Course Syllabus

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ENV H 532: Reproductive and Developmental Toxicology

3 Credits, Winter 2025

Tuesdays (2:30-3:20pm, HSEB (http://maps.google.com/maps?q=47.6516359999,-122.310452+(HSEB)&z=18) 427 (http://www.washington.edu/classroom/HSEB+427)) and Thursdays (2:30-4:20pm, HSEB (http://maps.google.com/maps?q=47.6516359999,-122.310452+(HSEB)&z=18) 427 (http://www.washington.edu/classroom/HSEB+427))

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Dr. Elaine M. Faustman (pronouns: she/her/hers), Professor and Director of the Institute of Risk Analysis and Risk Communication, School of Public Health, University of Washington, Seattle. Dr. Faustman directs the Center for Children's Health Research and directed the Pacific Northwest Center for the

National Children's Study and the Oceans and Human Health Center. She is an elected fellow of the American Association for the Advancement of Science and the Society for Risk Analysis. She has served on the USEPA Science Advisory Board and chaired the National Academy of Sciences Committee on Developmental Toxicology. She has also served on the National Advisory Environmental Health Sciences Council, NIEHS-NTP Board of Scientific Counselors and Committee on Alternative Toxicology Methods, National Academy of Sciences Committee on Toxicology and the Institute of Medicine Upper Reference Levels of Nutrient Subcommittee of the Food and Nutrition Board. She has served as the Secretary General for the International Union of Toxicology (IUTOX) and has been a member and co-chair of the International Science Council (ISC) World Data Systems Advisory Board. For over 2 decades, she has been involved and directed Stakeholder forums and Community Based Participatory Research for DOE, EPA and NIH. She currently serves on the ISC CODATA Citizen Sciences Task group. Her research expertise is on integrative scientific approaches including identifying molecular mechanisms of developmental, reproductive, and neuro toxicants, characterizing in vitro techniques for toxicology assessment, and developing biological and exposure based dose-response models. Across all of her research she uses a systems-based and risk framed methodology. The Institute for Risk Analysis and Risk Communication is a founding member of the WHO Chemical Risk Assessment Network. Two additional activities that she has been active is as past Co-Chair of the Health Professionals Advisory Board International Joint Commission between Canada and the USA and Chair of the Alternatives Congress Trust board that emphasizes 3 R approaches for responsible use of alternatives to animal use. She has over 200 peer reviewed research publications and reports.

Course Description

This class will cover basic principles of normal reproduction and development and then focus on how and when environmental chemicals induce adverse reproductive and developmental outcomes. it will cover both male and female reproductive topics. Discussion topics include identification and characterization of specific classes of reproductive and developmental toxicants, mechanisms of action of these agents at the molecular and cellular level, and risk assessment and regulatory issues relevant for reproductive health. The course will include discussions of recent literature as well as in-class demonstrations of laboratory-based assessments for reproductive and developmental toxicology. Practical approaches for communicating developmental and reproductive risk issues will be given. As a base for this course we will use a free Primer from the Teratology Society, an electronic copy of which will be made available to all students. This course provides an in-depth immersion for these important endpoints in public health.

Learning Objectives

At the end of the course, students shall be able to:

1. Describe the main themes of reproductive and developmental toxicology and identify new emerging issues for reproductive public health.
2. Discuss current research issues in these topics.
3. Summarize in-class laboratory demonstrations assessing reproductive and developmental toxicology. Characterize strengths and limitations in applying these approaches for assessing reproductive and

developmental impacts.
4. Apply approaches for data integration for evaluating these complex and dynamic endpoints.
5. Demonstrate skills for synthesis and oral and written reporting of research.
6. Share in the excitement of this area of study

Assignments

1. Become familiar with background material
2. Read, critique and report on current literature/publications. You are expected to read 6 articles and write a review as described below.
3. Fill out a **brief paper/manuscript report** (1-2 pages) for each paper review. Come to class prepared to share your points orally in front of the class for your papers. Prepare electronic copies (ie post your paper reviews) for all of your assignments so we can share with your classmates. Remember that your fellow students will not have read every paper so you will need to prepare the equivalent of 1-3 slides with key points, figures, and tables from the paper to familiarize everyone and then add your comments and review notes. These paper reviews will be due at intervals throughout the class so the topics can follow the topics being discussed or having just been discussed during class. Student participants will be required to respond to six postings throughout the course to a total of 6 response postings.
4. **Required Paper (see details below**):

Option 1- Propose a research study based on an evaluation of the shortcomings of the research in a reproductive or developmental toxicology area of your choice that will improve upon existing data.

Option 2- Propose a Mechanism or Proposed Adverse Outcome Pathway (AOP) for your agent of interest. Use the outline to support your proposed MOA or AOP and to identify additional research you would like to do to confirm your mechanism or AOP.

Either option for the required paper (3-5 page max) must be organized as follows:

A. Abstract containing Hypothesis or Proposed Mechanism and list of 2 Specific Aims
B. Background & Significance
C. Problem Formulation
D. Preliminary Data (based on the literature)
E. Experimental Design & Methods
Note: One Specific Aim must contain

1.) Rationale
2.) Short experimental design
3.) Expectations & pitfalls

F. Paragraph listing key communication points
G. References

An example proposal will be provided as a guide.

