

GE THEME COURSES

Courses that are accepted into the General Education (GE) Themes must meet two sets of Expected Learning Outcomes (ELO). One set is common for all GE Themes and one set is to the specific Theme to which the course belongs. Courses may be accepted into more than one Theme, but ELOs for each Theme must be met.

In this form, please describe how your class will meet the ELOs for the Theme(s) for which they seek approval. Please use language that is clear and concise and that colleagues outside of your discipline will be able to follow. The text boxes expand as you type, so you need not limit your response to the size of the box. Because this document will be used in the course review and approval process, you should be *as specific as possible*, listing concrete activities, specific theories, names of scholars, titles of textbooks etc. Your answers will be evaluated in conjunction with the syllabus submitted for the course.

Course subject & number: Issues in Global Environmental Health

PUBHEHS 3310

General Expectations of All Themes

GOAL 1: Successful students will analyze an important topic or idea at a more advanced and in-depth level than the foundations.

Please briefly identify the ways in which this course represents an advanced study of the focal Theme.

In this context, advanced refers to courses that are e.g., synthetic, rely on research or cutting-edge findings, or deeply engage with the subject matter, among other possibilities.

Students deeply engage in subject matter and rely on cutting edge research during this course by being introduced to current scientific literature on the topics being studied. An example of this is during the study of toxic chemical exposure, specifically exposure to Bisphenol A (BPA), an endocrine disruptor chemical. Students are NOT JUST presented with a cursory review of this chemical and its impact on human health, but, instead, are introduced to the most recent peer reviewed scientific literature and current policies, investigations, and advisories of US government agencies to protect public health ([Bisphenol A and Human Reproductive Health](#)). Students are not just introduced to Rachel Carson's *Silent Spring* (1962) about her concerns for DDT and environmental and human health, but we review toxicological profiles of DDT from 2002 and 2012 to learn how the cancer risk assessments changed during that time frame ([Link](#)). A foundational course may mention the Dupont Chemical C8, and how manufacturers of Teflon coated pans removed this product from the market due to its effects on human health. In this course, students are introduced to the case study of a large community of SE Ohioans who were exposed to C8 in their drinking water, and the scientific studies of this community's health effects from exposure to C8 ([Association of Perfluorooctanoic Acid and Perfluorooctane Sulfonate With Serum Lipids Among Adults Living Near a Chemical Plant](#)). Students are taught about exposures to chemicals from grilled charred meats and the risk of colorectal cancer, the risks associated with particulate matter air pollution and heart disease, the risk of colorectal cancer from red meat consumption, and the association between talcum powder use and ovarian cancer. They read peer reviewed journal articles using their own knowledge level of science and are asked to formulate an educated opinion of the "truth" from these articles. Students are challenged throughout the course to take deep dives into a particular scientific discovery, or their perception the risks communicated from these studies, to challenge their own perceptions. These articles introduced students to the importance of the discovery of biophysiological mechanisms that supported the concept of "causation": ([Epidemiology of colorectal cancer](#), [The Association Between Talc Use and Ovarian Cancer](#), [Red Meat-Derived Nitroso Compounds, Lipid Peroxidation Products and Colorectal Cancer](#), [Air particulate matter and cardiovascular disease: the epidemiological, biomedical and clinical evidence](#)). A 2014 article, [A review of what is an emerging contaminant](#), was assigned to illustrate the breadth of the new and reemerging chemicals of concern, to supplement the lecture material. [The Adverse Effects of Environmental Noise Exposure on Oxidative Stress and Cardiovascular Risk](#) was assigned to study noise pollution's effect on cardiovascular risk, which is usually not considered as an effect of noise pollution. Nevertheless, it makes a case that includes a physiological mechanism that noise may be associated with CVD! An example of a deep dive into how housing conditions and redlining is a social determinant of health is the study entitled [Confronting the Legacy of "Separate but Equal": Can the History of Race, Real Estate, and Discrimination Engage and Inform Contemporary Policy?](#)

ELO 1.1 Engage in critical and logical thinking about the topic or idea of the theme. Through what readings, assignments, course activities, course goals, topics, and other course components will students engage in critical and logical thinking about the topic or idea of the theme?

