STUDY GUIDE

Seminar in Energy & Sustainability Engineering (ENG 471)

Spring 2025

Prof. Leon Liebenberg, supported by several world-renowned specialists

COURSE ORGANIZATION

Instructor / Coordinator: Prof. Leon Liebenberg, Energy and Sustainability Engineering, Department of Nuclear, Plasma & Radiological Engineering, 121 Talbot Laboratory, 104 S. Wright St., Urbana 61801.

E-mail: leonl@illinois.edu Tel: (217) 300-5496

Seminars: The Spring 2025 class will be online only. Twelve world-renowned specialists will present recorded seminars. You are expected to study the assigned readings before watching a recorded seminar and the presenter's slides and notes, after which you will complete a quiz. The quiz will also contain a few questions on the following week's readings. The syllabus on page 5 sets out the sequence of events and activities.

Course description: The course will cover the challenges of developing energy systems and civil infrastructure that are sustainable in terms of resource availability, security, and environmental impact. Guest lecturers focus on: (i) global challenges – future energy demand, geologic sources of energy, climate change, energy-water nexus, energy and security; (ii) markets, policies and systems – economic incentives, policy and law, life cycle analyses; (iii) opportunities for change – CO_2 sequestration, renewable power, bioenergy feedstocks, biofuels for transportation, energy use in buildings, advanced power conversion, micro-nuclear power, the smart grid.
ENG 471 is a one-credit-hour course for undergraduates or graduates.
Prerequisites: MATH 220 or MATH 221; one of CHEM 104, CHEM 204, PHYS 101, PHYS 211.

Course context: Energy is all-pervasive in the global economy. Every activity directly or indirectly involves the use of energy. And every technological development depends on the availability of energy supplies in a useful form. In 2017, the U.S. spent $1.1 trillion on energy, or 5.8% of its Gross Domestic Product (GDP), and electricity, gas, coal mining, and oil exploration and oil refineries together employ well over 6.7 million people in the USA alone. The sources, conversion and ultimate end-use of energy have powerful influences on domestic consumers, the economies of individual industries and on the economy of an industrialized nation.

Crucially, to help ensure that we do not exceed a global temperature rise of 2 °C compared to pre-industrial times, we need to reduce global emission from 50 billion tons of CO_2 per annum to 20 billion tons or below by 2050; that is a cut by a factor of 2.5! Let's say that the global economy is three times as big in 2050 as it is now, then the emissions per unit of output would have to be cut by a factor of 2.5 × 3 (i.e., by a factor of around 7 or 8!) by 2050. Emission reductions on this scale would certainly require an energy-industrial revolution, as energy generation and distribution currently make up more than 70% of greenhouse gas pollution (mainly CO_2 and CH_4).

In this course, we will briefly investigate primary sources of energy, including the mineral resources of coal, gas, oil, and nuclear materials, and other (renewable) resources such as solar and geothermal. You will also delve into the processes which may be used to convert these fuels into forms that are easy to transport and convenient for the end-user, such as electricity. Although the focus of the course is on energy conversion, we will also briefly talk about the interrelated social, environmental, economic, and political (or governance) issues. This is after all the main province of the modern engineer and where skills of engineering design and analysis find their greatest employment.

Course assistants ("CAs"): The course assistants will grade all your assignments. You will be able to chat online (via *Piazza*) with your CAs, Ms. Ami Nicodemus and Mr. Gener Atienza, regarding difficulties that you might experience with general theory or assignments. The CAs will, however, not help you to complete quizzes or assignments. You could also attend the CA office hours, as detailed below. Please note that students must show their own calculations, for instance, when asking for assistance. Otherwise, students will be asked to first attempt the problems by themselves and to show evidence of their efforts before the CAs help.

Ms. Ami Nicodemus
amielan2@illinois.edu

Office hours: Fridays, 5 – 6 p.m.

Mr. Gener Atienza
generla2@illinois.edu

Office hours: Mondays, 5 – 6 p.m.