Either option 1 or 2 should be brief (3-5 page proposal) expanding one of the course topics. Examples include but are not limited to endocrine disrupters, stress and pregnancy outcome, nutrition (prevention versus prescription), pesticides, drugs, radiation, mechanisms of normal and perturbed development, 17 pathways of evolutionary conserved cell signaling, life stage models for children, autism, neural tube defects, fetal basis of adult disease, and epigenetics and development. Papers will require a framework of problem/issue formation, analysis and science integration, characterization and finally steps forward. Dependent on student background and interest, a research application or risk assessment AOP framework will be employed. Students will share their papers with the class.

Lab Demonstration Forms

Students will be expected to fill out lab forms to capture lessons learned after each Lab segment.

Course Grade

Students are required to constructively participate in class discussions and to synthesize scientific literature and key issues into discussions, presentations, and written materials (short publication reviews, and required paper). Students who miss a session will be responsible for preparing the overheads and key points and posting them to the canvas site.

Students will be graded as follows:

Graded Assignments		Percentage of Grade
Short Written Literature Reviews (6 total reviews)		30%
Brief Presentation of Literature Reviews and response to posted reviews		20%
Paper (3-5 Pages total for Option 1 or 20)		40%
Credit/No Credit		
Lab Demonstration Forms	(5 completed forms)	10%
		100

Classroom Climate- Equity, Diversity and Inclusion

Diverse backgrounds, embodiments and experiences are essential to the critical thinking endeavor at the heart of university education. In SPH, students are expected:

- To respect individual differences, which may include, but are not limited to, age, cultural background, disability, ethnicity, family status, gender, immigration status, national origin, race, religion, sex, sexual orientation, socioeconomic status and veteran status.
- To engage respectfully in the discussion of diverse worldviews and ideologies embedded in course readings, presentations and artifacts, including those course materials that are at odds with personal beliefs and values.

- To encourage students with concerns about classroom climate to talk to their instructor, adviser, a member of the departmental or SPH EDI Committee, the Assistant Dean for EDI, or the program's director.

UW School of Public Health Equity Diversity and Inclusion Statement:
Our School of Public Health is committed to addressing the root causes of health inequities and promoting healthy and safe communities in our region and beyond. As the problem of racial and ethnic disparities in health outcomes continues to persist, policymakers and the public increasingly look to health professional schools to address these urgent and unacceptable circumstances. As one of the few schools of public health in the Northwest, it is particularly important for us to be up to this challenge.

Underlying all public health research and training activities is an acknowledgement and deeper understanding of the effects that historical, cultural and socioeconomic factors have on the health of communities, especially those who are most underserved. Racism and race-based oppression is all too often a central driver of health disparities. We work to attract and retain students, faculty and staff from diverse backgrounds and perspectives, to build and sustain a positive climate for inclusion and community, and to engender multiple modes of approaching complex problems. We strive to create opportunities for education, research and collaboration that leverage our strengths, similarities and differences. We challenge ourselves to view problems and evaluate solutions through an equity lens. Through each of these efforts, we aim to foster a generation of public health professionals and academicians who are poised to transform health for the better in our communities.

Our historical logo, the SoulCatcher by Marvin Oliver, symbolizes the restoration of health and wellness and reminds us to align our work with the history, traditions, and practices while respecting and supporting the agency of individuals and communities to achieve their desired health outcomes. More information about our logo can be found **here (http://sph.washington.edu/about/soulcatcher.asp)** (https://sph.washington.edu/about/soulcatcher).

The work of equity, diversity and inclusion is the work of Public Health. We are committed to a future that is free of health inequities, that promotes the highest level of wellness that our communities aim for, and a diverse and inclusive public health workforce that embodies humility, respect, leadership and service on behalf of the diverse communities we are privileged to serve.

UW Disability Statement (http://depts.washington.edu/uwdrs/faculty-resources/syllabus-statement/)
(Access and Accommodations):
Your experience in this class is important to me. If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course. If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924 or **uwdrs@uw.edu (mailto:uwdrs@uw.edu)** or disability.uw.edu. DRS offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions.

Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.

Land Acknowledgment:

Washington State is **home** (https://www.washingtontribes.org/tribes-map) to 29 federally recognized and five unrecognized tribes. The University of Washington acknowledges the Coast Salish people of this land, the land which touches the shared waters of all tribes and bands within the Duwamish, Suquamish, Tulalip and Muckleshoot nations. This is important for several specific reasons in the course not the least of which is that these nations develop their own recognized environmental risk assessment programs. Their framing is one which many can learn from as it in many cases will have recognition of cultural and wellbeing and temporal scales that our broader and more inclusive of environment. We will be honored to learn from these concepts in this course. The other reasons include the shared physical space both on land and sea that we experience, and which impacts our populations.