The homework (HW) exercises assigned for each topic on a weekly basis are the learning methods used to promote critical thinking skills. Examples of these include 1. A “BPA Perception and Science” HW where students record their personal or professional perceptions of BPA risk to humans and if they are using BPA products in their home. Students are asked to read peer reviewed articles supporting the association between BPA and health outcomes. After they record their risk perceptions, students are required to find 5 “credible” articles refuting this claim. Finally, students are asked if their risk perception changed, because of their research and whether they will change their behavior toward BPA use; 2. A HW where students record personal behaviors that they believe places them at risk for developing cancer. They research the literature to find evidence of biological plausibility that identifies a biophysiological mechanism explaining how their exposure may lead to a health outcome, and then decide if their perception of risks is significant based upon what they learned about the biological plausibility (one of Hill’s criteria of causality) of the association between their behavior and the cancer outcome; 3. A HW where students download inspection reports from a local health department of their favorite restaurant, analyze the critical violations (those can cause a food born illness) over a three year period to determine if these violations keep reappearing over time even though they are corrected “at the time of the inspection;” and then decide what is the most hazardous critical violation, and whether they would continue to eat at this restaurant, and 4. A semester long scaffolded Environmental Health Science (EHS) Video Project where student groups will produce a 4 minute long “This is EHS” video on an EHS topic of their choice. Students will need to engage in critical thinking and problem-solving skills to work together as group both inside and outside of class to meet 5 milestones: a project proposal meeting specific metrics, an infographic, a storyboard, a script, and finally to film and edit their video to meet metrics that include bonus points for specific professional cinematic elements.

ELO 1.2 Engage in an advanced, in-depth, scholarly exploration of the topic or idea of the theme.

Through what readings, assignments, course activities, course goals, topics, and other course components will students engage in an advanced, in-depth, scholarly exploration about the topic or idea of the theme.

A semester long scaffolded EHS Video Project where student groups will produce a 4 minute long “This is EHS” video on the EHS topic of their choice. Students will need to engage in critical thinking and problem-solving skills to work together as group both inside and outside of class to meet 5 milestones: a project proposal meeting specific metrics, an infographic, a storyboard, a script, and finally to film and edit their video to meet metrics that include bonus points for specific professional cinematic elements. The rubric for each milestone contains a metric that requires that the milestone product be scientifically accurate and credible references must be provided. To achieve this level of accuracy, student must engage in scholarly exploration to meet the metric.

Another assignment requires students to list any confusions or muddy points from their learning activities outside of the classroom. These activities include listening to recorded lectures, reading materials provided, and taking Knowledge Checks. Students are encouraged to undertake their own scholarly exploration to find answers to their questions and confusions. The following instructions are taken from the assignment: “As the course progresses and evolves, so does our approach to the conversations we have in the weekly discussion boards. The purpose of those boards is to allow you the opportunity to reflect on your learning; put simply – to think about how you think. (This is called “metacognition.”) As I read through all of the posts (and I do read all of them), I can see how each of you are taking ownership and processing what you are learning. There is a higher expectation in flipped classrooms that students take ownership of their learning. What this means is that by identifying topics/concepts that are still muddy, you should be searching for the answers yourself on the web, as you would in a real-world work environment.”

The following is an announcement I made to class requiring credible and science-based reference material: “I am concerned about the frequency of non-scientific statements that are being made in the Reflection Journals. Do not make statements that are not true or are not **supported by an article from the NIH**. I will continue to take off points for spreading “pseudo” or non-science, or uninformed science! Back up your statements such as “this agent will kill you!” I will be checking the science!”

The following is one of objectives for the course: Explain and interpret the scientific justification and proposed causes of climate change and global warming

The following are examples of scholarly credible peer reviewed required learning materials:

Read entire article: [Risk Assessment of Growth Hormones and Antimicrobial Residues in Meat](#)
[Public Health Effects of Inadequately Managed Stormwater Runoff](#)
[Case Study: A massive outbreak of gastroenteritis on a Lake Erie Island](#)

Read Abstract, Section I except B and C; Section II A to H: [The Adverse Effects of Environmental Noise Exposure on Oxidative Stress and Cardiovascular Risk](#) ([Links to an external site.](#))

The following topics are that are explored in depth prior to introducing the remaining Environmental Health topics: Environmental Health Epidemiology, Environmental Toxicology

