric grid; maintenance; web site assessment; wind economics; and wind power legal, environmental, and ethical issues. Corequisite(s): MEE 410.
MEE 464	Sustainable energy systems	MEE 464: Sustainable energy systems	Survey of conventional fossil-fuel and renewable energy with an emphasis on system integration. Basic concepts of climate physics will be addressed along with estimates of fossil resources. Corequisite(s): MEE 410.
MEE 472	Design for environment	MEE 472: Design for environment	Emphasis on design for environment over the life cycle of a product or process, including consideration of the mining, processing, manufacturing, use, and post-life stages. Course provides knowledge and experience in invention for the purpose of clean design, life cycle assessment strategies to estimate the environmental impact of products and processes, and cleaner manufacturing practices. Course includes a major design project.
MEE 473	Renewable energy systems	MEE 473: Renewable energy systems	Introduction to the impact of energy on the economy and environment. Engineering models of solar thermal and photovoltaic systems. Introduction to wind power. Fuel cells and renewable sources of hydrogen.
MEE 478	Energy efficient manufacturing	MEE 478: Energy efficient manufacturing	This course presents a systematic approach for improving energy efficiency in the manufacturing sector. Current patterns of manufacturing energy use, the need for increased energy efficiency, and models for sustainable manufacturing are reviewed. The lean-energy paradigm is applied to identify energy efficiency opportunities in industrial, electrical, lighting, space conditioning, motor drive, compressed air, process heating, process cooling, and combined heat and power systems. Prerequisite(s): (EGR 202 or equivalent) or permision of instructor.
MEE 511	Advanced thermodynamics	MEE 511: Advanced thermodynamics	Equilibrium, first law, second law, state principle, and zeroth law; development of entropy and temperature from availability concepts; chemical potential, chemical equilibrium, and phase equilibrium. Thermodynamics of irreversible processes; Onsager reciprocal relations; application of these concepts to direct energy conversion.
MEE 524	Electrochemical Power	MEE 524: Electrochemical Power	The course will cover fundamental as well as engineering aspects of fuel cell technology. Specifically, the course will cover basic principles of electrochemistry, electrical conductivity (electronic and ionic) of solids, and development/design of major fuel cells (alkaline, polymer electrolyte, phosphoric acid, molten carbonate, and solid oxide). A major part of the course will focus on solid oxide fuel cells (SOFC), as it is emerging to be dominant among various fuel cell technologies. The SOFC can readily and safely use many common hydrocarbon fuels such as natural gas, diesel, gasoline, alcohol, and coal gas. Prerequisite(s): MEE 301, MEE 312, or permission of instructor.
MEE 573	Renewable energy systems	MEE 573: Renewable energy systems	Introduction to the impact of energy on the economy and environment. Engineering models of solar thermal and photovoltaic systems. Introduction to wind power. Fuel cells and renewable sources of hydrogen.
MEE 578	Energy efficient manufacturing	MEE 578: Energy efficient manufacturing	This course presents a systematic approach for improving energy efficiency in the manufacturing sector. Current patterns of manufacturing energy use, the need for increased energy efficiency, and models for sustainable manufacturing are reviewed. The lean-energy paradigm is applied to identify energy efficiency opportunities in industrial electrical, lighting, space conditioning, motor drive, compressed air, process heating, process cooling, and combined heat and power systems. Prerequisite(s): Thermodynamics MEE 310 and Heat Transfer MEE 410.
MEE 590	Solar energy engineering	MEE 590: Solar energy engineering	Special assignments in mechanical engineering subject matter to be approved by the student's faculty advisor and the department chair.
MPA 526	Leadership in building communities	MPA 526: Leadership in building communities	Seminar class where teams are formed to learn about the processes of building a neighborhood and recommending supportive public policy and other strategic interventions. Participants will be encouraged to refine their notions of community and leadership and to recommend strategies which capitalize on neighborhood assets, improve outcomes, and build community.
MPA 556	Environmental policy	MPA 556: Environmental policy	Examines environmental policymaking and implementation in the U.S. and analyzes government responses to particular environmental issues.
PHL 310	Social Philosophy (Food Justice)	PHL 310: Social Philosophy (Food Justice)	The concepts of liberty, justice, and equality as they relate to social problems such as autonomy, responsibility, privacy, common good, power, economic justice, and discrimination. This course also addresses how the obstacles to justice can be overcome. Prerequisite(s): PHL 103 or equivalent.

Undergraduate course numbers: 100 - 499; Graduate course numbers: 500 +

University of Dayton--Sustainability Course Offerings
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PHL 321	Environmental ethics	PHL 321: Environmental ethics	Study of the principal ethical perspectives on the treatment of animals and nature including such issues as agriculture, energy, pollution, and economics; assessment of political responses to current environmental problems. Prerequisite(s): PHL 103 or ASI 120 or equivalent.
