EN-530WS: Introduction to Sustainable Engineering

School of Engineering

Instructor: Jon Aktas, Ph.D.
Course Schedule: asynchronous course with weekly discussion sessions via Zoom
Virtual session link: https://stevens.zoom.us/j/94440477575 (also accessible via Canvas)
Virtual Office Hours: Friday 10:30-11:30 am EST; you may always schedule an appointment for other times
Contact Info: caktas@stevens.edu

COURSE DESCRIPTION

This course examines the global environmental and resource issues we face because of human actions; in particular those to which engineering has been a contributor and also for which engineers can offer the solutions that move us along the path to a sustainable future. There is an increasing stress in the planet's limited resources as a result of population growth and improving standards of living which demands future engineers to use natural resources more efficiently and minimize waste generation while satisfying an increasing demand of goods and services. The course integrates social, environmental, and economic considerations into engineering activities while addressing macroscopic considerations, including various important systems and cycles, industrial ecology and life cycle analysis of products and processes.

STUDENT LEARNING OUTCOMES

The goal of this course is to integrate social, environmental, and economic considerations into engineering activities while addressing macroscopic considerations, including various important systems and cycles, as well as life cycle analysis of products and processes.

The objective of this course is to introduce the students to the use of industrial ecology approaches and life cycle analysis in the integration of relevant social issues, economics and environmental principles in the design and implementation of products, processes, and engineering systems.

After successful completion of this course, students will be able to:

- assess social, economic, and environmental impacts of products and processes,

- differentiate among different types of environmental impacts and trade-offs amongst them,
- understand the implications and use of life cycle assessment as a design and evaluation tool.

As such, it is expected that students should gain expertise to be able to assess in terms of environmental, economic, and social indicators that an acceptable balance exists between the effects of undertaking engineering activities and the benefits that those activities deliver.

COURSE FORMAT AND STRUCTURE

This course is fully online and there will not be any on-ground meetings. To access the course, please visit stevens.edu/canvas . For more information about course access or support, contact the Technology Resource and Assistance Center (TRAC) by calling 201-216-5500.

Course content has been organized by modules/weeks, and the structure of the course is built on the progression of these modules. We will cover 1 module every week. This is to ease following course content as well as to ensure a uniform distribution of material throughout the semester. Lecture notes are present within each module, and so are assessment activities. Modules will become available on a set date (weekly basis) as opposed to all at once.

There will be **synchronous office hour sessions every week** on Friday mornings. These meetings are an opportunity to discuss ideas and questions and to go over material you did not fully understand. I will not be lecturing during those meetings. I will not take attendance and attendance is not mandatory, but highly encouraged. Since this is a graduate level course, **you are expected to review course material before-hand (i.e. before virtual office hour sessions on Friday mornings)**, including carefully going over lecture notes as well as watching any assigned videos. This is vital to achieve the desired quality and depth in discussions. Weekly journal entries will be due before these virtual sessions. Weekly quizzes that accompany every module needs to be completed by end of day Friday. Both of these assessment types are to ensure students review the material before live sessions with the ultimate goal of aiding students grasp course content.

We will use Zoom software to connect during synchronous sessions. Make sure to have the software installed on your computer and that you can access your account. Also make sure to have a device with a camera and a microphone to join live sessions.

Assignments are to be submitted through the Canvas course shell. Every assignment will have a set deadline and it is important for students to submit them on time. Late submissions will have automatic point deductions; 20% of the total points will be deducted for assignments received 1-3 days late, and assignments received more than 4 days late will receive 0 points. Due dates and delivery times are defined as Eastern Standard (or daylight saving) Time (as used in Hoboken, NJ). Please note, students living in distance time zones or overseas must comply with this course time and time and due date deadline policy.

Please do not hesitate to contact me via Canvas or email if you have any questions or concerns.