The following are actual quotes from grading the script for the EHS Video Project: 1. "YOU have to make sure there is credible research to back up the statements about health outcomes by googling NIH..." 2. "Do you have a credible reference to back this up? statements that are not backed in science will lose points." 3. "too colloquial use more scientific phrases"

The following are actual quotes from grading students' Reflection Journals" 1." You should read the science on fragrances: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7825391>" 2. "Check this out...read the acute health effects: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5651468>" 3. "need to use toxicological terms for exposure...acute, subacute, sub chronic and chronic"

GOAL 2: GOAL: Successful students will integrate approaches to the theme by making connections to out-of-classroom experiences with academic knowledge or across disciplines and/or to work they have done in previous classes and that they anticipate doing in future

ELO2.1 Through what readings, assignments, course activities, course goals, topics, and other course components will students identify, describe, and synthesize approaches or experiences relevant to the topic or idea of the theme in this course?

Homework assignments are the learning methods used that requires students to identify, describe, and synthesize approaches or experiences relevant to the topic or idea of the theme in this course. For example, there is a homework assignment that requires students to engage with the topic of environmental diseases. The instructions for this homework follows:

"This assignment is intended for you to think about your personal behaviors or exposures that may lead to the development of cancer, based upon what you learned from the text Chapter 5 and the reading materials. Based upon the exposure and disease outcome you identify (e.g., eating red meat and colon cancer), For 5 bonus points, I am also asking you to research the literature to determine if there are any references that describes a biophysiological mechanism that provides additional evidence that the epidemiological association identified between your exposure and health outcome is biologically plausible (one of Hill's Criteria of Causality....see Resources). Depending on if you find any such reference after a credible peer reviewed literature search, does your perception of that risk change, and are you still willing to change your behaviors?"

1. **For 6 points:** Make list of **three (3) of your own personal habits** and activities that **YOU PERCEIVE** might enhance your risk of someday developing a malignancy (a cancer health outcome). **If you can't identify 3 personal habits, then identify personal habits that you have observed in other people.** These personal habits and activities assume that you are being exposed to a biological, chemical, or physical agent, such as smoking (containing hazardous chemicals, alcohol consumption, or a sedentary lifestyle (a social determinant of health).
 - a. For each personal habit, include the potential cancer health outcomes.
2. **To earn 5 bonus points (not required): Answer the following questions:**
 - a. For one of your personal habits and activities that might enhance your risk of someday developing a malignancy, answer these questions:
 - i. Has "causation" been scientifically established by, **at a minimum**, a biophysiological mechanism linking your exposure to a health outcome?

1. Provide at least 2 URLs of peer reviewed articles that includes evidence of "causation" between your exposure/behavior and a health outcome, or URLs of a peer reviewed article that states that no "causation," or no strong evidence of "causation" has been found. Use the National Institutes of Health, your health outcome, "biological mechanism," and "Hill's Criteria of Causation" as a search term
 - a. As part of this bonus exercise, you will need to study on your own the Hill's Criteria (see Resources below).
1. How does your answer to #2.1.1 affect whether your perception of your exposure and health outcome is significant enough to change your behavior or the behavior of the people you know, i.e., would you feel comfortable asking these people to change their behaviors?
 - a. Would you be inclined to change your behaviors/exposures?

ELO 2.2: In what readings, assignments, course activities, course goals, topics, and other course components will students in this course use prior experiences to engage in reflection, self-assessment, and creative work?

This course was designed to engage students in the topics through learning activities and reflections. An example of a creative work that required student groups to use the knowledge from learning materials and lectures to create an infographic on food safety. Here is an example of a group's infographic and below the example are the instructions:

<https://spark.adobe.com/post/e8E7Qd56WHdze/>

CREATING THE INFOGRAPHIC

You can use any tool that you like to create this infographic, but we recommend using an OSU-approved tool such as Adobe Spark Post. Adobe Spark has pre-created templates for you to use, but you need to be careful in your selection of templates to make sure it addresses all the elements in the grading rubric. Some Adobe templates are less visually appealing than others. Adobe does let you **share a Spark page or post**, but you cannot collaborate, simultaneously, in "real-time."

