Spring 2021 Sustainability Courses

***Undergraduate Level***

**Sustainability Focused Courses**

**College of Arts & Sciences:**

**Intro to Sustainability Studies (GEV 3001)**

Development that meets the needs of the present without compromising the needs of future generations. Social, engineering, and economic dimensions, which make up the sustainability model.

**Advanced Sustainability Studies (GEV 4001)**

**Intro to Global Studies (GIS 2000)**

Gateway course to Global Interdisciplinary Studies, preparing for area studies specializations and GIS interdisciplinary programs. Focuses critical thinking skills through the comparative lens of both global and interdisciplinary analyses. Mandatory preparatory course for advanced study in GIS major.

**Sustainability Related Courses**

**College of Arts & Sciences**

**Biology (BIO 1101)**

General principles, cells and energy, hereditary mechanisms, survey of organisms, evolution and ecological principles. For non-biologists who do not plan a more extensive study of biology. Open to VSB majors.

**General Microbiology (BIO 3595)**

Bacteria, viruses, eukaryotic microbes, immune function. Microbes in air, water, soil: interactions with plants and animals. Agricultural, commercial, industrial, and medical applications. Laboratory studies in growth and analysis of selected organisms/viruses.

**Special Topics in Biology (BIO 3950)**

Coverage of current topics in biology. Topics announced on a semester-by-semester basis.

**Geography of a Globalizing World (GEV 1002)**

The human and physical realms of Geography. Focus on current geographic problems facing specific regions of the world.

**Geography of Earth’s Environments (GEV 1003)**

World climates, water, landforms, soil, and vegetation form the basis of this global environmental approach.

**Environmental Science II (GEV 1051)**

Second of two course sequence. Multidisciplinary foundation in Environmental Science: natural resources, pollution, & energy, with related field trips & laboratory sessions.

**Environmental Studies II (GEV 1053)**

Free elective course to provide Advanced Placement credit for Environmental Science

**Environmental Chemistry (GEV 2310)**

Interdisciplinary approach to chemical and biochemical phenomena. Sources, reactions, transport, effects, and fates of chemical species in the air, soil, and water environments, and their effect on human activity

**Special Topics: History of Disease (HIS 1065)**

Selected core courses exploring relationship between environmental and technological change in different eras and societies.

**Ethics for Healthcare Professionals (PHI 2115)**

Rights and duties of the patient/client and the members of the health care team, death and dying, genetic engineering and manipulation.

**Environmental Ethics (PHI 2121)**

The relation of the physical and biological environment to ethical values. Priorities among environmental, economic and political values as a basis for ethical decisions.

**Catholic Social Thought (PHI 2450)**

Catholic Social Thought from Rerum Navarum to the present. Its Aristotelean-Thomistic grounding. The Church's challenge to analyses of contemporary social, political, and economic systems.

**College of Engineering**

**CEE Capstone Design 2 (CEE 4606)**

**Principles of Air Pollution Control (CHE 5002)**Causes, effects and control of air pollution, emphasizing abatement technologies: classification and sources of airborne pollutants, particulate control devices, VOC abatement technologies, NOx and SOx abatement, and meteorological effects.

**EGR: Humanistic Context (EGR 2001)**

This course will focus on the biggest issues facing the world and the role engineering must play in the solution. Interdisciplinary engineering teams will be used to develop sustainable and humanistic solutions to real world problems.

**Thermodynamics (ME 3100)**

Elements of thermodynamics theory, system and control volumes, properties of pure substance, ideal gas, heat and work interactions, first and second laws, entropy.

**Thermal-Fluid System Design (ME 4850)**

Integration of thermodynamics, fluid mechanics and heat transfer and application to thermal designs. Characteristics of applied heat transfer problems: nature of problem specification, incompleteness of needed knowledge based and accuracy issues.

**Villanova School of Business**

**Global Political Economics (ECO 3108)**

Socio-economic conditions, political history, and government policy and the global impact on international trade and monetary relations; regional integration; stability of international economic systems; economic development and transition strategies; role of multinational corporations in the global world.

**Global Leadership (MGT 2360)**

Help students gain insights about the nature of culture, the nature of leadership, and their intersection. Provide students with an increased understanding of, (1) existing theory and research on different leadership and culture topics and, (2) themselves with respect to leadership development and cultural intelligence.

