



SUFFOLK
UNIVERSITY
MADRID CAMPUS

SCI 171 M1 - THE BUILT WORLD: HOW HUMANS ENGINEER THE ENVIRONMENT

Instructor Information:

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Course Information:

Catalog Description: The most basic needs of humans have not changed - water, food, and shelter - but the means of meeting these needs has. In this course, we will examine how technology-driven societies operate by studying how cities are built and how they function. Topics will include water supply and distribution systems; transportation systems (including road and bridge design and construction); building design, construction, and operation (including skyscraper and sustainable building design), and waste removal systems (municipal and industrial wastewater removal and treatment, solid waste removal and treatment). This is not a course about little gadgets and widgets; this is a course about big engineering marvels; and it emphasizes applications of science - how things work - rather than scientific theory.

Instructor's Additional Course Description: The course will provide a general context in which the main actor will be the built world moving towards a sustainable society. So, the different units focusing on the workings of basic human infrastructures will be framed in the context of economy, environment and the human predicament.

Prerequisites: None

Credit Hours: 4 credits

This course follows the US Federal Government's Credit Hour definition: "An amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutional established equivalence that reasonably approximates no less than:

- (1) One hour of classroom or direct faculty instruction and a minimum of two hours of out of class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or
- (2) At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours."

For full up-to-date statement:

https://cihe.neasc.org/sites/cihe.neasc.org/files/downloads/POLICIES/Pp111_Policy_On_Credits-And-Degrees.pdf

To complete this course, students will need to dedicate, at a minimum, the following amount of time to the listed activities:

Assignments/Activities	Engagement Estimate	Engagement Hours
Course readings + Homework	5 assignments x 6 hours	30
Ppt Presentation + Megaprojects	2 x 10 hours	20
Review lecture notes	4 pages/lecture x 43 lectures x 7 min per page	20
Exam preparation	10 hours x 2	20
Research paper	Reading sources 25 + writing 20	35
Research presentation		15-20
Class Attendance	3 hours x 15 weeks	45
TOTAL		185-190 hours

Textbook/Course Materials:

Infrastructure: A Guide to the Industrial Landscape, Brian Hayes, W. W. Norton & Company, NY, 2014.

Additional Readings: Readings, in addition to the textbook readings, will be provided. These readings are considered **mandatory**.

Course Goals & Learning Objectives:

Upon successful completion of this course, students will know/understand	Upon successful completion of this course, students will be able to	How the student will be assessed on these learning objectives:
<ul style="list-style-type: none"> that the Science, Technology & Engineering (STE) disciplines involve a manner of inquiry and a process, and are not just content. 	<ul style="list-style-type: none"> distinguish between hypothesis-driven and inquiry-based research. recognize the flexibility of the discovery process and the scientific method. analyze and solve a problem based upon information from the scientific / technical literature. 	<ul style="list-style-type: none"> Responses to written and oral questions in class Class discussion Items on final exam
<ul style="list-style-type: none"> the skills required to locate and understand scientific/technical literature. 	<ul style="list-style-type: none"> locate scientific or technical literature online and/or in the library. differentiate between factual scientific/technical literature and news/stories/opinions that are intended to persuade or entertain an audience. locate the definition of unknown vocabulary from a credible source and learn its meaning. explain an article from the secondary and tertiary scientific/technical literature. explain scientific / technical ideas in written or oral format. 	<ul style="list-style-type: none"> In class oral discussions. In-class work Present the research to the class in a short, concise and oral presentation.
<ul style="list-style-type: none"> the relationship between natural science and technology, the implications of scientific discoveries, and the potential of the STE disciplines to address problems of the contemporary world. 	<ul style="list-style-type: none"> give examples of how the STE disciplines are relevant and applicable to daily life. recognize that as we gather scientific information, our view of the world changes. explain how the application of STE disciplines requires ethical considerations and responsibilities. appreciate that society has a vested interest in STE discoveries. 	<ul style="list-style-type: none"> In class oral discussions. Written and verbal summaries. Responses to written and oral questions in class