Religious Accommodations:

Washington state law requires that UW develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW's policy, including more information about how to request an accommodation, is available at **Religious Accommodations Policy (https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/)** (https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/) . Accommodations must be requested within the first two weeks of this course using the **Religious Accommodations Request form (https://registrar.washington.edu/students/religious-accommodations-request/)** (https://registrar.washington.edu/students/religious-accommodations-request/) .

Academic Integrity (**http://sph.washington.edu/students/academicintegrity** (http://sph.washington.edu/students/academicintegrity))

Students at the University of Washington (UW) are expected to maintain the highest standards of academic conduct, professional honesty, and personal integrity. The UW School of Public Health (SPH) is committed to upholding standards of academic integrity consistent with the academic and professional communities of which it is a part. Plagiarism, cheating, and other misconduct are serious violations of the University of Washington Student Conduct Code (WAC 478-120). We expect you to know and follow the university's policies on cheating and plagiarism, and the SPH Academic Integrity Policy. Any suspected cases of academic misconduct will be handled according to University of Washington regulations. For more information, see the University of Washington Community Standards and Student Conduct website.

Bias Concerns:

The Office of the Dean has a **student concern policy** (https://sph.washington.edu/students/student-concern-policy) , a faculty concern policy and standard HR procedures for staff concerns. Our 2018 climate survey states that most people in SPH do not report bias incidents because they do not know

where to go. Students are encouraged to report any incidents of bias to someone they feel comfortable with, including instructors, advisers or department staff. They can email **dcinfo@uw.edu (mailto:dcinfo@uw.edu)** for immediate follow up. Bias concerns can be anonymously and confidentially reported at this link **https://sph.washington.edu/about/diversity/bias-concerns (https://sph.washington.edu/about/diversity/bias-concerns)**. Data is collected by the Assistant Dean for EDI and the Director of Program Operations for Student and Academic Services and tracked for resolution and areas are identified for further training.

Pronouns:

According to the UW First Year Programs, being an ally is not just about intention, it is also about behavior. We share our pronouns because we strive to cultivate an inclusive environment where people of all genders feel safe and respected. We cannot assume we know someone's gender just by looking at them. We invite everyone to share their pronouns. To facilitate this in a non-zoom context and to help our colleagues learn our names, we will ask students to use name tags throughout the course.

Course Summary:

Date	Details	Due
Tue Jan 7, 2025	**ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099583&include_contexts=course_1795069)**	2:30pm to 3:30pm
Thu Jan 9, 2025	**ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099593&include_contexts=course_1795069)**	2:30pm to 4:30pm
Tue Jan 14, 2025	**ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099584&include_contexts=course_1795069)**	2:30pm to 3:30pm
Thu Jan 16, 2025	**ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099594&include_contexts=course_1795069)**	2:30pm to 4:30pm
Tue Jan 21, 2025	**ENV H 532 A Wi 25: Reproductive And Developmental Toxicology**	2:30pm to 3:30pm

Date	Details	Due
	(https://canvas.uw.edu/calendar?event_id=4099585&include_contexts=course_1795069)	
Thu Jan 23, 2025	ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099595&include_contexts=course_1795069)	2:30pm to 4:30pm
Sat Jan 25, 2025	Paper review 1 (https://canvas.uw.edu/courses/1795069/assignments/10049473)	due by 11:59pm
Tue Jan 28, 2025	ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099586&include_contexts=course_1795069)	2:30pm to 3:30pm
Thu Jan 30, 2025	ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099596&include_contexts=course_1795069)	2:30pm to 4:30pm
Tue Feb 4, 2025	ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099587&include_contexts=course_1795069)	2:30pm to 3:30pm
	Lab report for Developmental Toxicity evaluation Jan 23 (https://canvas.uw.edu/courses/1795069/assignments/10074770)	due by 11:59pm
Thu Feb 6, 2025	ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099597&include_contexts=course_1795069)	2:30pm to 4:30pm
Tue Feb 11, 2025	ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099588&include_contexts=course_1795069)	2:30pm to 3:30pm

Date	Details	Due
Thu Feb 13, 2025	ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099598&include_contexts=course_1795069)	2:30pm to 4:30pm
Tue Feb 18, 2025	ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099589&include_contexts=course_1795069)	2:30pm to 3:30pm
Thu Feb 20, 2025	ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099599&include_contexts=course_1795069)	2:30pm to 4:30pm
Tue Feb 25, 2025	ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099590&include_contexts=course_1795069)	2:30pm to 3:30pm
Thu Feb 27, 2025	ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099600&include_contexts=course_1795069)	2:30pm to 4:30pm
Tue Mar 4, 2025	ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099591&include_contexts=course_1795069)	2:30pm to 3:30pm
Thu Mar 6, 2025	ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099601&include_contexts=course_1795069)	2:30pm to 4:30pm
Tue Mar 11, 2025	ENV H 532 A Wi 25: Reproductive And Developmental Toxicology	2:30pm to 3:30pm

Date	Details	Due
	(https://canvas.uw.edu/calendar?event_id=4099592&include_contexts=course_1795069)	
Thu Mar 13, 2025	ENV H 532 A Wi 25: Reproductive And Developmental Toxicology (https://canvas.uw.edu/calendar?event_id=4099602&include_contexts=course_1795069)	2:30pm to 4:30pm