ELEMENTS TO INCLUDE IN INFOGRAPHIC

Include the following food safety elements in your infographic:

1. Safe **cooking temperatures** for the following foods
 - a. Rice, vegetables, grains, legumes
 - b. Seafood, scrambled eggs served immediately, steaks/chops of veal, beef, pork, lamb
 - c. Ground meat
 - d. Poultry
2. Safe method for **re-heating** foods including time and temperature
3. Safe method for **cooling foods** including proper time, temperature, proper equipment
4. Safe method for **holding food** using temperature control
5. Safe methods for **food thawing** methods...include two methods
6. Proper refrigerator food storage

The EHS Model Video assignment is an immersive active learning experience designed for students to engage in extremely creative activities. These include designing an infographic and a storyboard of their video, writing a script for their video that includes requirements for: 1. scientific accuracy, 2. videography elements including percentage of video time using narrative voiceovers, graphics, interviewing, and acting in front of the camera, and 3. technical elements including lighting, sound, transitions, shot angle and framing. Bonus points are awarded for meeting 5 professional videography elements such as pace, passion/emotional content, voice, the use of music, and illustrations. Here is an actual storyboard from the assignment:

https://osu.instructure.com/courses/105300/gradebook/speed_grader?assignment_id=2308721&student_id=101996

The weekly Reflection Journals (RJ) assignments are used to engage the students in course topics from the perspective of their own experiences with each topic. Here is an example of a RJ assignment and below the example are the instructions:

https://osu.instructure.com/courses/105300/gradebook/speed_grader?assignment_id=2308703&student_id=541746

Prompts

1. Topic: Introduction to Environmental Health Science

1. Prompt #1: To understand the meaning of Environment Health Science, we first must understand the scope of our environment. Using what you learned about Environmental Health Science from your assigned videos and the class lecture, think about the different environments you experience in your daily lives.
 - a. Part 1. List three of those environments
 - b. Part 2. For each environment list:
 - i. What potentially hazardous physical, biological, or chemical agents could you be exposed to (be specific as possible...not just "chemical" but what chemical).
 - ii. Where would this agent go (in your environment) in order to expose you? (air, water, food, soil)
 - iii. How would you be exposed? (dermal, ingestion, inhalation, injection)

Instructions

1. Review the prompt question above and draft a response.
2. Create an Adobe Spark Page for your replies to the prompt(s). This Page must capture your response, using text and media elements. This will look very similar to a magazine page, [like the one seen here. \(Links to an external site.\)](#) Your pages must include:
 - a. **some text, answering the prompt questions**
 - b. **at least one image.** Your images should support your response. Be thoughtful in your search for images; use keywords from your text to search for appropriate images.
 - i. can also include screenshots, videos, links, etc.
 - c. **When completed, publish your page and submit that URL** in the text box for this assignment.
 - i. In the web version of Spark, you can share using the project Share link found on any project in the Projects view and at the top of the page when editing

The **Lived Environments** theme is intended to enable students to explore issues related to humans and their lived environments through both objective and subjective lenses inclusive of physical, biological, cultural, and aesthetic space that individuals and groups occupy, and the relationship between humans and these environments.

Specific Expectations for Courses in Lived Environments

GOAL 1: Successful students will explore a range of perspectives on the interactions and impacts between humans and one or more types of environments (e.g., agricultural, built, cultural, economic, intellectual, natural) in which humans live.

ELO 1.1 Through what readings, assignments, course activities, course goals, topics, and other course components will students engage with the complexity and uncertainty of human-environment interactions?

The readings that are assigned in the learning materials for course topics are designed to engage the students in the complexity and uncertainty of the science of human-environment interactions. Students are encouraged to include curiosity and skepticism while reading and analyzing scientific literature. Here is an example of the instructions given prior to reading selected scientific articles:

Read the article from the Abstract to Screening. If you didn't know how much your behavior may influence your risk of CRC, this article will widen your perspective. Notice the content about mechanisms. Do you know if you burn meat on the grill that would increase your risk of cancer? BUT we always have to remember that the "dose determines the poison." Do you eat charbroiled meat from the grill every day of your life? If the answer is no, then your risk decreases. More to come on that when we talk about risk assessment.

- [Epidemiology of colorectal cancer \(Links to an external site.\)](#)

The question to take away from the following article is: do you believe that talc use is associated with OC? REMEMBER, there is a BIG difference if I say "causal," than if I say, "associated with." Why is that? Is there a biophysiological mechanism identified? Read from "Background" to "Study Population." What study design do you recognize in the article that you were exposed to in our epidemiology lecture? Juries across the country believe that talcum powder "causes" cancer. My mom died from ovarian cancer, and she used talcum powder.