Online Etiquette Guidelines

Your instructor and fellow students wish to foster a safe online learning environment. All opinions and experiences, no matter how different or controversial they may be perceived, must be respected in the tolerant spirit of academic discourse. You are encouraged to comment, question, or critique an idea but you are not to attack an individual. Our differences, some of which are outlined in the University's inclusion statement below, will add richness to this learning experience. Please consider that sarcasm and humor can be misconstrued in online interactions and generate unintended disruptions. Working as a community of learners, we can build a polite and respectful course ambience. The Netiquette rules for this course are:

- Do not dominate any discussion. Give other students the opportunity to join in the discussion.
- Do not use offensive language. Present ideas appropriately.
- Be cautious in using Internet language. For example, do not capitalize all letters since this suggests shouting.
- Avoid using vernacular and/or slang language. This could possibly lead to misinterpretation.
- Keep an “open-mind” and be willing to express even your minority opinion.
- Think and edit before you push the “Send” button.
- Do not hesitate to ask for feedback.

TENTATIVE COURSE SCHEDULE

Week	**Topic(s)**	**Lecture Notes to be Covered**	**Quizzes** (to be taken by end of day Friday)	**Journal Entries** (due before Friday office hour)	**Assignments** (due 1 week after assigned date indicated below)
1	Introduction to Sustainability and Sustainable Engineering	L1	Q1		
2	Relation Between Population, Resource Consumption, and Sustainability	L2	Q2	J2	
3	Climate Change and its Impacts	L3	Q3	J3	A3
4	Traditional Energy Sources	L4	Q4	J4	
5	Alternative Energy Sources	L5	Q5	J5	
6	Water Resources and Their Management	L6	Q6	J6	A6
7	Built Environment, the State of Infrastructure and Their Problems	L7	Q7	J7	A7
8	Life Cycle Assessment	L8	Q8	J8	
9	Life Cycle of the Built Environment	L9	Q9	J9	A9
10	Life Cycle Impact Assessment	L10	Q10	J10	A10
11	EIO-LCA	L11	Q11	J11	A11
12	LCA Case Studies in Civil Engineering	L12		J12	
13	Design for Environment	L13	Q13	J13	Project Part 1
14	Course Wrap-up and Project Discussions				Project Part 2; Project Poster
Finals Week	Project Submissions				

COURSE MATERIALS

Lecture Notes provided by the instructor should be your primary source of study. The provided notes builds upon and expands on the following two textbooks. You may want to obtain a copy as reference or for future use.

- **Industrial Ecology and Sustainable Engineering,** Graedel, T.E., Allenby, B.R, Prentice Hall, 2009, ISBN-13: 978-0136008064.
- **Environment,** Hassenzahl, D.M., Hager, M.C., Gift, N.Y., Berg, L.R., Raven, P.H., John Wiley & Sons, 10th Ed., 2018, Paperback ISBN 978-1119393481

COURSE REQUIREMENTS AND GRADING PROCEDURES

Assessment Method	Weighting
Assignments	30%
Journal Entries – weekly	25%
Quizzes – weekly	25%
Project	20%

Each assessment in this course will have a set deadline that will be announced at the beginning of the semester. Make sure to submit on time as late submissions will result in automatic point deductions.

There will be multiple homework assignments related to subjects covered in the course. Assignments will require you to carry out some additional research outside of lecture notes, and/or form and present your opinion on the topic covered that week. Grades will be based on depth, clarity, accuracy, and originality of the work submitted.

Students are required to submit weekly journal entries individually. You should summarize what you learned from that week's content within 1-2 paragraphs, discuss facts that impressed/shocked you from what you learned and things you found interesting, and any extension questions you pondered while you were studying. You should also write about any concepts you did not understand. These entries will be condensed and revisited during the weekly synchronous office hour sessions.

There will be brief weekly quizzes during the semester that will be scheduled for after the synchronous meeting sessions. They will have a set duration that will start once you access the quiz.

There is a project associated with the course. This is a chance for students to apply what they learn in class to their surrounding, or gain additional skills and knowledge on a topic of their choosing. Project deliverables will include a proposal document outlining the importance of the chosen topic, planned activities and milestones, and goal of the study. The final written report will present results as well. Students are also expected to prepare a poster presenting their work. The project may be carried out individually or in groups.