Upon successful completion of this course, students will know/understand	Upon successful completion of this course, students will be able to	How the student will be assessed on these learning objectives:
<ul style="list-style-type: none"> • how the major infrastructure systems that support developed areas work. 	<ul style="list-style-type: none"> • describe the major elements of infrastructure, e.g., water and wastewater systems, power production and distribution systems, transportation systems, etc. • explain how these systems function using expository writing and flow diagrams. 	<ul style="list-style-type: none"> • Short expository writing assignments • Class discussion • In-class work
<ul style="list-style-type: none"> • sustainable development initiatives in the context of the pressing global environmental issues of the 21st century (i.e., climate change, human population growth, resource scarcity, etc.). 	<ul style="list-style-type: none"> • describe the criteria for green building design. • identify alternative energy technologies. • explain elements of Smart growth communities. 	<ul style="list-style-type: none"> • Responses to written and oral questions in class • Short expository writing assignments • Class discussion • In-class work
<ul style="list-style-type: none"> • appreciate the engineering design approach. 	<ul style="list-style-type: none"> • manipulate engineering units and do basic calculations. • describe the elements of the engineering design approach. 	<ul style="list-style-type: none"> • In-class work • Class discussion • Items on final exam

Assignments/Exams/Papers/Projects:

Students will be evaluated in the following areas:

15%: **Class participation** (attendance, contribution to discussions, in class exercises, presentations, evaluations)

15%: **Homework & Assignments** (On-your-own exercises, ideas coming from reading assignments, internet research)

20%: **Final Research Paper and presentation:** required.

50%: **Midterm and Final examinations:** required.

NOTES:

(1) If you have an average below 60% in any graded element of the course, you are failing that part of the course. Please consult me if you are concerned about your performance in this course.

(2) Select assignments in this course may be used by our accreditation team for institutional assessment purposes and will be handled confidentially.

Percentage	Grade	Percentage	Grade
100% - 93%	A	76% - 73%	C
92% - 90%	A-	72% - 70%	C-
89% - 87%	B+	69% - 67%	D+
86% - 83%	B	66% - 63%	D
82% - 80%	B-	62%-60%	D-
79% - 77%	C+	60% or less	F

These cutoffs can be adjusted (up or down) depending on class average and dispersion.

Grading/Evaluation:

Class attendance and participation: Attendance in this course is mandatory and requires participation in discussions, in-class exercises, student presentations and article submittals. Routine participation by students is important and constitutes a substantial portion of the attendance grade.

Homework Assignments: Essay assignments are to be submitted using Microsoft Word format. Multi-page assignments are to be paginated. Assignments are to be submitted electronically and will be due prior

to noon on the following Tuesday unless otherwise directed. Each assignment varies depending upon content covered in the course and will correlate to the lecture material, outside readings, and calculations covered in and out of the classroom. ***No late work is accepted.***

There is no math prerequisite for this course. However, it is expected that students can perform all basic arithmetic operations including addition, subtraction, multiplication, and division. It is also expected that students can manipulate fractions and percentages. In addition, it is expected that students are familiar with the basic units of weights and measures. If this is not your case, let me know as soon as possible to clarify and introduce them from the beginning of the course.

Research Paper and In-Class Presentation: Every student must prepare a paper about a specific topic. The professor will give a list of topics but just to serve as an orientation. The student or group of students has to suggest the research topic (always related to the course). Papers will be presented orally at the end of the course. Detailed information about the paper will be given in a separate document. Together with every paper, a PowerPoint presentation must be submitted by e-mail no later than the day before the presentation. This PowerPoint presentation will be the basis of the oral presentation.

Besides the main research topic and presentation, there are other shorter presentations, and some of them can be done in groups. These presentations will be an excellent opportunity to include corrections and improvements so that the principal individual presentation can be improved.

Diagrams, charts, or pictures should not take up more than the equivalent of 25% of the paper's length and must be clearly relevant and an enhancement of text description of the information. No fewer than 5 references must be utilized, and these references must be clearly indicated both in the body of the text and included in a reference list. (The required title page and reference list do not count towards paper length.)