Zoom meeting link for office hour for both course assistants:

Weekly: https://illinois.zoom.us/meeting/tZEkc-mqqTopHtCtVl94L87z8LcTdAR8oAGo/ics?icsToken=DGNbrUaYY5dMaQw1YgAALAAAAFxo5NfxfiTDrvgOrv2tY4HdOIrFebjrXYsULu9nitjavJrMWWR1ut4k6QKh1nddqYhdGlhk8yUMJ5uVpjAwMDAwMQ&meetingMasterEventId=SOZDjo0qR5qdauUtzOLp5A

Join Zoom Meeting: https://illinois.zoom.us/j/85940271344?pwd=PyQeQVEnaaLGwJZEfkERDYUQqrMdBD.1

Meeting ID: 859 4027 1344
Password: 014240

Your queries: You may also submit queries or questions anytime via *Piazza*. Students are encouraged to view their classmates' questions and to participate in course discussions on *Piazza*.

Sign up at: https://piazza.com/illinois/spring2025/eng471

Private questions should be directed using the "Private" option on *Piazza*, else the whole class will see your query / request. The course assistant or the instructor will respond to your questions as soon as they can.

The course assistants and the instructor will attempt to address your queries promptly from Mondays to Fridays (9 a.m. – 5 p.m.) and less promptly after these hours or over weekends. No queries will be taken during holidays.

Instructor's office hours: Professor Liebenberg's office hours will be held online-only via Zoom on Thursdays from 3:00 p.m. to 3:50 p.m. (excluding holidays):

https://illinois.zoom.us/j/89833760805?pwd=K1gvL1RLeDB5bjBYNVFqYisrOFJTdz09
Meeting ID: 898 3376 0805
Password: 511839

If office hours do not work for you, then you should send Prof. Liebenberg an email clearly stating your difficulty and attaching any relevant information (such as calculations).

Course webpage (Canvas): https://canvas.illinois.edu/courses/54389

If you have difficulties accessing Canvas, then please contact consult@illinois.edu, *not* the instructor *nor* the course assistant.

Course notes / slides / recordings: Video recordings are posted on the course's Canvas site. Instructor slides, notes, and mandatory or suggested reading material are also posted on Canvas. The instructor will not prompt you to read any material or to watch videos. Rather, you will need to schedule those for yourself. That is part of participating in a guided-self-directed course such as this one. So, be sure to strictly follow the syllabus regarding your assignments.

Video recordings: Each of the guest presenters has recorded a one-hour lecture, which you are required to watch in full. These recordings are based on seminars previously given in-person in ENG 471 classes. Watch the recorded seminar from beginning to end. Canvas keeps track of the video viewing of each class member, which will be considered in the event of grading queries.

Sometimes the presenters run over their allotted 1-hour time and their video ends abruptly. No worries! You also have access to an instructor's accompanying PowerPoint slides or lecture notes. (NOTE: Professor Marshak only has a videorecording and no accompanying slides.) You will use this information to complete the post-seminar quizzes, which form the biggest part of this course's grade.

Quizzes and Team-based assignments: As mentioned above, weekly take-home quizzes must be completed, and you will get a few days to complete each (in the Canvas environment). All quizzes are solo (independent) assignments. Quizzes count between 5 to 15 points. Quizzes will test a student's knowledge of the seminar in the current week and also of the following week's reading assignment.

On three occasions, teams will be asked to review the previous 4 or 5 seminars. Teams must then produce a one-page fact sheet summarizing their insights. These fact sheets count 40 points each.

No late quizzes or team-based assignments will be allowed. Non-receipt of completed quizzes or team-based assignments by the submission deadline will result in a zero grade for the missed assignment. There is no curving of grades to penalize late assignments, and there are no make-up assignments. All late assignments get a score of 0.

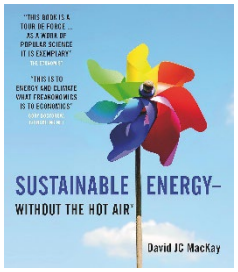
Please follow the assignment submission guidelines carefully.

Grade appeal: Students have one week to appeal a grade after it has been published. After this period, the grades are final.

Assessment

70% — 14 Quizzes (independent, solo assignments)
30% — 3 Team-based assignments

Recommended textbook (free!): "Sustainable Energy-without the hot air," by David MacKay (Bloomsbury Publishing, 2016), freely downloadable.



Course Objectives: Students will be asked to demonstrate their knowledge of the material covered in ENG 471 through their mastery of the following course objectives:

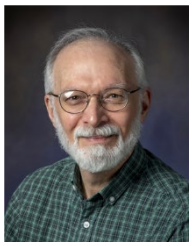
- Learning the key issues involved in developing energy systems and infrastructure that are sustainable in terms of resource availability, security, and environmental impact.
- Participating in seminars and discussions and completing pre- and post-seminar quizzes that focus on global energy challenges, energy markets, energy policies and energy systems, and opportunities for change.