As the synchronous sessions are discussion sessions, attendance and participation are strongly encouraged but do not have an assigned grade percentage.

Grade scale

90%+……A
85-90%.....A-
80-85%.....B+
75-80%.....B
70-75%.....B-
65-70%.....C+
60-65%.....C

TECHNOLOGY REQUIREMENTS

Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Navigating Canvas

Technology skills necessary for this specific course

- Live web conferencing using Zoom
- Recording a slide presentation with audio narration
- Recording, editing, and uploading video via Kaltura

Required Equipment

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed
- Microphone: built-in laptop or tablet mic or external microphone

Required Software

- Microsoft Word
- Microsoft Excel
- Microsoft PowerPoint

Late Policy

20% of the total points will be deducted for assignments received past the deadline; assignments received 4 or more days late will receive 0 points. Quizzes need to be completed on time. No extensions or partial grades will be assigned for missed quizzes.

Academic Integrity

Collaboration among students is strongly encouraged but with exception of eventual group assignments, the work should be individual. The term paper document will be submitted through the Turnitin^{R} tool.

Undergraduate Honor System

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution. More information about the Honor System including the

constitution, bylaws, investigative procedures, and the penalty matrix can be found online at http://web.stevens.edu/honor/

Reporting Honor System Violations
Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at www.stevens.edu/honor.

Graduate Student Code of Academic Integrity

All Stevens graduate students promise to be fully truthful and avoid dishonesty, fraud, misrepresentation, and deceit of any type in relation to their academic work. A student's submission of work for academic credit indicates that the work is the student's own. All outside assistance must be acknowledged. Any student who violates this code or who knowingly assists another student in violating this code shall be subject to discipline.

All graduate students are bound to the Graduate Student Code of Academic Integrity by enrollment in graduate coursework at Stevens. It is the responsibility of each graduate student to understand and adhere to the Graduate Student Code of Academic Integrity. More information including types of violations, the process for handling perceived violations, and types of sanctions can be found at www.stevens.edu/provost/graduate-academics.

Special Provisions for Undergraduate Students in 500-level Courses

The general provisions of the Stevens Honor System do not apply fully to graduate courses, 500 level or otherwise. Any student who wishes to report an undergraduate for a violation in a 500-level course shall submit the report to the Honor Board following the protocol for undergraduate courses, and an investigation will be conducted following the same process for an appeal on false accusation described in Section 8.04 of the Bylaws of the Honor System. Any student who wishes to report a graduate student may submit the report to the Dean of Graduate Academics or to the Honor Board, who will refer the report to the Dean. The Honor Board Chairman will give the Dean of Graduate Academics weekly updates on the progress of any casework relating to 500-level courses. For more information about the scope, penalties, and procedures pertaining to undergraduate students in 500-level courses, see Section 9 of the Bylaws of the Honor System document, located on the Honor Board website.

LEARNING ACCOMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

For more information about Disability Services and the process to receive accommodations, visit https://www.stevens.edu/office-disability-services. If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at pgehman@stevens.edu or by phone 201-216-3748.

Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

INCLUSIVITY

Name and Pronoun Usage

As this course includes group work and class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.

Inclusion Statement

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

MENTAL HEALTH RESOURCES

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression) and who can visit the office in person. CAPS is open from 9:00 am – 5:00 pm Mondays, Wednesdays, Thursdays and Fridays and from 9:00 am – 7:00 pm on Tuesdays during the Fall and Spring semesters; appointments are highly encouraged. For those students who cannot visit the Stevens campus for an in-person appointment, you can contact a local mental health care provider for an in-person appointment, or if you are enrolled in the Stevens Student Health Insurance, you may call Care Connect for 24/7 mental health support at 1-888-857-5462.

For further information please visit the CAPS webpage on Seeking Help Off-Campus.

EMERGENCY INFORMATION

In the event of an urgent or emergent concern about the safety of yourself or someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105

or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year-round. For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct. Other 24/7 national resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text "Home" to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at care@stevens.edu. A member of the CARE Team will respond to your concern as soon as possible.