



Lead for the Greater Good

O'Neill School of Public and Environmental Affairs

SPEA V550 (Section 14337) / SPEA V450 (Section 33456)

Future Shock: Cyber Security and Climate Change
Topics in Public Affairs / Contemporary Issues in Public Affairs

In Person Class MW 1:15 – 2:30 p.m. PV A201
Zoom (Online Office Hours, Class Back-up): TBD

Instructor:

Diane Henshel

Office Hours: By appointment, and TBD

Email: dhenshel@indiana.edu

Phone (Secretary – S. van Doren): 812 855-4556

Why am I teaching this course:

I have been doing risk analysis for decades as a part of an integrated environmental research (and consulting) program addressing environmental and health risks of environmental stressors, including pollutants and (more recently) climate stressor effects on communities. In 2013 I began applying risk analysis tools to cyber security to model system risks associated with cyber vulnerabilities. In 2019, I began a project integrating risk, resilience and vulnerability analysis of local critical infrastructure into risk communication to build guidance for communities and community members to enhance their personal resilience to climate change.

This course integrates all of my work into a consideration of the intersection of the rapidly changing climate stressors and our increasingly cyber-dependent global society, especially through overlapping impacts on critical infrastructure.

COURSE DESCRIPTION

Future Shock: Cyber Security and Climate Change will address both the implications of climate change (and environmental controls) for cybersecurity and implications of cybersecurity for environmental controls for climate change. Cybersecurity and climate change are two of the most pressing forces of our current time. The world is increasingly controlled by computers, including the critical infrastructure that controls energy, water, even the air we breathe both

indoors and outdoors. Climate change is being driven by inadequately controlled resource use, particularly use of carbon-releasing energy sources although many other societal processes are contributing to climate instability and weather trends and extremes. The two intersect in our computer controlled built environment, and we are not prepared for the impacts of that intersection. This course will be an investigation of the intersection between cybersecurity and climate change, and how these two pressing phenomena interact now and into the future.

GUIDING COURSE QUESTION:

Just how screwed are we (globally? US?) going to be, how soon, and can we do anything to prevent it?

COURSE and LEARNING GOALS:

Course Goals:

- Ensure cyber students understand climate change and environmental students understand cyber issues
- Frame the interacting link between cyber policy, cyber security, and climate change through critical infrastructure.

Student Learning Goals:

By the end of this course you will:

- be able to identify and describe critical infrastructure as defined by the Department of Homeland Security, and create a more general definition for critical infrastructure
- be able to identify the main predicted weather changes caused by climate change in the USA, particularly in the midwest
- be able to reason through the potential impacts of climate change on your built environment and critical infrastructure
- be able to describe the current cyber security threats, the main types of threat actors, and reason through your personal cyber security vulnerabilities
- be able to describe the NIST cyber security framework, and identify actions that are appropriate for correcting your personal cyber security vulnerabilities
- be able to investigate, identify and describe current and potential cyber controls and cyber security vulnerabilities linked to your built environment
- be able to calculate the potential contribution of cyber technology on climate change using available carbon and resource calculators
- be able to frame the linkage between future extreme weather events and cyber physical control systems, critical infrastructure generally, and IoT

Class Project

The class will develop an intersectional framework that highlights the links between climate change-related vulnerabilities, cyber-related vulnerabilities – especially as reflected in cybersecurity planning and implementation, and critical infrastructure. The class will develop a

report that explains and highlights potential adaptation strategies for these intersectional vulnerabilities. Each student will contribute to the introduction and conclusion, and will be part of a team that writes one of the chapters in the report.

EXAMS:

There will be no final exam. The exams will be replaced by:

1. The team final paper that will contribute to the full class report.
2. An annotated bibliography that the full class will contribute to. Your contribution expectations will be adjusted based on whether you are an undergraduate or graduate student.

WEEKLY TOPIC SCHEDULE (draft – to be filled out in more detail)

Weekly Topic Schedule:

Week 1: Framing the Problem

Day 1: Introductions, Skills and personal knowledgebase discussions, information sources

Assignment for Day 2:

Day 2: Initial Framework brainstorm

Preparation Readings:

Week 2: Cyber Security Basics

Preparation Readings: NIST cyber risk framework,

Relevant current events readings

Personal evaluation of cyber vulnerabilities and behaviors

Week 3: Climate Change Basics

Preparation readings: IPCC regional / Purdue Climate Assessment / National Climate Assessment

Carbon footprint, water footprint, energy footprint

Week 4: Critical Infrastructure

Day 1: Critical Infrastructure and climate linkages

Preparation Readings: Homeland security site

Exercise: Potential influence of each critical infrastructure on climate insecurity

Homework review: (Need for template for presentations)

Day 2: Cyber controls on critical infrastructure

(Need for template for presentations)

Preparation Readings:

current state of Cyber Physical Systems (CPS) and Internet of Things etc that introduce vulnerabilities

electrical grid, water systems, HVAC, IoT

Exercise: team reports out

Week 5: Cyber → Climate week 1

Energy uses of computers and cyber defense
Preparation Readings: MIT paper on energy costs of zoom, other

Week 6: Cyber → Climate week 2

Energy grid:
Preparation Readings: histories of grid attacks
?DOE or CERT grid cyber guidance?

