SCIE310: The Scientific Basis of Sustainability

College of Graduate and Continuing Studies, Norwich University

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Course Description

This course begins by examining how Sustainability Science has emerged in the 21st Century as a new academic field defined by the problems it addresses rather than by the individual disciplines it includes. By addressing the complexity of the problems that threaten the survival of life on this planet, sustainability science combines the study of environmental, human and engineered systems to provide solutions to problems such as climate change, pollution and biodiversity loss.

The course then examines how evidence-based, quantitative data is collected and used to define and monitor sustainability-related issues and problems, and discusses how critical thinking skills can be applied to an interdisciplinary understanding of problems and solutions, as well as how information networks can both supply important data and serve as a medium for communicating with other interested parties on a global basis.

The course concludes by examining how sustainability science relates to an ever-widening range of decisions, strategies and activities in the private, public and military worlds, illustrating how an understanding of sustainability science will be critical to every future leader's toolkit of competencies.

Learning Goals and Outcomes

- Analyze five current usages of the term Sustainability and formulate a working definition of the term that encompasses three of its most important characteristics.
- Provide a ranked list of five principal challenges that an individual in one of the major Sustainability specializations (e.g., Pollution and Waste Management, Defense Sustainability, Agriculture and Food Sustainability, Sustainable Energy, etc.) will be forced to address in the coming decade, with reference to human or natural variables that may affect these predictions.
- Describe in general terms the principal stakeholders in sustainable development, including citizens; federal, state and local governments; the media; NGOs; foundations; universities and research organizations; and private corporations.
- Schematize one industrial, organizational or infrastructure process from the student's work or educational experience that can be improved by sustainable design.
- Describe the utility, cost and availability of two information-technology based tools in forecasting measurable environmental outcomes that can aid in sustainability management decision making. These tools can include GIS, remote sensing, modeling, and Big Data resources and applications.
- Demonstrate the use of the scientific method to design, conduct and analyze inquiries relating to environmental data collection.

Student Learning Outcomes

Students successfully completing this course will have the ability to:

- Understand and describe how Sustainability Science relies on specific scientific and disciplines but differs by its focus on solving environmental problems and processes.
- Identify at least four academic or scientific disciplines that contribute to the analysis of sustainability problems, and describe the opportunities and challenges that can result from an interdisciplinary interaction of the examples cited.

- Demonstrate the ability to acquire, analyze, and critically evaluate sustainability-related data from at least five different types of sources, such as environmental sample measurements, geospatial data, government regulations and guidelines, media sources, and population or demographic data.
- Identify leadership opportunities in sustainability science and management in corporate, public, military, academic and other fields.
- Demonstrate the ability to write in a clear and compelling way to illuminate a sustainability topic with precision and originality.

Required Textbooks

The following texts as eBooks are used in the course.

Primary Textbook

- Theis, T., & Tomkin, J. (2011 rev 2015). ***Sustainability: A comprehensive foundation***. OpenStax (CC BY 3.0).

Additional Readings

- Kelly, B. (2013, September 29). *Standards for sustainable infrastructure*. OpenStax (CC BY 3.0).
- Klein-Banai, C. (2014, March 18). *Sustainability metrics and rating systems*. OpenStax (CC BY 3.0).
- **Optional:**
  - *Sustainability* – Open Access Journal
    - *Sustainability* (ISSN 2071-1050; CODEN: SUSTDE) is an international, cross-disciplinary, scholarly and open access journal of environmental, cultural, economic, and social sustainability of human beings. *Sustainability* provides an advanced forum for studies related to sustainability and sustainable development, and is published monthly online by MDPI. (MDPI Open Access License)
  - *Toxics* – Open Access Journal
    - *Toxics* (ISSN 2305-6304; CODEN: TOXIC8) is an international open access journal on all aspects of toxics, published quarterly online by MDPI. (MDPI Open Access License)
  - *Environments* – Open Access Journal
    - *Environments* (ISSN 2076-3298) is an international scientific open access journal of environmental sciences published quarterly online by MDPI. (MDPI Open Access License)
  - *Sustainability: Science, Practice, & Policy* (ISSN 1548-7733): A peer-reviewed, open access e-journal published by ProQuest. (SSPP Open Access License)

Late Work

It is important that writing assignments and discussion posts be completed on time. Extensions of deadlines will be given only for serious extenuating circumstances. In the absence of such extensions, assignments may be downgraded for lateness at the discretion of the instructor. You must contact your instructor ahead of time to request an extension.