- [The Association Between Talc Use and Ovarian Cancer \(Links to an external site.\)](#)

Finally, in case you don't believe the red meat and CRC association, this study will make a believer out of you (but it's OK to remain a skeptic...remember this, because we address skepticism in science later in the course. Read Section 2. The application of toxicological principles at its finest!

- [Red Meat-Derived Nitroso Compounds, Lipid Peroxidation Products and Colorectal Cancer \(Links to an external site.\)](#)

And again, finally, in case you think it's strange that heart disease can be associated with air pollution (social determinants of health):

[Air particulate matter and cardiovascular disease: the epidemiological, biomedical, and clinical evidence](#)

ELO 1.2 Through what readings, assignments, course activities, course goals, topics, and other course components will students describe examples of human interaction with and impact on environmental change and transformation across time and space?

Climate change is a topic that features current and projected data of human's impact on the environment that is associated with changes in our climate over time and space.

The most recent report of Intergovernmental Panel on Climate Change, the 6th Assessment Report (AR6) is a featured reading for this topic. This report [Sixth Assessment Report of the Intergovernmental Panel on Climate Change](#), The Physical Science Basis, contains a Summary for Policy Makers that includes sections on The Current State of the Climate and Possible Climate Futures, which should be easily digested by students taking this course. The Current State of the Climate is introduced with the following description: "Since AR5, improvements in observationally based estimates and information from paleoclimate archives provide a comprehensive view of each component of the climate system and its changes to date. New climate model simulations, new analyses, and methods combining multiple lines of evidence lead to improved understanding of human influence on a wider range of climate variables, including weather and climate extremes. The time periods considered throughout this Section depend upon the availability of observational products, paleoclimate archives and peer-reviewed studies." Possible Climate Futures is presented with the following description: "A set of five new illustrative emissions scenarios is considered consistently across this report to explore the climate response to a broader range of greenhouse gas (GHG), land use and air pollutant futures than assessed in AR5. This set of scenarios drives climate model projections of changes in the climate system. These projections account for solar activity and background forcing from volcanoes. Results over the 21st century is provided for the near-term (2021–2040), mid-term (2041–2060) and long-term (2081–2100) relative to 1850–1900, unless otherwise stated."

Any knowledge about climate change that may be lacking in the students who take this course, will be fulfilled because students have access to not only an easily readable summary for policy makers of the science of climate change, but the actual science supporting the claims in the summary. Climate change can be described by this ELO: **Examples of human interaction with and impact on environmental change across time and space!**

This course uses Geographic Information System data and maps extensively in learning materials and homework to give students examples of human interaction with and impact on environmental change over time and space, i.e., spatial, and temporal depictions of humans interacting with their environment. Examples of these databases and interactive maps are the National Outbreak Reporting System (<https://wwwn.cdc.gov/NORSDashboard/Default.aspx>), the Toxics Release Inventory (TRI) Program (<https://www.epa.gov/toxics-release-inventory-tri-program>), Air Data Air Quality Monitors (<https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=5f239fd3e72f424f98ef3d5def547eb5&extent=-146.2334,13.1913,-46.3896,56.5319>), Air Now (<https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=5f239fd3e72f424f98ef3d5def547eb5&extent=-146.2334,13.1913,-46.3896,56.5319>), and the World Air Quality Index Ranking (<https://www.iqair.com/us/air-quality-map>). The “Not Even Past” data and interactive map allows the student to visualize how the socioeconomic, environmental injustice, and public health impacts redlining in the 1930’s are still prevalent today in Columbus, Ohio census tracts. Following are actual instructions from the course: “Open [Not Even Past](#), click on a census tract and find its HOLC grade in the left ‘1930s’ column. Follow that census tract as it transitioned into its current social vulnerability score in the right-hand column. Open the current health outcome data for the census tract and compare those data to other census tracts within that health outcome. Do you notice the 1930s redlined areas have the poorest current health outcomes unless the census tract made a substantial transition from a higher to a lower vulnerability score?”

GOAL 2: Successful students will analyze a variety of perceptions, representations and/or discourses about environments and humans within them.

ELO 2.1 Through what readings, assignments, course activities, course goals, topics, and other course components will students analyze how humans’ interactions with their environments shape (or have shaped) attitudes, beliefs, values, and behaviors?