SYLLABUS (subject to change)

Week #	**For the week of …**	… you must first **study the following readings at home**, and after watching the seminar videorecording, you must submit the take-home quiz …	… at the following **assignment due dates** (uploaded before 10 p.m. U.S. Central Time, unless otherwise specified)
1.	20 Jan.	Climate Change, by Prof. Ryan Sriver (Atmospheric Sciences)	Quiz 1: Mon. 27 Jan.
2.	27 Jan.	Growing Bioenergy and Bioproducts, by Prof. Steve Moose (Crop Sciences)	Quiz 2: Mon. 3 Feb.
3.	3 Feb.	Small Modular Nuclear Power, by Prof. Caleb Brooks (Nuclear, Plasma & Radiological Engineering)	Quiz 3: Mon. 10 Feb.
4.	10 Feb.	Evaluating Sustainability, by Prof. John Abelson (Materials Science and Engineering)	Quiz 4: Mon. 17 Feb.
5.	17 Feb.	*Team discussion of Seminars 1-4*	One-page fact sheet based on team discussion 1: Mon. 24 Feb.
6.	24 Feb.	Energy–Water Nexus, by Prof. Ashlynn Stillwell (Civil and Environmental Engineering)	Quiz 6: Mon. 3 Mar.
7.	3 Mar.	Net-Zero, Healthy Buildings, by Prof. Ty Newell (Build Equinox)	Quiz 7: Mon. 10 Mar.
8.	10 Mar.	Sustainably Co-locating Agricultural and Photovoltaic Electricity Systems in the US, by Dr. Paul Mwebaze (Institute for Sustainability, Energy, and Environment)	Quiz 8: Fri 14 Mar.
	15 – 23 Mar.	SPRING BREAK (no classes)	
9.	24 Mar.	Plant Adaptation to Climate Change, by Prof. Megan Matthews (Civil and Environmental Engineering)	Quiz 9: Mon. 31 Mar.
10.	31 Mar.	*Team discussion of Seminars 6-9*	One-page fact sheet based on team discussion 2: Mon. 7 Apr.
11.	7 Apr.	Vehicle-to-grid technology, by Prof. George Gross (Electrical & Computer Engineering)	Quiz 11: Mon. 14 Apr.
12.	14 Apr.	Prairie Research Institute: Technologies to Support Energy Transition, by Prof. Praveen Kumar (Prairie Research Institute)	Quiz 12: Mon. 21 Apr.
13.	21 Apr.	Unconventional Hydrocarbons, by Prof. Steve Marshak (Earth Science & Environmental Change)	Quiz 13: Mon. 28 Apr.
14.	28 Apr.	Advanced battery storage systems, by Prof. Paul Braun, Prof. Ben Zahiri, Dr. Rajen Basu (Materials Science & Engineering)	Quiz 14: Mon. 5 May
15.	5 May	*Team discussion of lectures 11-14*	One-page fact sheet based on team discussion 3: Friday 9 May

Guiding "big picture" questions for ENG 471

When he founded the Energy and Sustainability Engineering program at UI, *Professor John Abelson* generated some superb guiding "big picture" questions for ENG 471. As you go through the topics of ENG 471, Professor Abelson's questions will help you to form an interconnected understanding of the challenges and opportunities in the energy and sustainability fields and will stimulate you to ask probing questions.



Professor John Abelson, Department of Materials Science and Engineering, founder of the Energy and Sustainability Engineering program at UIUC.

There are many ways to frame these questions. As a starting point, Professor Abelson proposes the following:

Stakeholders: What groups of people, or regions of the world, are directly affected by a given issue? Or indirectly affected?

Time scale: How soon does this issue become critical enough to motivate a major stakeholder? Can changes in human activity be implemented in time to avoid or offset major consequences?

Solutions: Do there exist technologies or approaches that can make a substantial reduction in impact for this issue? If technologies are available, what are the challenges to implementation – scale-up, economic, policy, social acceptance, other?

If not currently available, can new technologies be developed soon enough that the anticipation of future availability can be used in current planning decisions? Here, one may include plausible incremental improvements (e.g., improved efficiency or cost reductions), but not breakthroughs, which are (by definition) unknown.