PHL 334	Philosophy and ecology	PHL 334: Philosophy and ecology	An examination of the epistemological, methodological, ontological, and value issues of ecology, with a focus on how these issues affect the debates in philosophy of science. Prerequisite(s): PHL 103 or ASI 120 or equivalent.
PHY 220	Energy and environmental physics	PHY 220: Energy and environmental physics	Introduction to the physical basis of energy systems and the climate. Topics covered will include thermodynamics, planetary radiation balance, heat transfer, basic atmospheric and ocean physics, nuclear energy, renewable energy, modeling of carbon emissions from fossil fuels, simple climate models, monitoring climate change, and mitigation strategies. Prerequisite(s): PHY 206.
POL 101	global politics	POL 101: global politics	Examination of major problems and trends in world politics such as ethnic and religious conflict, economic integration and inequality, democratization and security issues, as well as the role of regional and international organizations.
POL 300	Environmental rights, justice, and the law	POL 300: Environmental rights, justice, and the law	Introductory examination of contemporary political issues selected by the instructor, such topics as welfare, political morality, political campaigns, institutional reform, and political economy.
POL 371	Environmental policy	POL 371: Environmental policy	Examination of environmental public policymaking and implementation in the United States. Students will apply knowledge of government and policy processes to specific environmental issues, analyze governmental response, and consider how action on those issues may be pursued.
POL 426	Leadership in building communities	POL 426: Leadership in building communities	Investigation of the processes by which urban neighborhoods develop themselves from the inside out. Students cultivate their own interdisciplinary appreciation of urban communities through extensive interaction with one neighborhood's visioning process. Topics include asset-based community development, social capital, citizenship, adaptive leadership, and community building strategies and tools.
RCL 507	Materials advanced energy applications	RCL 507: Materials advanced energy applications	Various advanced energy technologies (AMTEC, Fuel Cells, Thermoelectrics, Nuclear, etc.) will be discussed with an emphasis on the role that materials have/will play in their development. Critical 'bottlenecks' in materials development delaying the introduction of new advanced energy systems will be identified. In addition, how material selections are made based on operational system environments in 'real world' scenarios will be presented.
RCL 524	Electrochemical Power	RCL 524: Electrochemical Power	The course will cover fundamental as well as engineering aspects of fuel cell technology. Specifically, the course will cover basic principles of electrochemistry, electrical conductivity (electronic and ionic) of solids, and development/design of major fuel cells (alkaline, polymer electrolyte, phosphoric acid, molten carbonate, and solid oxide). A major part of the course will focus on solid oxide fuel cells (SOFC), as it is emerging to be dominant among various fuel cell technologies. The SOFC can readily and safely use many common hydrocarbon fuels such as natural gas, diesel, gasoline, alcohol, and coal gas. Prerequisite(s): (MEE 301, MEE 312) or permission of instructor.
RCL 533	Biofuel production process	RCL 533: Biofuel production process	This course will provide an overview of the range of fuels derived from biological materials and processes, with a focus on anaerobic digestion, bioethanol and biodiesel and production of synethetic fuel from biological materials. The course will include an overview of the biochemistry of energy production in biological systems, discussions of the economics and environmental sustainability of biofuels, and a review of reactor and separation systems concepts relevant to biofuel production. Prerequisite(s): EGR 202, CHM 123, or consent of instructor.
RCL 556	Energy systems engineering	RCL 556: Energy systems engineering	This course is aimed at providing fundamental knowledge of thermodynamics, fluid mechanics, and heat transfer in context of Energy Systems Engineering. A Just-in-Time approach to learning and applying these topics will be used. Projects will anchor all class activities. In addition to providing knowledge and experience of thermodynamics, fluid mechanics, and heat transfer, this course seeks to provide students the analysis skills necessary to determine the importance of energy conversion technologies, with special emphasis on energy efficiency and renewable energy (tidal, hydroelectric, wind, solar and geothermal).
RCL 557	Building energy informatics	RCL 557: Building energy informatics	The focus of the course is the collection and analysis of energy data sets to reduce energy consumption and/or energy demand. Students will typically utilize monthly energy data from multiple buildings, real time energy data, and building energy audit data. Students will disaggregate/aggregate data to develop energy use benchmarks, identify priority buildings/actions for energy reduction, identify problems, and estimate savings. Programming in Matlab and an introduction to sql dbase management are covered.