A popular homework is one that students name their favorite restaurant (based on attitudes, beliefs, values and behaviors) in Columbus or its suburbs and to open the Columbus Public Health and Franklin County Public Health on-line food service inspection reports: [Columbus Public Health food service inspection reports \(Links to an external site.\)](#), [\(Links to an external site.\)Franklin County Public Health food service inspection reports](#). The instructions require the student to open actual inspection reports of their favorite restaurant, review three years of critical violations, determine the most critical violation and any trends that are shown from the inspections over time, and decide, based upon those reports, whether to eat there again. Here are the instructions: “click on your restaurant and you will see the inspection reports listed by date. Beginning with the most recent inspection in 2021, open all of the inspections during 2020 and 2019 with the word “Standard” in the description of the inspection, AND only those inspections that have “Critical” violations. The Critical violations will have either the code in red e.g., 3717-1-03.4(J), or the word “Critical” in red. These are violations that if left uncorrected, are more likely to contribute to foodborne illness. Examples of critical violations include improper cooking temperatures and improper holding temperatures. Copy and paste all of the critical violations from the three years as a text entry below your answers to 1.1 and 1.2. See example of Copy and Paste of Critical Violations in Resources. After you have viewed all the critical violations listed on the inspection reports, answer the following questions **BELOW THE INSPECTION REPORTS. NUMBER YOUR ANSWERS EXACTLY AS SHOWN BELOW TO HELP WITH GRADING EFFICIENCY.**”

- a. Look for trends in the inspection reports. Do you notice any violations repeating on each inspection or are they corrected once and remain corrected on subsequent inspections?
 - i. Describe in a few sentences any trends that you have noticed.
 - b. Why do you think these trends are occurring?
 - c. What, if any, is the worst critical violation in your opinion? Why? Your answer should include food safety concepts.
2. Based upon your answers to questions:
- a. What is your perception of your favorite restaurant?
 - b. Has it changed or stayed the same?
 - c. Will you eat there again?

A Reflective Journal (RJ) assignment ask the student to identify an ethical dilemma that they have experienced in their lives. This RJ meets ELO 2.1 because “environments” is broadly defined in environmental public health to include the social determinants of health, and ethical decision making could be one of the determinants of health and wellbeing. Here are the actual instructions: “To understand how ethical decisions are made in Environment Health Science, we first should understand our personal approach to ethical decision making. Using what you learned about the two philosophies of ethical approaches, **duty-based or deontology, and utilitarianism**, in our class lecture, think about the approach you use in most of your ethical decision-making. Here is an example of an ethic dilemma involving wearing masks for CoVID: <https://spark.adobe.com/page/RXJl7lE6kc9L/>. These are the Prompt questions used:”

- Prompt Question #1: (THIS IS A THREE-PART PROMPT QUESTION)
 - 1. describe an ethical dilemma you were involved in (currently or in the past),
 - 2. describe the ethical approach (listed in Prompt #1) you used in your ethical decision-making process,
 - 3. describe the resolution of your ethical dilemma

Another Reflective Journal assignment asks students to illustrate their exposures to zoonotic diseases, if they had any health effects, their emotional response to the health outcome, and how they would change their behaviors to avoid the zoonotic disease hazard. Here is an example of this reflection:

https://osu.instructure.com/courses/105300/gradebook/speed_grader?assignment_id=2308711&student_id=54453

ELO 2.2 Through what readings, assignments, course activities, course goals, topics, and other course components will students describe how humans perceive and represent the environments with which they interact?

Reflective Journals (RJs) require students to describe how they perceive and represent the environments with which they interact. An example of a HW “BPA Perception and Science,” where students record their personal or professional perceptions of BPA risk to humans and if they are using BPA products in their home. Students are asked to read peer reviewed articles supporting the association between BPA and health outcomes. After they record their risk perceptions based upon what they learn from the peer reviewed articles provided, students are required to find 5 “credible” articles refuting this claim. Finally, students are asked if their risk perception changed, because of their research and whether they will change their behavior toward BPA use.