And we should not expect miracles. There are always fundamental (thermodynamic) and practical (engineering) limits to what is possible. Good technology may reach 50 % of the fundamental limit, and a great one 75% of the limit. Never believe a claim that obviously exceeds this.

Physical scale: Can the proposed technology be employed *at scale*, meaning enough units, soon enough to make an impact? This involves ramping up the *manufacturing supply chain*. In some cases, such as the fabrication of modular (compact) nuclear power plants, a supply chain does not yet exist and must be created!

Note that systems with major infrastructure investment – fossil energy, for example – *require decades to change*. That is because, from an investment point of view, CEOs prefer to use existing systems until they need physical replacement, rather than to invest in new systems earlier than otherwise needed. Only in a few cases (e.g., replacing incandescent light bulbs) is the saving from a new technology (compact fluorescent or LED bulbs) so great that early retirement makes economic sense.

The above is not good news from a sustainability perspective but is a reality that must be dealt with.

Fundamental tradeoffs: For a given situation – e.g., heating a home or driving a vehicle – *there does not exist a solution that simultaneously maximizes all benefits and minimizes costs and consequences*. (If there were, we would already be using it!)

Typically, we can lower environmental impact by investing in a more efficient system. An immediate question is whether we have (or want to spend) more money on capital costs. Also, the efficiency gain may, or may not, lower the net costs over the lifetime of the system, particularly if calculated using economic "discounting."

And there is always a minimum impact that cannot be reduced (unless we lower total demand for that technology). For example, if we insulate a house to enormous levels, the energy required to manufacture *surplus* insulation becomes greater than the energy saved by its use. Or if we reduce the fuel consumption of an automobile by changing the materials of construction to reduce the mass, above some level of improvement the energy needed to manufacture the lightweight materials is greater than the energy saved through their use. Also, it can be much more difficult – or impossible – to recycle advanced materials at the end of the life of the auto.

Ecosystem services: Human activity – economic activity – cannot occur without impact on the earth and its ecosystem. Farming, logging, animal husbandry, etc., are examples of economic activity that derive from "ecosystem services." Mining, a crucial economic activity, also draws resources from the active ecosystem and has ecosystem consequences.

When does human economic activity trigger an ecosystem degradation from which recovery of important functions is difficult or impossible on intergenerational time scales?

At high levels of economic activity, the direct or secondary effects are large and the changes (damage) to the ecosystem are obvious. At very low levels, the effects of human activity may not be noticeable or significant compared with naturally occurring variations. At moderate levels, the ecosystem still functions, but operates in a new state that, although different from the original equilibrium, may not degrade rapidly. But ecosystems are very complex and interdependent, so the real impacts may not be clear in the short run.

COURSE POLICIES

Late work: Extensions to a due date will be considered only if the student sends *advance notice* by email to the instructor, except for an emergency. The instructor may request documentation of why the situation was unavoidable.

No late assignments are graded, and there are no make-up assignments. Also, there are no deadline extensions for team-based deliverables.

The *only* valid reasons for missing a quiz submission deadline are:

a. student illness or accidental injury;
b. serious illness, serious injury, or death in the student's direct family;
c. birth of a child for which the student is identified as a parent on the birth certificate;
d. required duty in the U.S. military (active-duty, reserve, or in a National Guard unit activated by the President or a governor), required service in a foreign military organization acting in concert with the United States, or service under provisions of the Volunteer Emergency Worker Job Protection Act;
e. participation in, or travel to, an obligatory AFROTC, NROTC, or ROTC event;
f. participation in, or travel to, varsity or DRES-sanctioned athletic events (excluding fencing, bowling, and other club sports);
g. participation in, or travel to, an organized extracurricular activity sanctioned by the College of Engineering or one of its departments, for which a full-time or emeritus faculty member of the College of Engineering attests that the student's participation is essential;
h. observance of a religious holiday;
i. any excuse allowed by the UIUC for students participating in online learning.

If the student was so seriously ill or injured as to be unable to communicate their intentions to the instructor prior to the beginning submission deadline, the advance notification requirement will be waived if the student subsequently provides satisfactory documentation of such incapacitation.