Week 7: Cyber → Climate week 3

Water infrastructure
Preparation readings: attacks on water systems, dams
AWWA critical infrastructure guidance

Week 8: Cyber → Climate week 4

Air and building controls and IoT
Preparation readings: attacks on HVAC and IoT

Week 9: Revisiting the Framework 1, Report structure

Week 10: Climate Change → Cyber risk week 1

Flooding, Storm Surges, Seiches, etc

Week 11: Climate Change → Cyber risk week 2

Storm Damage, Tornadoes, Derechos

Week 12: Climate Change → Cyber risk week 3

Heat and Drought (note – leaving out erosion)

Week 13: Revisiting the Framework 2, Report structure, final sections, re-evaluate organization

Are we missing anything?

Week 14: Reporting out

Week 15: Final Framework, Report finalization, Social media campaign

NOTE:

There is no textbook for this course. We will rely upon standard guidances and the literature in each subject area to provide background material. There will be both current (and some historic) articles, and a few books to read as well. In many ways, this is an exploration course

Professional Standard Expectations

- You will be producing a FORMAL EPA (US Environmental Protection Agency)-based risk assessment report using EPA standard guidance.

- ALL WORK IS EXPECTED TO BE WELL WRITTEN, aiming to be of professional quality.
- All report sections must be well organized, and clearly and grammatically written.

These are documents you should be proud of presenting to the County Commissioners, as well as showing to prospective employers.

There are “writing handouts” on Canvas (in Files) and in the class Google Drive that will be useful in writing better and in avoiding plagiarism.

Class Expectations

1. Attendance is mandatory.

If you cannot attend a class, please contact me (DH) or the TAs ahead of time so that you can find out what will be covered and what will be expected of you. **If you are sick or quarantined, Zoom in to class.** (ONLY Zoom in if you are sick or under quarantine.) If you miss class due to illness or other unexpected events, please let us know why ASAP. We will be recording class, and the recordings will be available in Canvas. However, WE CAN NOT RECORD THE BREAK OUT ROOMS, when students are working in groups during class. That is a Zoom limitation, and other possible meeting options are no better. Notice that points towards your final grades are earned by class attendance or responses to class attendance questions. You will need to submit your answers to the class questions separately to demonstrate your class “attendance”.

2. Active participation in the class is critical to the success of the class. This is a forum for clarification of ideas and problem solving.

3. Come to class having read the preparation material. At the very least, SKIM the material before class. Reading reflections will be used to help you build both the framework and your part of the report, and will be used to contribute to the annotated bibliography.

Remember to turn in the assignment through TurnItIn (see below) ON TIME. (Canvas assignments are set up with TurnItIn as the default for this class.)

4. All students are expected to follow the IU Honor Code and behave professionally at all times. Everyone is to do their own work, and claim only the work they have done. Plagiarism or any honor code violation (see handout on plagiarism from the IU Writing Tutorial Services) will not be accepted and will result in an immediate 0 for the assignment. Repeated offenses of the Honor Code will result in an automatic failure in the course.

To minimize plagiarism, you are required to submit all of your written work through TurnItIn, a software package integrated into the Canvas assignments that screens submitted work and compares it against all work accessible through Web, and against all work previously submitted to TurnItIn. We now have a backlog of several years of past risk assessment homeworks and final reports, including the ones you review for your second assignment, the risk assessment critique. All applicable assignments must pass TurnItIn review to be given credit. You will see the reports, and you can then determine whether your

work will be considered acceptable. Green is most preferable, most yellow will be acceptable under rare circumstances (the bibliography can generate a yellow), red will never be given any credit. Don't try to hand in report chapters or homework reading responses that fail TurnItIn or you will end up with a 0 (zero) for the assignment. Repeat offenders will flunk the course.

5. In addition all students must complete a plagiarism certification test online to demonstrate that they can identify what is and is not plagiarism. The certification test can be reached at: <https://plagiarism.iu.edu/certificationTests/>. Submit the completed certificate to earn 1% towards your final grade.

