LIST OF UND SUSTAINABILITY COURSES AND SUSTAINABILITY RELATED COURSES
UNDERGRADUATE AND GRADUATE LEVEL.

The list below is not exhaustive, this is a first attempt at listing UND Sustainability courses or sustainability related course. Please contact Soizik Laguette (laguette@aero.und.edu) or Jeff VanLooy (Vanlooy@aero.und.edu) to add one course plus course description to the list, or if you think a course should change category.

Sustainability courses

ESSP 160. Sustainability & Society.
Human interactions with the natural environment are often perceived as conflicts between environmental protection and socio-economics. Sustainability attempts to redefine that world view by seeking balance between the 'three Es' - environment, economy, equity. This course examines the concept of sustainability, the theory behind it, and what it means for society.

ESSP 200. Sustainability Science.
This course will provide an integrated, system-oriented introduction on the concepts, theories and issues surrounding a sustainable future for humans and the Planet Earth. The course will address the concept of sustainability, the concept of a system, explore human world views, provide an introduction to energy, complexity and ecosystems, and examine resources use, food production, industrial development and the prospects for a sustainable future.

ESSP 310. Sustainable Food Systems.
This course will examine the need for development of sustainable food production systems. The course will introduce the concept of an integrated agro-ecosystem. Students will learn how food production systems work, how they impact natural ecosystems, how fragile the human food resource has become, and gain an appreciation of the complexity of relationships between humans and food. F, even years.

ESSP 320. Land and Water Sustainability.
This course covers topics of sustainability of physical landscapes and water on the Earth. Class lectures will introduce concepts related to landscape use, perception of landscape and water use as a resource, and most importantly how to use the physical landscape and freshwater as a resource in a manner to which it will be viable for future generations (i.e. landscape and water resource sustainability). Topics include, but are not limited to snow and glacier melt water, ground water, mountain environment resources, river flood plain land use, and water use in desert environments.

The objective is to introduce the varieties of adaptation and mitigation strategies to address four main sustainability challenges: land use/land cover change, climate change, water security, and biodiversity loss. The major physical processes of the Earth systems will be examined, together with the natural and anthropogenic changes in these processes; then, the societal impacts from modifications to the Earth
systems will be described; finally, the strategies of adaptation and mitigation will be compared, using a variety of regional case studies as examples.

**ESSP 420. Sustainable Energy.**
This course is an interdisciplinary exploration of Sustainable Energy. The interdisciplinary exploration includes the analysis of renewable energy systems as well as the socio-economical, political, and environmental aspects of renewable energy. The course will specifically analyze the origin and dimensions of global energy issues and identify how renewable energy issues and policies are critical to the sustainable future of global environmental quality, economic growth, social justice, and democracy.

**ESSP 450. Environmental and Natural Resource Economics.**
This course will cover the general topics in the field of environmental and natural resource economics: market failure, pollution regulation, the valuation of environmental amenities, the use of renewable and non-renewable resources over time, and the economics of biodiversity conservation, climate change and sustainability. We will analyze the issue of efficient use of resources over time, whether market equilibrium achieves an efficient outcome, common property resources, imperfect competition in energy market, and uncertainty, irreversibility and discounting related issues in environmental policy design. The course has a strong focus on the interaction between human society and natural environmental systems and the connection between market equilibrium and social sustainability.

**ESSP 499. Special Topics in Sustainability.**
Investigation and detailed study of special topics related to sustainability issues. The course may include a lab if applicable. Repeatable once with different topic.

**IS 385. Sustainable Communities.** 3 credits. This course discusses how societies can build sustainable communities, focusing on indigenous communities in North America and through comparison around the globe.

**IDS 399 - 01 Interdisciplinary Topics (undergrad); A&S 599 - 02 Special Topics (grad): Sustainable Cities Initiative – transforming English Coulee**
This course focuses on the sustainable development of the English Coulee watershed to improve its environment, aesthetic, and recreational uses and is part of a partnership between UND and the City of Grand Forks. The course will involve presentations by a multidisciplinary group of professionals who will share their perspectives and lead class discussions on practical long-term solutions to the challenges. Field visits to the Coulee may occur as part of the class.

**Ch.E420. Capstone in Sustainable Energy.** The student will work one-on-one with a faculty member to develop a concept paper on the primary issues facing the development and implementation of sustainable energy technologies.

**SEE 510. Process Design and Feasibility Assessment of Sustainable Technologies.** The research-to-commercialization lifecycle and evaluation methods are examined indepth using sustainable energy technologies as specific case studies.
SEE 590. Special Topics in Sustainable Energy Engineering. Investigations of special topics in sustainable energy engineering dictated by students and faculty interests.

**Courses that include sustainability**

GEOG 250. Introduction to Geopolitics. 3 credits. As a branch of political geography, the study of Geopolitics is concerned with the spatial dynamics of power relations, especially at the international level. From a geographic perspective, this course surveys changing relations among states and the influences of national and transnational actors and events. The course attempts to help students apply a broad range of theoretical perspectives to the analysis of global and regional issues and events, and develop insights into what is happening in the world today. From war and terrorism to economic globalization, human rights and sustainable development, this course will explore a myriad of important issues and challenges that face the world today.