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course number	title	course number and title	course description
RCL 561	Solar energy engineering	RCL 561: Solar energy engineering	This course will cover the theory, design, and application of two broad uses of solar energy: (i) direct thermal and (ii) electrical energy generation. The majority of the course will focus on thermal applications, with emphasis on system simulation and design for buildings and other systems. The course will expose students to the development and use of solar design and simulation tools. Most of the tools will be implemented in Excel and TRNSYS, but students are welcome to use other software tools such as Engineering Equation Solver (EES) or MATLAB. Some of the class time will be devoted to demonstrate the development and use of these tools to solve homework problems.
RCL 562	Geothermal energy engineering	RCL 562: Geothermal energy engineering	This course will cover the theory and design of the three broad uses of geothermal energy: (i) heat pump applications, (ii) direct uses, and (iii) electrical energy generation. The majority of the course will focus on heat pump applications, with emphasis on ground heat exchanger simulation and design for buildings and other systems. Closed-loop, open-loop, and hybrid geothermal heat pump systems will be examined. Heating, cooling, and electricity generating applications using hot geothermal reservoirs will also be discussed. The course will expose students to the development and use of geothermal design and simulation tools. Most of the tools will be implemented in Excel, but students are welcome to use other software tools such as Engineering Equation Solver (EES) or MATLAB. The course notes explain the development and use of these tools, which will be used to solve homework problems. Prerequisite(s): Undergraduate thermodynamics and heat transfer courses.
RCL 563	Wind energy engineering	RCL 563: Wind energy engineering	Introduction to wind energy engineering, including wind energy potential and its application to power generation. Topics include wind turbine components; turbine fluid dynamics and aerodynamics; turbine structures; turbine dynamics; wind turbine controls; fatigue; connection to the electric grid; maintenance; wind site assessment; wind economics; and wind power legal, environmental, and ethical issues. Prerequisite(s): Undergraduate fluid mechanics course.
RCL 568	Internal combustion engines	RCL 568: Internal combustion engines	Study of combustion and energy release processes. Applications to spark and compression ignition, jet, rocket, and gas turbine engines. Special emphasis given to understanding of air pollution problems caused by internal combustion engines. Idealized and actual cycles are studied in preparation for laboratory testing of internal combustion engines.
RCL 569	Energy efficient buildings	RCL 569: Energy efficient buildings	Provides knowledge and skills necessary to design and operate healthier, more comfortable, more productive, and less environmentally destructive buildings; A specific design target of E/3 (typical energy use divided by three) is established as a goal. Economic, thermodynamic, and heat transfer analyses are utilized. Extensive software development. Prerequisite(s): MEE 410.
RCL 572	Design for environment	RCL 572: Design for environment	Emphasis on design for environment over the life cycle of a product or process, including consideration of mining, processing, manufacturing, use, and post-life stages. Course provides knowledge and experience in invention for the purpose of clean design, life cycle assessment strategies to estimate the environmental impact of products and processes, and cleaner manufacturing practices. Course includes a major design project.
RCL 573	Renewable energy systems	RCL 573: Renewable energy systems	Introduction to the impact of energy on the economy and environment. Engineering models of solar thermal and photovoltaic systems. Introduction to wind power. Fuel cells and renewable sources of hydrogen. Corequisite(s): MEE 410 or equivalent.
RCL 578	Energy efficient manufacturing	RCL 578: Energy efficient manufacturing	This course presents a systematic approach for improving energy efficiency in the manufacturing sector. Current patterns of manufacturing energy use, the need for increased energy efficiency, and models for sustainable manufacturing are reviewed. The lean-energy paradigm is applied to identify energy efficiency opportunities in industrial electrical, lighting, space conditioning, motor drive, compressed air, process heating, process cooling, and combined heat and power systems. Prerequisite(s): EGR 202, MEE 410.
RCL 590	Special Problems: Wind Energy	RCL 590: Special Problems: Wind Energy	Special problems in a designated area of energy systems arranged and approved by the student's faculty advisor and the departmental chair.
RCL 590	Special Problems: Geothermal	RCL 590: Special Problems: Geothermal	Special problems in a designated area of energy systems arranged and approved by the student's faculty advisor and the departmental chair.
RCL 590	Special problems: Buidling energy	RCL 590: Special problems: Buidling energy	Special problems in a designated area of energy systems arranged and approved by the student's faculty advisor and the departmental chair.
RCL 590	Special problems: Solar energy engineering	RCL 590: Special problems: Solar energy engineering	Special problems in a designated area of energy systems arranged and approved by the student's faculty advisor and the departmental chair.
RCL 590	Special problems: Thermal systems analysis	RCL 590: Special problems: Thermal systems analysis	Special problems in a designated area of energy systems arranged and approved by the student's faculty advisor and the departmental chair.