**Global Business Leadership (MGT 2370)**

Interactive study of business ethics within a global economy. Alternative ethical theories across and within different cultures are presented. Both Western and non-Western traditions are explored to develop a framework useful to address ethical challenges as they arise globally.

**Real Estate Development (RES 4150)**

Senior capstone class that focuses on the development process from land acquisition to final product incorporating real time real estate development projects. Specific topics include land acquisition, tax issues, optimal land use decisions, architectural and sight design, contracting and construction, leasing and marketing of properties and optimal exit strategies.

**Backpack-to-Briefcase: SO Seminar (VSB 2000)**

Professional development program combining class sessions and out-of-class activities focused on career exploration, job search skills, and development of soft skills.

**Corporate Responsibility & Regulation (VSB 2007)**

Examines law, ethics, corporate responsibility, and business regulation. Studies the sources, substantive principles, and evolving nature of law, and its role in ethical business decision making.

**Student-Managed Funds I (FIN 2342)**

Management of real-dollar portfolios using various investment styles; business cycle analysis; industry analysis; investment objective screening; security analysis; portfolio analysis, compliance; portfolio reporting. Approval of Finance Department Chair and instructor required.

**College of Nursing**

**Imperatives for Global and Public Health (NUR 3122)**

Factors that influence the health of communities and populations locally, nationally and globally. Public health principles and sciences, epidemiological data, environmental health, social determinants of health, genetics/genomics, influence of culture and health behaviors and health vulnerabilities are addressed.

**Principles of Nutrition (NTR 2120)**

Principles of normal nutrition and the interrelatedness of economics, culture and health.

***Graduate Level***

**Sustainability Focused Courses**

**College of Engineering**

**Renewable Energy Systems (ECE 7800)**

The design of renewable energy systems. Topics include: Solar Thermal Energy, Photovoltaics, Bioenergy, Hydroelectricity, Tidal Power, Wind Power and Geothermal Energy.

**Life Cycle/ Impact Assessment (EGR 7111)**

Methodology for assessing and modifying the impacts of product development, new project construction, operations upgrade and infrastructure improvement within a sustainable development framework consistent with US and global requirements.

**Sustainable Engineering Systems (EGR 7115)**

An overview of systems engineering theory and techniques in Sustainable Engineering with a central focus on sustainability related applications.

**ICT and Energy for Development (EGR 7123)**

Open source software and mobile tools and platforms for development; low cost renewable energy technologies for energy access; applications in health care, water and sanitation, education, agriculture, financial inclusion and monitoring and evaluation.

**Biomimicry (EGR 7200)**

Using observations from nature to provide sustainable solutions to our everyday needs. Key outcomes include whole system understanding of current solutions (benefits/issues), nature's capabilities, and new solutions by applying nature's capabilities to today's needs. Restricted to Engineering students or permission of instructor

**Intro to Sustainable Engineering for International Development (EGR 7120)**

Introduction to engineering in a developing community context; frameworks for applying engineering and technology to achieve sustainable development goals; geo-political, historical, institutional, economic, cultural, and ethical perspectives. NOTE: Intro course for the Sustainable Development track and should be the first course taken for this 4 course track program.

**Supply Chain Sustainability (EGR 8112)**

Sustainability practices from upstream sourcing from suppliers to manufacturing through delivery to customers and disposal and how these impact a company's triple bottom line. Topics include product/process design, green procurement, network management, life cycle assessment, performance measurement, risk management, among others

**Sustainable Buildings and Operations (EGR 8113)**

Focuses on implementing sustainability and reducing impacts of buildings. Students will evaluate green building standards for New Construction and Existing Buildings and learn the principals of making buildings more sustainable. Restricted to College of Engineering students. Otherwise permission of instructor.

**Villanova School of Business**

**Sustainable Real Estate Development (MBA 8827)**

This course reflects on the principles and processes of development including land acquisition, legal, zoning, planning and approvals. An in-depth study of the sustainable development of offices, mixed use communities, residential and renovation projects. Emphasis is on understanding and evaluating through case studies the design, architecture, sustainability and financial analysis of real estate development.

**Sustainability Related Courses**

**College of Arts and Science**

**GIS for Environmental Systems (GEV 7041)**

Advanced techniques, applications and projects in GIS focused on supporting graduate level research.