A minimum of two reference must be paper-based (newspaper, book, periodical, magazine). All students are required to be present during all presentations. ***Late papers will not be accepted.***

Reading Blocks: It is important that you read the material assigned prior to the lecture. There is a fair amount of reading in this course. Therefore, I suggest that you try the following technique to keep up with your reading:

- Preview the entire chapter by reading the chapter headings and looking at the figures and graphs.
- After previewing the chapter, read the topic sentence in each paragraph and look for key terms; list terms that are unfamiliar to you.
- After you have done this preview and scanning of the chapter, read the pages I have assigned to you in detail.

This technique allows you to essentially "read" the chapter three times, although you do a detailed reading only once.

Exam Paradigm: There are two exams. The exams will be comprised of several essay questions. The purpose of this element of the course is to see whether you have acquired the course content covered in class and in the outside readings. The midterm grade will be calculated on the material covered up to the midterm exam week. ***Make-up exams will be allowed only according to the SUMC policy regarding the same.***

Course and Classroom Policies:

- Students are encouraged to participate in class discussions and to ask questions.
- Announcements on possible changes may be made during the semester.
- Useful information for the course may be found on BlackBoard.
- No food or drink (except water) in class is allowed.
- Use of cell phones, laptops and other electronic devices is not allowed. Anyone using or showing them in the classroom will be asked to give it to the professor that will keep it in the professor's table until the end of the class session or, in some cases, the professor will ask the student to leave the classroom

with for the rest of the session.

- Late arrivals to class are considered up to 10 minutes. Students who arrive 15 minutes or more after the beginning of class will be considered as having missed that class. Students are expected to remain in the classroom throughout the class meeting, except for reasonable emergencies. Chronic lateness will significantly reduce the attendance portion of the student's grade.
- The order of the topics on the syllabus, readings and homework assignments are subject to change.
- Students are responsible for all lecture material, handouts and assigned reading.
- Make-up exams are not given. Students who legitimately miss an exam, due to illness, a doctor's visit or family emergency must provide written documentation of the circumstances. Exams that are missed without proper justification result in a grade of F.
- E-mails are answered from Monday 12:00h to Friday a 12:00h.
- Exams include all the material covered in the classroom.

Late Work Policy:

The due dates for assignments, exams, and papers will be posted at the beginning of the course. No further reminders will be provided. ***Late work is not accepted.***

BlackBoard. This course makes heavy use of BlackBoard. It is your responsibility to regularly check the Announcements for information on the course and course materials (readings, clips, etc.).

General comments and announcements from the instructor will be posted under Announcements as necessary.

****Email: Please note that you must use your Suffolk email account for this course. Blackboard will not allow the substitution of other email addresses****

Participation/Attendance Policy:

The SUMC Student Handbook states the following:

Once a student is registered for a course, attendance at every meeting of every class is expected, including those held in the first week of the semester. A maximum of two unjustified absences is permitted. Each additional absence will cause the final course grade to be lowered by one-third of a letter grade, i.e., from A to A-; A- to B+; B+ to B, etc.

Excessive absences in a course will have a negative effect on the final grade. When a student is absent, the quality of his or her work in a course will deteriorate since material missed in class sessions can rarely be made up satisfactorily, even though the student remains responsible for that work.

Please note that even when a student has a justified reason for missing class, such as illness, the negative academic impact on learning will be the same as if the absence were for spurious reasons.

In this course, any absence due to illness should be justified by a note from the student's physician or other health professional confirming the day(s) on which the student was unable to attend class. In this case the student is responsible for all material and assignments for the days missed, regardless of the reason for the absence.

In the event that a class meeting is unexpectedly cancelled, students will be expected to continue with readings or other assignments as originally scheduled. Any assignments due or class activities (e.g., a quiz, exam or presentation) planned for such a cancelled class are due at the next class meeting unless other instructions are communicated.