RCL 590	Special problems: Building energy informatics	RCL 590: Special problems: Building energy informatics	Special problems in a designated area of energy systems arranged and approved by the student's faculty advisor and the departmental chair.
RCL 590	Special problems: Sustainable energy systems	RCL 590: Special problems: Sustainable energy systems	Special problems in a designated area of energy systems arranged and approved by the student's faculty advisor and the departmental chair.

Undergraduate course numbers: 100 - 499; Graduate course numbers: 500 +

University of Dayton--Sustainability Course Offerings
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course number	title	course number and title	course description
RCL 590	Special Problems: LEED building design	RCL 590: Special Problems: LEED building design	Special problems in a designated area of energy systems arranged and approved by the student's faculty advisor and the departmental chair.
RCL 590	Special probems: Energy	RCL 590: Special probems: Energy	Special problems in a designated area of energy systems arranged and approved by the student's faculty advisor and the departmental chair.
RCL 590	Special problems: Advanced photovoltaics	RCL 590: Special problems: Advanced photovoltaics	Special problems in a designated area of energy systems arranged and approved by the student's faculty advisor and the departmental chair.
RCL 595	Renewable and clean energy project	RCL 595: Renewable and clean energy project	Student participation in an energy related design or development project under the direction of a project advisor. The student must show satisfactory progress as determined by the project advisor and must present a written report at the conclusion of the project.
RCL 599	Renewable and clean energy thesis	RCL 599: Renewable and clean energy thesis	Original research in energy systems which makes a definite contribution to technical knowledge. Results must be of sufficient importance to merit publication.
REL 472	Ecology and religion	REL 472: Ecology and religion	Examination of the relationship between religion and ecology; bridges the contributions of traditional theological inquiry and modern scientific insights and offers an enlarged vision of ecological concerns. Prerequisite(s): REL 103 or ASI 110 or equivalent.
SCI 230	Organisms, evolution, and the environment	SCI 230: Organisms, evolution, and the environment	An evolutionary approach to the relationship between living organisms and their environments. This survey of basic concepts in biology continues the evolutionary theme of the two prerequisite courses. Prerequisite(s): (SCI 190, SCI 210) or permission of instructor.
SCI 230L	Organisms, evolution, and the environment	SCI 230L: Organisms, evolution, and the environment	Laboratory exercises to accompany SCI 230. One two-hour laboratory per week. Prerequisite(s): SCI 230 (may be taken as a corequisite).
SEE 250	Introduction to sustainability, energy, and environment	SEE 250: Introduction to sustainability, energy, and environment	A multidisciplinary introduction to Sustainability, Energy and the Environment (SEE) and to the SEE minor. Emphasis on learning how to view complex issues from different disciplinary points of view, developing reading and critical thinking skills about current issues in sustainability, gaining an awareness of different ethical positions and how these influence the quest for solutions, and learning how scientific and sociopolitical processes work to investigate and address sustainability issues.
SEE 301	Global Change and Earth Systems	SEE 301: Global Change and Earth Systems	Multidisciplinary introduction to the science of the earth system. Focus is on the interrelatedness of geological, biological, chemical and physical processes, and on methods used to understand both the past natural history and potential future scenarios for change in the earth system. Corequisite(s): BIO 101, SCI 230, or equivalent.
SEE 303	Constructions of place	SEE 303: Constructions of place	Multidisciplinary, arts-based course that explores the complex connections between our sense of place and the physical and environmental conditions that influence landscapes and communities.
SEE 401	Sustainability research I	SEE 401: Sustainability research I	Interdisciplinary exploration of the issues of sustainability. The scientific, moral, spiritual, social, political, historical, ethical and economic dimensions of sustainability will be explored. Exploration of the foundations of ethical theory and their application to environmental issues. Students will pursue a research project with the primary focus on sustainability on campus. Prerequisite(s): PHL 103 or ASI 112 or ASI 120; completion of General Education Natural Science or CAP Natural Science Requirements: junior or senior standing.
SEE 402	Sustainability research II	SEE 402: Sustainability research II	An interdisciplinary exploration of the issues of sustainability as they affect the Dayton community. Course will also explore political philosophy and the ethical foundations of public policy. Students will choose an in-depth community-based research project. Prerequisite(s): PHL 103 or ASI 112 or ASI 120; completion of General Education Natural Science or CAP Natural Science Requirements; junior or senior standing.
SOC 328	Racial and ethnic issues	SOC 328: Racial and ethnic issues	Study of the historical and contemporary experiences of racial and ethnic groups in the United States and globally. Examines how racial and ethnic relations function in the political, social, legal, and economic systems, and how this impacts privilege, oppression, and resistance.