In the module Trust and Mistrust of Science, students are required to reflect on how they perceive science by watching three videos: [Alan Alda: Why you should trust science even if you're a skeptic](#), [Bill Nye Responds to Anti-Science Tweets](#), and [Bill Nye Explains the Scientific Method and His Greatest Accomplishment in Life | Big Think](#). This module teaches students to critically analyze scientific discoveries to assure that their perceptions and description of the science of environmental public health is correctly communicated; and to understand that these discoveries represent our current knowledge, and that additional scientific studies may be needed to get to the actual truth.

ELO 2.3 Through what readings, assignments, course activities, course goals, topics, and other course components will students analyze and critique conventions, theories, and ideologies that influence discourses around environments?

The toxicology module requires students to critically analyze the current science on the health effects of toxic chemicals and contaminants of emerging concern. Students will read the following introduction to the module: “Most of us are not exposed to toxic amount of lead and mercury, but you are drinking lead and mercury in your drinking water in ‘safe’ amounts, i.e., if you drink water with these metals below a specific concentration every day for the rest of your life, you are unlikely to develop cancer. Have you followed the BPA controversy over the past 10 - 15 years? Do you use BPA free food contact containers in your kitchen? Should pregnant women be concerned about exposure to BPA based upon adverse pregnancy outcomes in animal experiments and limited human studies? These are questions you should be thinking about as an EH scientist and personally. The world community is concerned about EDCs and a report was written by the WHO and UNEP called the **State of the Science of Endocrine Disrupting Chemicals - 2012**. This concern will undoubtedly work its way into future UN SDGs. The state of the science is still developing on the issue of the association of EDCs to endocrine system modulated health outcomes. Should we wait until we are closer to knowing the ‘truth’ about the health outcomes from exposure to EDCs? Or, should we modify our behaviors now, without waiting for ‘further studies’? This is yet another decision you must ‘make personally and as practicing EH professional. If it is not just yourself but an unborn child that you are responsible for, would your risk perception be any different? We will learn this in risk communication...if children are involved, the perception of risk is much greater. Students are required to read: [A review of what is an emerging contaminant \(Links to an external site.\)](#), which challenges what was historically and contemporarily description of toxic chemicals of concern. The article introduces new theories that ‘true or really new’ emerging contaminants ‘would of course include many more types of contaminants such as pesticides, pharmaceuticals and personal care products, fragrances, plasticizers, hormones, flame retardants, nanoparticles, perfluoroalkyl compounds, chlorinated paraffins, siloxanes, algal toxins, various trace elements including rare earths and radionuclides, etc. It is only a few examples from a long list of potential emerging contaminants. The exercise of a literature search was also done for the term “emerging contaminants” and we observed a steady increase since the turn of the millennia (Figure [\(Figure2\)2](#)) but this probably does not reflect so much the scientific efforts towards contaminants of emerging interest but rather the coining of the term ‘emerging contaminants’.”

From the beginning of course, students were taught the many conventional definitions of EHS: “Environmental Health is the science and practice of preventing human injury and illness and promoting well-being by (1) identifying and evaluating sources and hazardous agents; and (2) limiting exposures to hazardous physical, chemical, and biological agents in air, water, soil, food and other environmental media or settings that may adversely affect human health.” (National Environmental Health Association). With the Publication of Public Health 3.0 (<https://www.healthypeople.gov/sites/default/files/Public-Health-3.0-White-Paper.pdf>), public environmental health was transformed into a new model of public health that we call Public Health 3.0 (PH3.0). In this paradigm shift, pioneering local public health agencies are building upon their historic success at health improvement and are adding attention to the social determinants of health—the conditions in the social, physical, and economic environment in which people are born, live, work, and age. Students in this course are taught to think of one of the “agents” in the EHS Exposure Model as a social determinants of health such as housing quality, indoor air quality, and access to safe food. Consequently, new, and better definitions of EHS were developed and are taught in the course: “Environmental health includes both the direct pathological effects of chemicals, radiation and some biological agents, and the effects (often indirect) on health and well-being of the broad physical, psychological, social, and aesthetic environment, which includes housing, urban development, land use, and transport.” (European Charter on Environment and Health)

The Ohio State Sustainability Education and Learning Committee defines a “sustainability course” as one that “acknowledges the fundamental dependence of humans on earth and environmental systems and addresses one or more aspects of the interdependence of human and natural systems...” and focuses its view of these interactions of human-natural systems through at least one of the dimensions of sustainability: “environmental & earth systems; economy & governance; society & culture; engineering, technology & design; and health & well-being.”