In those cases where advance notification of lateness or non-submission has been provided, or where such notice has been waived according to the provisions of the second sentence of the above paragraph, late submissions of non-submissions will be classified as unexcused unless the student provides satisfactory after-the-fact documentation, as indicated below.

For illness or injury of the student, a satisfactory letter stating that the student was medically unfit to complete the quiz by the submission deadline must be provided by an appropriate medical practitioner (C.N.P., D.D.S., D.M.D., D.O., D.P.M., M.D., O.D., or P.A.) after the quiz submission deadline. *Medical bills, prescriptions, e-mail or letters from friends or relatives, letters from naturopaths, chiropractors, psychologists, and mental health counselors, "visit slips" from McKinley Health Center, and records of calls to McKinley Health Center's Dial-a-Nurse program (with or without endorsement by an "emergency*

dean" in the Office of the Dean of Students) are among the types of documentation that will not be accepted.

For serious illness, serious injury, or death in the student's family, the student's relationship to the ill, injured, or deceased party must be established, along with documentation of the illness, injury, or death.

For the birth of a student's child, a photocopy of an original birth certificate, showing the student as a parent, is required.

For military duty, copies of valid military orders are required.

For participation in or travel to varsity or DRES-sanctioned athletic events or AFROTC/NROTC/ROTC events, a satisfactory letter from the Division of Intercollegiate Athletics, DRES, or the commanding officer of the detachment is required.

For participation in, or travel to, an organized extracurricular activity sanctioned by the College of Engineering or one of its departments, a satisfactory letter from the faculty sponsor is required.

Independent work: You are encouraged to discuss class material with your classmates, but *you must answer the quiz questions independently (i.e., alone, by yourself)*.

Academic integrity: The highest academic integrity is expected. Academic violations will however be dealt with according to the UIUC Student Code, Article 1, Part 4. Violations will be reported to the College of Engineering. The recommended penalty will be either failure of the course, or dismissal for the M.Eng. program and separation from the College of Engineering or UIUC.

Specific comments about academic integrity

- All students are responsible to refrain from infractions of academic integrity, conduct that may lead to suspicion of such infractions, and conduct that aids other in such infractions. "I did not know" is not an excuse.
- The following are academic integrity infractions (http://www.provost.illinois.edu/academicintegrity/students):
    - ✓ Cheating: using or attempting to use unauthorized materials.
    - ✓ Plagiarism: representing the words, work, or ideas of another as your own.
    - ✓ Fabrication: falsification or invention of information, including citations.
    - ✓ Facilitating infractions of academic integrity, helping, or attempting to help another commit infraction.
    - ✓ Bribes, favors, and threats: actions intended to affect a grade or evaluation.
    - ✓ Academic interference: tampering, altering, or destroying educational material or depriving someone else of access to that material.
    - ✓ Note: All infractions are documented in the campus-wide FAIR database.

- If you have difficulty completing your classwork, you should consult the instructor by showing him evidence of your attempts to solve the specific problem/s. However, most lecture time has been set aside exactly for this type of activity; use it to your full advantage.
- Copying (in whole or in part) another student's (or team's) quiz, project work, or exam is not permitted. Copying solutions from web-based answer keys such as Chegg is an honor code violation.
- Be sure to follow the course and University's regulations pertaining to the use of Artificial Intelligence (AI) tools such as Chat GPT, Bing, ChatSonic, or Jasper. When using AI tools, be sure to substantiate or validate all claims, findings, or insights by citing credible reference sources (such as peer-reviewed journal articles). Remember that AI is merely a probabilistic tool based on a massive database. It makes mistakes; do not make the mistake of merely copying answers from an AI tool. You will be sure to regret doing that.
- If you choose to discuss your work with a fellow student, it should be a discussion in which one teaches the other, or where both work to a mutual understanding. The discussion should however relate to general concepts and not address the specifics of the quiz questions.

- It is not acceptable to give a fellow student your completed project work or quiz or other assignment so that they can copy it. In such a case, both you and your fellow student will have committed an academic violation.
- It is also unacceptable to copy work from a student who completed the course previously.
- You should properly cite references and sources in your written reports. Cases of cheating or plagiarism will be handled severely.