GEOG 454. Conservation of Resources. Geographic principles applied to the analysis of natural resources and their efficient utilization. Emphasis is on sustainable development.

ESSP 460. Global Environmental Policy. Governance and policy are the most common strategies used to address environmental problems. This course introduces students to the foundation, development, actors, process, challenges, and future outlook of global environmental policy. By navigating various levels of US and global governance, students will explore a variety of concepts and principles in the development and implementation of environmental policies.

TECH 332. Industrial Design. In this industrial design course students will learn how to design products in support of human activities and interactions. Principles and techniques of needs assessment, patent research, concept realization, design alternatives, and prototype development will be introduced through a creative and inventive process to address various instrumental factors such as product aesthetics, functionality, materials, sustainability and usability.

ChE 411. Plant Design I: Process Design and Economics. Introduction to how projects are executed in the process industries, including an understanding of what constitutes preliminary process design, preliminary cost estimation, the fundamentals of economics as applied to process economic assessment, sustainability considerations in design, oral and written communications, teamwork, and the typical drawings and other deliverables produced during the scoping phase of process plant design. There is a particular emphasis on safety considerations in design.

ESSP 333. Oceanography. Oceanography introduces the ocean and the study of the ocean, which regulates our climate, maintains our atmosphere, and serves as an enormous resource. The course explores all aspects of the oceans—their physics, chemistry and biology, as well as the structure of the basins that contain them. Students will learn how the oceans interact with the atmosphere and the solid Earth, understand the role played by the oceans, not only as a producer of food and source of recreation, but as a transporter of heat energy, sink for greenhouse gases, and moderator of the climate. In the end, students will come away
with a deeper understanding of how the ocean works and greater appreciation for the benefits we derive from it.

This course focuses on economic development issues at the global level. It covers both developing countries in the conventional sense and economies in transition from socialism to a market economy. In this context development is broadly defined as the transition from one stage of development to another. Selected topics common among these countries (such as determinants of growth, modernization, technology, price liberalization, privatization, macro stabilization, trade policies, legal structure, organized crime, inequality, poverty, human capital, and global sustainability) are discussed to better understand the forces that shape the wealth and well being of nations and people in the world around us.

PHIL 253. Environmental Ethics.
The course centers on the way that ethics helps us to understand environmental issues. We examine a broad cross-section of environmental issues from a variety of traditional and contemporary ethical frameworks. Issues include sustainability, animal rights, energy consumption, habitat loss, biodiversity, land conservation, and pollution. Class members will explore such issues through case studies in a context of relevant ethical history and theory.

TECH 570. Sustainability Challenges and Opportunities.
This course begins with an overview of the fundamental concepts associated with energy from its generation, use, and environmental implications to conservation practices and pricing schemes. Students will also learn how to conduct energy audits and examine issues associated with energy management.

ENTR 580. Seminar in Social Entrepreneurship.
Social Entrepreneurship is a rapidly growing, interdisciplinary area of interest that draws on entrepreneurial knowledge and skills to craft innovative businesses that address social needs. This course explores current trends in both the private and social sectors, which are creating space for innovation and opportunities for individuals to apply their business skills to drive positive and large scale social change. We will explore major opportunities and challenges presented by social enterprise through examining a variety of models ranging from social purpose to the creation of social ventures. Students will work in teams to conduct a feasibility study for a social entrepreneurship related project. Through the project, students will enhance and apply their understanding of business strategies and processes that enhance sustainability and social impact. These strategies can include launching revenue-generating enterprises, developing a marketing plan for an existing social enterprise, or creating strategic partnerships with the private sector. Students will also gain practical skills necessary to develop and manage a high-impact social venture.

ECON 580. Economic Development: Global, National, and Regional Issues. The first part of this course focuses on growth theories, globalization and economic development and sustainable growth among less developed, developing, and more developed countries, as well as countries in transition to market economies. The second part of the course specifically examines economic development for advanced nations, incorporating rural, urban and regional economic analysis. Issues such as rural technology,
employment, poverty, housing, transportation, location problems, industrialization, urbanization and sustainable growth in North Dakota and North Central Region are explored.

An overview of the fundamental issues from five research areas: Biodiversity and Ecosystem Functioning; Climate and Environmental Change; Land and Resource Management; Environmental Policy, Management, and Communication; and Human Health and the Environment. Material will be presented “situationally” in a problem-based learning environment. ESSP faculty and guest lecturers will present background information relevant to the topics. Students are expected to engage actively in the learning process by 1) determining what further information they need to understand the problem, 2) researching the questions, 3) clearly and concisely presenting the findings of their research to one another.

ESSP 502, 502R, 502L. Earth System Science and Policy II.
Course follows the design of ESSP 501 but with more emphasis on written reports and team projects. At the beginning of the semester, students will either select or be assigned a topic for an interdisciplinary team project for completion by the end of the semester. The team project helps students acquire an interdisciplinary outlook, and fosters communication and cooperation within a positive multi-disciplinary work environment. This will provide students with skills that are integral to the management of complex environmental problems they will face in the world beyond academia.