Assignments and Grades

In this 3-credit course, you can expect to spend 15-20 hours per week over the eight-week course schedule. The instructor expects each student to participate actively in weekly discussions, and to post at least two original contributions that relate to the assigned topics; further each student is required to post at least two comments on postings submitted by other students. Each posting will be assessed and graded according to its depth of analysis and its clarity and style.

Discussion Topic Assignments

For each of the four assignments, please select one of the two choices and submit an essay of approximately 750 words in digital format. (This is the equivalent of three, double-spaced pages of text in a 12-point font with normal margins.) Your essay may exceed this amount, and may be supplemented with your own charts and illustrations or those that you find in other sources, but in the latter case be sure to provide clear and full references to the sources used, and remember that your grade will be based on your original thoughts and your success in communicating them clearly and persuasively.

Curated Digital Archive (Final Project)

The Curated Digital Archive (CDA) is both a final project for this course and an active tool that will assist you in your future work in any area that deals with sustainability science and practice. The CDA involves two principal activities:

1. Information Gathering, in which you assemble references, pictures, charts, computer application, and anything else of possible interest or use to your studies in sustainability science. You can arrange these sources in a web page format, or in a Microsoft Word document.
2. Data Curation, in which you evaluate, organize, prioritize and annotate the sources you assembled in phase one, and produce an archive that is dynamic and useful, and one that you will continue to use in the future.

Please also refer to Grading Guidelines and Rubrics on the front page of your course.

Here is the breakdown of graded assessments:

Graded Assessment Type	Week	Number Required	Points Each	Total Points	Percent
Weekly Discussions	1 - 8	8	50	400	40
Discussion Topic Assignment	2, 4, 5, 7	4	100	400	40
Curated Digital Archive	8	1	200	200	20
Totals	--	13	--	1000	100

Letter grades for the course will be based on the following grading scale.

Letter Grade	Percentage	Grade Point
A	93-100%	4.0
A -	90-92.9%	3.7
B +	87-89.9%	3.3
B	83-86.9%	3.0
B -	80-82.9%	2.7
C +	77-79.9%	2.3
C	75-76.9%	2.0
C -	73-74.9%	1.7
D +	70-72.9%	1.3

D	67-69.9%	1.0
D-	63-66.9%	0.7
F	0-62.9%	0.0

For complete information on the Grading Policy for Bachelor Degree students, please refer to the CGCS Online Catalog (Sub-Section of Catalog on "Grades.")

Academic Honesty and the Norwich University Honor Code

A student must submit work that represents the student's own original analysis and writing. Copying another's work is not appropriate. If the student relies on the research or writing of others, the student must cite those sources. Words or ideas that require citations include, but are not limited to all hardcopy or electronic publications, whether copyrighted or not, and all verbal or visual communication when the content of such communication clearly originates from an identifiable source. While students are encouraged to seek editing feedback, extensive revisions of one's work by another person is considered a lack of academic honesty, as it is representing another student's work as one's own.

For more information see:

Academic Dishonesty
Academic Integrity
Norwich University Honor Code

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Section 504 of the Rehabilitation Act of 1973/ADA

Please consult Appendix H: University Policy - Section 504 of the Rehabilitation Act of 1973/Americans with Disabilities Act (ADA) for instructions on obtaining an accommodation.

Disclaimer: Please note the specifics of this Course Syllabus are subject to change. Students are responsible for abiding by any such changes. Your instructor will notify you of any changes.