  Also, be wary to correctly use quotation marks for sentences or important data that did not originate with you. Further, paraphrasing should be kept to a minimum. When used, the paraphrased section should be specifically identified by citing the original source. It is not sufficient to simply provide a list of references but not indicate where a specific quotation or paraphrase was employed. In addition, all sources should be fully cited. As is done in scientific and engineering literature, you should briefly acknowledge in writing any significant discussions or interactions you had regarding the work you are reporting on.
- Ignorance of academic integrity or uncertainty regarding the instructor's wishes are not justifiable reasons for academic violations. If you are uncertain of the instructor's wishes or intentions, you should consult with him *before* acting.

Communication etiquette: The instructor welcomes communications concerning possible errors, or constructive suggestions about the materials. Please do not contact the instructor to request increases in your assigned grade, outside of errors in grading. All class communications will use your UI NetID email; do not use any alternate such as gmail.

If you believe that an assignment has been incorrectly graded, communicate this with the instructor within 5 working days after the assignment has been handed back to you. After that period, your assignment will not be regraded, and your grade will remain unchanged.

Most Valuable Players (MVPs): As mentioned, you should state all your queries via Piazza. Piazza is configured to allow any student to post anonymously to their classmates whenever they prefer. In each discussion thread, different anonymous posters are automatically differentiated with pseudonyms to avoid confusion. The instructor invites you all to help answer your classmate's Piazza questions. The course assistant and the instructor will keep track of each time a student suitably answers a fellow student's Piazza question. At the end of the semester, we will tally all the results to see which students consistently and significantly helped their fellow classmates the most. **Those winning students will each receive a bump of 1% in their final grade!** Those winning students will also win the "Most Valuable Player" certificates that will be awarded at the end of the semester. We encourage the students in our class to make the most of this opportunity. This helps you to learn from each other's understanding of the course and increase your grades! And, as you answer the questions posted by your fellow classmates, you will realize that it also betters your own understanding of any concept.

Note: When the course assistant or instructor award "good post" awards on Piazza, which will eventually be tallied to give us the MVPs, they will use the following criteria:

- Does the question or the answer clarify a technical (not class-administrative) issue which was vague or confusing in the class instructional materials (lecture announcements and syllabus)?
- Does the question or the answer demonstrate unique and thoughtful engagement with the course material?
- Is one student going out of their way to clarify something from the lecture to another student?
- Does reading what the student wrote make you excited to learn more about the energy systems?
- Other: (New justification which we can apply retroactively).

Final grade

At the end of the semester, letter grades are determined based on composite numerical scores, weighted as previously described. The instructor does not have a predetermined "target" grade distribution, and it may vary significantly from semester to semester. Additionally, there is no "curving" of grades in this class.

Grades will be rounded up to the nearest whole number. For example, a final grade of 93.2% will be rounded to 93%, while a final grade of 93.6% will be rounded to 94%.

Letter grades at semester's end

Grade meaning	Refined letter scale	Numerical scale of marks
Excellent	A+	97 to 100
	A	94 to <97
	A-	90 to <94
Good	B+	87 to <90
	B	84 to <87
	B-	80 to <84
Adequate	C+	77 to <80
	C	74 to <77
	C-	70 to <74
Marginal	D+	67 to <70
	D	64 to <67
	D-	60 to <64
Inadequate	F	<60

Mini-Bibliography

Here are a few references that provide background and insight. These are not assigned or mandatory readings, but you are encouraged to look at them:

- DECC 2050 Calculator for the UK: http://2050-calculator-tool.decc.gov.uk/#/home
- The Gapminder site of world statistics and trends: www.gapminder.org
- Switch, The Future of Energy (*a full-length movie*): https://www.youtube.com/watch?v=RvaE0PFna84
- Zero-net energy home simulator: http://buildequinox.com/zeros/

College of Engineering statements

Sexual Misconduct Reporting Obligation

The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX Office. In turn, an individual with the Title IX Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options.

A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here: wecare.illinois.edu/resources/students/#confidential.

Other information about resources and reporting is available here: wecare.illinois.edu.

Community of Care

As members of the Illinois community, we each have a responsibility to express care and concern for one another. If you come across a classmate whose behavior concerns you, whether in regards to their well-being or yours, we encourage you to refer this behavior to the Student Assistance Center (217-333-0050 or http://odos.illinois.edu/community-ofcare/referral/). Based on your report, the staff in the Student Assistance Center reaches out to students to make sure they have the support they need to be healthy and safe.