**Public Administration Theory (MPA 8011)**

**Financial Management (MPA 8031)**

**Effective City Management (MPA 8500)**

**Urban Politics and Government (MPA 8550)**

The study of city and suburban governments in metropolitan areas; special emphasis devoted to such topics as governmental form, city-suburb relations, race and ethnic relations, and economic change.

**Effective Nonprofit Management (MPA 8600)**

**Fundraising for Non-Profits (MPA 8700)**

Development plans, institutional mission & readiness factors, development of office operations, analysis of constituencies & effectiveness, communications & marketing, the role of the board of directors & volunteers, ethical considerations of fundraising, benchmarking, & the role of technology on philanthropy.

**Managing Public Networks (MPA 8800)**

**College of Engineering**

**Fate-Trans. Contaminants (CEE 7513)**

Physical, chemical, and biological processes governing the fate and transport of hazardous contaminants in natural and engineered systems: sorption, volatilization, biodegradation, hydrolysis, advection, and diffusion.

**Urban Planning (CEE 8303)**

Structure and history of urbanization in the United States. The current problems of cities and suburbs, and how they have evolved, will be the subjects of student projects. Will Philadelphia survive? Proposed solutions involving community activism, urban renewal, fiscal reform and new towns will be examined and evaluated. The design professional's role in the planning team is defined

**Watershed Modeling (CEE 8502)**

Continuation of CEE 8501 (Surface Water Hydrology). Use and application of hydrologic quality and quantity watershed models. Topics include GIS, Scale, accuracy and numerical and statistical methods.

**River Dynamics (CEE 8511)**

Changes in channels and floodplains through time based on the governing theories of fluvial geomorphology, river hydraulics, and sediment entrainment, transport, and deposition. Analysis of various aspects of channels numberically and using different software platforms.

**Bio Treatment Processes (CEE 8708)**

Biological treatment processes including aerobic, anoxic, and anaerobic processes; suspended growth and fixed film microbial communities; biological nutrient removal processes. Prerequisite: CEE 7511 or its equivalent.

**Separation Processes I (CHE 8571)**

Distillation processes, from the equilibrium-stage point of view: separation factors, phase equilibrium relationships, analysis of steady state processes such as flash vaporization, binary, multicomponent and azeotropic distillations, batch distillation.

**Convection Heat Transfer (ME 8120)**

Fundamentals of convection; conservation of mass, momentum and energy in integral and differential forms; laminar and turbulent, forced, and natural convection in internal and external flows; introduction to mass transfer. Prerequisite or Corequisite ME 7000.

**College of Nursing**

**Principles of Epidemiology (NUR 7084)**

Determinants and distribution of health and illness; application of epidemological principles and biostatistics to advanced nursing practice and health care delivery.

**GlobalPresp for Climate & Health (NUR 7091)**

An interdisciplinary, international course that examines the impact of climate change on human health in Finland, India, Nigeria and the U.S. and strategies for mitigation and adaptation. Part of the Global Health Minor

**Charles Widger School of Law**

**International Enviro Law Seminar (LAW 6010)**

This three-credit seminar explores environmental problems that transcend national boundaries and thus implicate questions of international law. After an introduction to the international legal system in general and as it pertains to the environment. Potential research paper topics include depletion of the ozone layer, biologically modified foodstuffs, invasive species, trade and the environment, and the loss of biodiversity. Given the recent increase in the number and severity of catastrophic storms and other weather-related disasters and the growing documented evidence of global warming, there will be a special emphasis on climate change as one of the most urgent issues now facing the global community. Students will be required to write a research paper on a topic of their choice (suggestions are available) and are expected to participate in class discussions.

**Energy Law (LAW 7207)**

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This course will examine the regulation and development of energy in the United States. Energy law is an area of increasing activity and importance in the law, driven by increasing attention to the environmental impacts of existing fossil fuel-based generation, the growth of renewable energy generation, and increasing concerns with U.S. energy security. Moreover, as energy law ascends in importance, it will increasingly intersect with other areas of the law, such as administrative law, business law, land use law, and environmental law. Thus, many students who do not pursue a career in energy law are likely to encounter energy law in their legal careers. Instead of using a traditional course format with assigned readings from a casebook, this course will emphasize self-directed student work and small-group collaboration, including the frequent use of simulations.