SOC 339	Social inequality	SOC 339: Social inequality	Study of the historical and contemporary experiences of groups in society in terms of social inequality. Examines social structures and how they contribute to social hierarchy and inequality. The students will examine the wealthy, middle class, and the poor in society. Emphasis on the processes that divide people into unequal groups based on wealth, income, status, and power. The effects of social inequality on an individuals' life chances will be examined in this course.
SOC 351	Urban sociology	SOC 351: Urban sociology	The study of the development of urban life from ancient times to the present, with an emphasis on contemporary urban population characteristics, social-economic-political structure, and problems. Prerequisite(s): SOC 101 or SOC 204.
SOC 352	Community: food justice	SOC 352: Community: food justice	Study of the interaction of groups and individuals related by common situations, problems and intentions; creation, maintenance, eclipse, and restoration of close social ties in urban neighborhoods, small towns, and groups with similar interests and lifestyles.

Undergraduate course numbers: 100 - 499; Graduate course numbers: 500 +

University of Dayton--Sustainability Course Offerings
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course number	title	course number and title	course description
SOC 368	Immigration and immigrants	SOC 368: Immigration and immigrants	Perspectives on immigration and ethnicity. Studies of social and economic adaptation of new immigrants and the second generation in communities, cities, and societies. Ethnic change, conflict, and contemporary national and international issues, with an emphasis on human rights. (Same as ANT 368.) Prerequisite(s): (SOC 101 or SOC 204) or ANT 150.
SOC 392	Food Justice	SOC 392: Food Justice	Examination of a current topic of general interest in sociology. Majors and nonmajors may enroll. Consult composite for topics. May be repeated as topic changes. Prerequisite(s): SOC 101 or SOC 204.
SOC 426	Leadership in building communities	SOC 426: Leadership in building communities	Investigation of the processes by which urban neighborhoods develop themselves from the inside out. Students cultivate their own interdisciplinary appreciation of urban communities through extensive interaction with one neighborhood's visioning process. Topics include asset-based community development, social capital, citizenship, adaptive leadership, and community building strategies and tools. Same as POL 426. Prerequisite(s): Junior standing.
SOC 435	Economy and society	SOC 435: Economy and society	Sociological analysis of modern economic institutions, with an emphasis on classical themes. Topics include capitalism, industrialism and social consequences of contemporary economic trends. Empirical research will be required. Prerequisite(s): SOC 101 or SOC 204; permission of instructor.
SSC 220	Social Science CAP: Globalization	SSC 220: Social Science CAP: Globalization	A theme-based course that varies across sections but shares common learning outcomes. Application of social science methods and social theory to critically examine human issues and problems from the perspective of at least three social science disciplines (anthropology, economics, political science, psychology and sociology). The course will emphasize outcomes related to scholarship, critical evaluation of our times, and the diversity of the human world.
UDI 262	Exploring Sustainability, Energy, and Environment	UDI 262: Exploring Sustainability, Energy, and Environment	This minicourse provides an exploration of sustainability, energy and environment (SEE) themes, people and organizations through a series of field trips. The course is designed for students in the SEE integrated learning-living community. It is also open to other students interested in SEE issues.
UDI 316	River Steward Experience I	UDI 316: River Steward Experience I	This course is for the River Stewards ONLY, the student group of the Rivers Institute at the University of Dayton. River Steward Experience Year I will highlight aspects of leadership development and civic engagement through education, experience and action in an interdisciplinary setting. Students will begin to lead discussions and interact with community partners. The Great Miami River will serve as the focus for community engagement and meaningful learning. Class limit: 20.
UDI 324	Living Simply and Sustainably	UDI 324: Living Simply and Sustainably	No description available.
UDI 416	River Steward Experience II	UDI 416: River Steward Experience II	This course will be a seminar for the River Stewards, the student group of the Rivers Institute at the University of Dayton. The course will be available for only River Stewards. Like the River Steward Experience Year I, this course will highlight components of education, action and experience. Further, participants in the Year II mini-course will, under the supervision of the instructor, organize and teach many of the topics covered in the Year 1 course. The Great Miami River will serve as the focus for community engagement and meaningful learning. The course will have primarily junior enrollment. It will require commitments beyond the classroom and readings.
VAP 490	Special problems in Photography	VAP 490: Special problems in Photography	Series of assignments to guide independent study in photography, formulated to meet individual needs of the student. Prerequisite(s): VAP 201; permission of department chairperson.

Undergraduate course numbers: 100 - 499; Graduate course numbers: 500 +