Disability Statement:

If you anticipate issues related to the format or requirements of this course, please meet with me. I would like us to discuss ways to ensure your full participation in my classroom.

If formal, disability-related accommodations are necessary, it is very important that you be registered with the Office of Disability Services (ODS) at the main Campus in Boston so that I am notified of your eligibility for reasonable accommodations. We can then plan how best to coordinate your accommodations. Check the ODS web site at www.suffolk.edu/disability for information on accommodations.

Student Resources:

SUMC provides a range of student services, both academic and personal. To learn more about course-related tutorials and academic workshops, refer to the SUMC Student Handbook, Section 2 “Academic Policies and Services”. Section 5, “Living in Madrid”, contains information on the medical and mental health resources, including an English-speaking therapist, available to you.

Midterm Review:

At midterm, around week 6, you will be given a midterm grade based on your progress to date and performance on assignments, quizzes and midterm exam. Midterm grades of C- or below will be reported to the Madrid Campus Academic Standing Committee, with an explanation of what I believe has contributed to that grade: excessive absences, poor time management or study skills, lack of effort, difficulty with the course material or with writing or language skills, etc. The Academic Standing Committee or I may contact you to suggest strategies for addressing these difficulties. I strongly encourage you to visit me during my office hours so we may discuss how you can be successful in this class.

Academic Misconduct:

www.suffolk.edu/about/mission-history/policies-procedures/academic-misconduct-policy

Suffolk University expects all students to be responsible individuals with high standards of conduct. Students are expected to practice ethical behavior in all learning environments and scenarios, including classrooms and laboratories, internships and practica, and study groups and academic teams. Cheating, plagiarism, unauthorized collaboration, use of unauthorized electronic devices, self-plagiarism, fabrication or falsification of data, and other types of academic misconduct are treated as serious offenses that initiate a formal process of inquiry, one that may lead to disciplinary sanctions.

Student work will be thoroughly examined for academic integrity and may be scanned using plagiarism detection software. A faculty member suspecting academic misconduct will contact the student using the Suffolk email address to schedule a meeting and will make all effort to do so within five business days of detecting the incident. During the meeting, the faculty member will present the documentation that led to suspected academic misconduct. Resolution of the incident will be according to the procedures outlined in the SUMC Student Handbook.

Academic Grievances Policy:

www.suffolk.edu/student-life/student-services/student-handbook/university-policies-for-student-cas-sbs/grievances-academics

Course Schedule:

The schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement, and/or to ensure better student learning.

Week	General Topic of lesson	Readings or Other Assignments Due
1	The Built World vs Nature: An Introduction and Course overview An introduction to Science	Course syllabus Read the article What's Science? Preparing first short group presentation on mining and natural resources
2	Environment, Sustainability and cities	Video: Ingels Read an article on Boston city traffic management with numbers. Ideas to make your city more sustainable.
3	Mining	Prepare initial presentation. Use the text book and complete it with additional information. Read textbook chapter on Mining.
4	Waterworks	Thinking critically about the three gorge dam (China) and dams in Amazonia. Read textbook chapter on Waterworks
5	Waste	Watch video and extract relevant info Chapter 13: Wastes and Recycling Read textbook chapter on Waste.
6	Farming	Read article and watch video Chapter 3 Food and Farming Read textbook chapter on Farming
7	Preparation for mid-term	Midterm Exam
8	Transportation: Airports	Understanding how Heathrow airport works Read textbook chapter on Airports
9	Transportation: Shipping	Understanding how Singapore harbour works Read textbook chapter on Shipping
10	Energy I: Renewable	Watch a video and think critically
11	Energy II: Power Plants	Watch a video and think critically Read textbook chapter on Power Plants
12	World Megaprojects	Read article on Megaprojects and search for additional information.
13	Communications	Read afterword: the world we've made Read textbook chapter on Communications
14	Remaining student presentations Course wrap-up and Final Exam preparation.	Special office hours. Learning from your classmates presentations
15	Final exam	