Use the following format when naming your submitted assignment files: “Last Name (or Group Name)_Assignment” (Example: Henshel_Uncertainty Log [for individual assignments] OR EcoReptileGroup_Toxicology Chapter [for group assignments])

6. Use correct grammar and a formal writing style (i.e. no colloquial phrasing) in all written work. There is a plagiarism and writing handout on Canvas in Files along with a few other more focused writing handouts culled from other professors. (“Hit Parade of Errors” is the first page of the main handout.) **DON'T LOSE IT, USE IT!** Check your spelling with a spell-checker, then proof-read it afterwards **BEFORE** handing it in. Spell-checkers make mistakes and can not be fully trusted. Check also to make sure you are not mistaking one homonym for another (see Homonyms and Sound Alike Words Not to be Confused – just before the schedule). There is no excuse for poor writing. Use full sentences, no sentence fragments. Use correct preposition – verb combinations. Check tense, gender and number agreement of nouns and verbs. In short, use good grammar. Your writing represents you, learn to and take care to write well.

TEAM WORK and PARTICIPATION ISSUES

You will work in teams when you work on the report chapters. Each student is expected to behave honorably to their team members, as well as to the rest of the class. This means showing respect to one another verbally and by your behavior. Practice active listening. Do not interrupt one another in discussions. Use constructive criticism. Do not belittle anyone else's ideas. Ask someone to clarify ideas that you don't understand or that seem unclearly stated. Showing respect also means that you follow through on your commitments to one another. If you promise to carry out a specific part of the assignment, do so, and do so to the best of your ability, carefully, completely and neatly, and on time, your teammates are counting on you, and will be frustrated by your lack of cooperation.

If a truly uncooperative situation occurs, you may get no credit whatsoever (group or individual grade) for the group project that you did not participate in, but were supposed to. This situation occurs rarely, but does occur. I will base my decision on private discussions with all the group members. In this situation, the student who did not participate is required to complete the assignment on their own in order to get class credit. It takes significantly less time to be cooperative from the start.

REMEMBER – YOUR TEAM CAN KICK YOU OFF THE TEAM AT ANY TIME DURING THE SEMESTER UP TO AND INCLUDING THE DAY OF THE FINAL

PRESENTATION OR WHEN THE FINAL REPORT IS DUE. Your team will then decide which parts of the assignment you participated in and are allowed to take with you. You will have one week after the end of the semester to finish all the rest of the assignment, the readings, and your part of the class final report, and give a final presentation.

Class Participation

You are expected to participate actively in the learning process. If you are confused, you **MUST** ask questions. (No question is dumb. Chances are good that if you don't understand a point, other people in the class also do not understand.) If class is being diverted by a line of questioning that is not directly pertinent, we will ask to continue that part of the discussion later.

Grading

The class is out of 100 points total. Each assignment's value is marked and graded as points as a part of your final grade. You can get a sense of how you are doing at any time during the semester by adding all the points you have earned and dividing that value by the total available points on the assignments to date.

****All assignments are due within 2 weeks of the original due date. Assignments are marked down 5% per day late. For a 5 pt assignment that is 2 days late, your score will be marked down by 0.5 pts (.05 [%] * 5 pt * 2 days). So, if you were to have received a 4.5 out of 5 maximum points after the assignment is graded, your actual grade for that assignment would be marked down to a 4 out of the total 5 points available due to the late penalty. At 2 weeks (14 days), you will lose 3.5 out of 5 points. On day 15, you lose ALL points, and will be given a 0 for the assignment.**

Homework

Individual (assignments that are passed through TurnItIn are marked)
To be filled out soon

The grade scale is typically:

A+	98+
A	92 - <98
A-	90 - <92
B+	88 - <90
B	83 - <88
B-	80 - <83
C+	78 - <80
C	73 - <78
C-	70 - <73
D+	68 - <70
D	63 - <68
D-	60 - <63
F	<60

We reserve the right to adjust this grading scale at the end of the term, and only at the end of the term.

Class Google Drive and Canvas and resource Files

The class will use the class Canvas site and the class Google Drive as our basic means of written transfer of information. You are asked to do all your group work on Google Drive in your assigned group folder so that your teaching team can track your progress, and help you as you go. Canvas will have all current assignments and resources, as well as class messages. Previous risk assessment final reports are available on Google Drive as pdfs.

Enjoy the class!