Further, we understand the impact that struggles with mental health can have on your experience at Illinois. Significant stress, strained relationships, anxiety, excessive worry, alcohol/drug problems, a loss of motivation, or problems with eating and/or sleeping can all interfere with optimal academic performance. We encourage all students to reach out to talk with someone, and we want to make sure you are aware that you can access mental health support at the Counseling Center (https://counselingcenter.illinois.edu/) or McKinley Health Center (https://mckinley.illinois.edu/).

Mental Health

Significant stress, mood changes, excessive worry, substance/alcohol misuse or interferences in eating or sleep can have an impact on academic performance, social development, and emotional wellbeing. The University of Illinois Urbana-Champaign offers a variety of confidential services including individual and group counseling, crisis intervention, psychiatric services and specialized screenings which are covered through the Student Health Fee.

If you or someone you know experiences any of the above mental health concerns, it is strongly encouraged to contact or visit any of the University's resources provided below. Getting help is a smart and courageous thing to do for yourself and for those who care about you.

- Counseling Center (217) 333-3704
- McKinley Health Center (217) 333-2700
- National Suicide Prevention Lifeline (800) 273-8255
- Rosecrance Crisis Line (217) 359-4141 (available 24/7, 365 days a year)

Academic Integrity

The University of Illinois at Urbana-Champaign Student Code should also be considered as a part of this syllabus. Students should pay particular attention to Article 1, Part 4: Academic Integrity. Read the Code at the following URL: http://studentcode.illinois.edu/.

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy: https://studentcode.illinois.edu/article1/part4/1-401/. Ignorance is not an excuse for any academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask the instructor(s) if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.

Religious Observances

The Religious Observance Accommodation Request form is available at http://odos.illinois.edu/community-ofcare/resources/docs/Religious-ObservanceAccommodation-Request-Form.pdf. Submit the form to the instructor and to the Office of the Dean of Students (helpdean@illinois.edu) by the end of the second week of the course; in the case of exams or assignments scheduled after this period, students should submit the form to the instructor and to the Office of the Dean of Students as soon as possible.

Disability-Related Accommodations

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 333-4603, e-mail disability@illinois.edu or go to https://www.disability.illinois.edu. If you are concerned you have a disability-related condition that is impacting your academic progress, there are academic screening appointments available that can help diagnosis a previously undiagnosed disability. You may access these by visiting the DRES website and selecting "Request an Academic Screening" at the bottom of the page.

Family Educational Rights and Privacy Act (FERPA)

Any student who has suppressed their directory information pursuant to Family Educational Rights and Privacy Act (FERPA) should self-identify to the instructor to ensure protection of the privacy of their attendance in this course. See https://registrar.illinois.edu/academic-records/ferpa/ for more information on FERPA.

Inclusion

The intent is to raise student and instructor awareness of the ongoing threat of bias and racism and of the need to take personal responsibility in creating an inclusive learning environment. The Grainger College of Engineering is committed to the creation of an anti-racist, inclusive community that welcomes diversity along a number of dimensions, including, but not limited to, race, ethnicity and national origins, gender and gender identity, sexuality, disability status, class, age, or religious beliefs.

The College recognizes that we are learning together in the midst of the Black Lives Matter movement, that Black, Hispanic, and Indigenous voices and contributions have largely either been excluded from, or not recognized in, science and engineering, and that both overt racism and micro-aggressions threaten the well-being of our students and our university community.

The effectiveness of this course is dependent upon each of us to create a safe and encouraging learning environment that allows for the open exchange of ideas while also ensuring equitable opportunities and respect for all of us. Everyone is expected to help establish and maintain an environment where students, staff, and faculty can contribute without fear of personal ridicule, or intolerant or offensive language. If you witness or experience racism, discrimination, micro-aggressions, or other offensive behavior, you are encouraged to bring this to the attention of the course director if you feel comfortable.

You can also report these behaviors to the Bias Assessment and Response Team (BART) (https://bart.illinois.edu/). Based on your report, BART members will follow up and reach out to students to make sure they have the support they need to be healthy and safe. If the reported behavior also violates

university policy, staff in the Office for Student Conflict Resolution may respond as well and will take appropriate action.

Emergency response recommendations can be found at the following website: http://police.illinois.edu/emergency-preparedness/. You are encouraged to review this website and the campus building floor plans website within the first 10 days of class. http://police.illinois.edu/emergencypreparedness/building-emergency-action-plans/

Enjoy this guided self-directed course!