O'Neill School expectations of civility and professional conduct¹

The O'Neill School takes matters of honesty and integrity seriously because O'Neill is the training ground for future leaders in government, civic organizations, health organizations, and other institutions charged with providing resources for the public, and for members of society who are vulnerable and who are lacking in power and status. Precisely because O'Neill graduates tend to rise to positions of power and responsibility, it is critical that the lessons of honesty and integrity are learned early.

O'Neill requires that all members of its community – students, faculty, and staff – treat others with an attitude of mutual respect both in the classroom and during all academic and nonacademic activities outside the classroom. A student is expected to show respect through behavior that promotes conditions in which all students can learn without interruption or distraction. These behaviors foster an appropriate atmosphere inside and outside the classroom:

- Students are expected to attend class regularly and to be prepared for class.
- Students must be punctual in their arrival to class and be present and attentive for the duration of the class. Eating, sleeping, reading the newspaper, doing work for another class, wandering in and out of the classroom, and packing up or leaving class early are not civil or professional behaviors.
- Students must abide by the course policy regarding use of electronic devices in the classroom.
- Students must responsibly participate in class activities and during team meetings.
- Students must address faculty members, other students, and others appropriately and with respect, whether in person, in writing, or in electronic communications.
- Students must show tolerance and respect for diverse nationalities, religions, races, sexual orientations, and physical abilities.

¹ These expectations are excerpted from the O'Neill School Honor Code which can be found at: https://oneill.indiana.edu/doc/undergraduate/ugrd_student_honorcode.pdf

- Students must not destroy or deface classroom property nor leave litter in the classroom.

Academic integrity.

Students must follow the academic code of conduct at <http://www.iu.edu/~code/>.

Note Selling: Several commercial services have approached students regarding selling class notes/study guides to their classmates. Selling the instructor's notes/study guides in this course is not permitted. Violations of this policy will be reported to the Dean of Students as academic misconduct (violation of course rules). Sanctions for academic misconduct may include a failing grade on the assignment for which the notes/study guides are being sold, a reduction in your final course grade, or a failing grade in the course, among other possibilities. Additionally, you should know that selling a faculty member's notes/study guides individually or on behalf of one of these services using IU email, or via Canvas may also constitute a violation of IU information technology and IU intellectual property policies; additional consequences may result.

Online Course Materials: The faculty member teaching this course holds the exclusive right to distribute, modify, post, and reproduce course materials, including all written materials, study guides, lectures, assignments, exercises, and exams. While you are permitted to take notes on the online materials and lectures posted for this course for your personal use, you are not permitted to re-post in another forum, distribute, or reproduce content from this course without the express written permission of the faculty member. Any violation of this course rule will be reported to the appropriate university offices and officials, including to the Dean of Students as academic misconduct.

Enforcement of Public Health Requirements

Masks and Physical Distancing Requirements

In recognition of what all IU community members owe to each other all students, staff, and faculty signed an acknowledgement of their responsibility to follow public health measures as a condition returning to the campus this fall. Included in that commitment were requirements for wearing masks in all IU buildings and maintaining physical distancing in all IU buildings. Both are classroom requirements.

Both requirements are necessary for us to protect each other from transmission of COVID-19.

- Therefore, if a student is present in class without a mask, the instructor will ask the student to put a mask on immediately or leave the class.
 - If a student comes to class a second time without a mask, the student's final grade will be reduced by one letter (e.g., from an A to a B, for instance), and the instructor will report the student to the Office of Student Conduct of the Division of Student Affairs.
 - If a student refuses to put a mask on after being instructed to do so, the instructor may end the class immediately, and report the student to the Office of Student Conduct. The

student will be summarily suspended from the university pursuant to IU's [Summary Suspension Policy](#)

- If Student Conduct receives three cumulative reports from any combination of instructors or staff members that a student is not complying with the requirements of masking and physical distancing, the student [will be summarily suspended](#) from the university for the semester.

Summary Suspension Policy

"A student may be summarily suspended from the university and summarily excluded from university property and programs by the Provost or designee of a university campus. The Provost or designee may act summarily without following the hearing procedures established by this section if the officer is satisfied that the student's continued presence on the campus constitutes a serious threat of harm to the student or to any other person on the campus or to the property of the university or property of other persons on the university campus."

The Provost has determined that refusal to comply with the public health requirements specified in the Student Commitment form, including the requirement of wearing a mask in all IU buildings, constitutes "a serious threat of harm to other persons" within the meaning of the summary suspension policy. In addition, the Provost has determined that a person who does not comply with these requirements, as evidenced by three credible violations of the policy reported to the campus from any source, constitutes "a serious threat of harm to other persons" within the meaning of the summary suspension policy.

The syllabus and the schedule is subject to limited change in the event of extenuating circumstances. "

Additional information for students:

Counseling and Psychological Services

For information about services offered to students by CAPS:
<http://healthcenter.indiana.edu/counseling/index.shtml>.

Religious Observation

In accordance with the Office of the Dean of Faculties, any student who wishes to receive an excused absence from class must submit a request form available from the Dean of Faculties for each day to be absent. This form must be presented to the course instructor by the end of the second week of this semester. A separate form must be submitted for each day. The instructor will fill in the bottom section of the form and then return the original to the student. Information about the policy on religious observation can be found at the following website: <https://policies.iu.edu/policies/aca-59-accommodation-religious-observances/index.html>.

Disability Services for Students

Securing accommodations for a student with disabilities is a responsibility shared by the student, the instructor and the DSS Office. For information about support services or accommodations available to students with disabilities, and for the procedures to be followed by students and instructors: <https://studentaffairs.indiana.edu/student-support/disability-services/index.html>.

Sexual Harassment

As your instructor, one of my responsibilities is to help create a safe learning environment on our campus. Title IX and our own Sexual Misconduct policy prohibit sexual misconduct. If you have experienced sexual misconduct, or know someone who has, the University can help.

If you are seeking help and would like to talk to someone confidentially, you can make an appointment with:

- i. The Sexual Assault Crisis Service (SACS) at 812-855-8900
- ii. Counseling and Psychological Services (CAPS) at 812-855-5711
- iii. Confidential Victim Advocates (CVA) at 812-856-2469
- iv. IU Health Center at 812-855-4011

For more information about available resources:

<http://stopsexualviolence.iu.edu/help/index.html>. It is also important to know that federal regulations and University policy require me to promptly convey any information about potential sexual misconduct known to me to our campus' Deputy Title IX Coordinator or IU's Title IX Coordinator. In that event, they will work with a small number of others on campus to ensure that appropriate measures are taken and resources are made available to the student who may have been harmed. Protecting a student's privacy is of utmost concern, and all involved will only share information with those that need to know to ensure the University can respond and assist. I encourage you to visit <http://stopsexualviolence.iu.edu/help/index.html> to learn more.

Commitment to Diversity: Find your home and community at IU

Asian Culture Center

Address: 807 East Tenth Street, Bloomington, IN 47408

Phone: 812-856-5361

Email: acc@indiana.edu

Website: <https://asianresource.indiana.edu/index.html>

First Nations Educational & Cultural Center

Address: 712 E 8th St., Bloomington, IN 47408

Phone: 812-855-4814

Email: fnecc@indiana.edu

Website: <https://firstnations.indiana.edu/contact/index.html>

LGBTQ+ Culture Center

Address: 705 E 7th St., Bloomington, Indiana 47408

Phone: 812-855-4252

Email: glbtserve@indiana.edu

Website: <https://lgbtq.indiana.edu/contact/index.html>

La Casa Latino Culture Center

Address: 715 E 7th St., Bloomington IN, 47408

Phone: 812-855-0174

Email: lacasa@indiana.edu

Website: <https://lacasa.indiana.edu/>

Neal Marshall Black Culture Center

Address: 275 N Jordan Ave Bloomington, Indiana 47405
Phone: 812-855-9271
Email: nmgrad@indiana.edu
Website: <https://blackculture.indiana.edu/index.html>

Homonyms and Sound-Alike Words NOT to be Confused

(Definitions adapted from: Webster's New World Dictionary, Pocket Books Paperback Edition, Simon and Schuster Inc, NY, 1995)

Note that these are not the only definitions, just the ones I have seen most often confused.

cite: to quote or reference

site: a place

sight: something seen or looked at

to: (preposition) toward, until

too: also, more than enough

two: 2

write: to compose, to form words on paper

right: correct, opposite of left

there: at that place or point

they're: they are

their: possessive form

affect: (n) the psychological veneer represented by actions, facial expressions, etc

(From his affect, I deduced that he was a snob)

(v) to influence

(That movie affected and saddened me. //

The viral infection adversely affected my ability to think clearly.)

effect: (n) the result, the change induced (in the case of R.A., by a stressor)

(A compromised immune system is one effect of PCB exposure in rats.)

(v) to cause or induce a change

(To effect [*i.e.* carry out] that site clean-up will cost millions of dollars.)

weather: "the condition of the atmosphere with regard to temperature, moisture, etc"; e.g. cold and rainy, hot and sunny...

whether: "introducing alternatives"

where: in what place?

were: past tense of "are"

wear: "to bear [clothing, etc] on the body," "to impair or diminish by use"

we're: we are