

EHS M241/ Mol Tox M247
Advanced Concepts in Gene-Environment Interactions
Short title: Gene x Environment
(4 units)

Instructor:

Patrick Allard, PhD.

Email: pallard@ucla.edu

Office hours/location: To be arranged by email, LSB3320.

Lectures:

Tuesday/Thursday 3 to 5pm, CHS 61235

Course description:

This course will provide a both a comprehensive and practical examination of the emerging science of Gene -Environment interaction. The students will be expected to learn and be able to discuss the primary components of the field including the role of metabolic pathways in modifying environmental responses and the importance of environmental influences in human disease. In addition, we will also explore selected “hot” topics in the field such as the importance of epigenetics and of the microbiome. To learn these concepts, the course will use a combination of lectures, in-class student led presentations as well as a written paper. The lectures will be divided into two halves: a formal lecture of 1 hour and the analysis of a scientific paper on the topic covered that week. The students will be expected to have assimilated the content of the paper and to discuss its findings during class.

Readings:

Scientific papers (no satisfactory textbook on the topic currently exists)

Grading:

In class presentation: 30%

Term Paper: 50%

Participation: 20%

Final grades will not be curved and students will earn straight points.

Course Learning objective:

Students will get a strong grounding in genetic and genomic science and the intellectual tools for a critical examination of relevant issues related to the field of GxE. At the culmination of the course, students are expected to be able to discuss GxE concepts and later integrate its principles into their public health education and practice. important

COURSE LEARNING OBJECTIVES	HOW THESE LEARNING OBJECTIVES ALIGN WITH COMPETENCIES FOR SPECIFIC DEGREE PROGRAMS			
	Undergraduate Public Health Learning Outcomes	ASPH MPH Competencies	EHS MS Competencies	EHS PhD Competencies
1. Understand the genetic, epigenetic and microbiotic connection between exposure and health outcome and disease.	2.2. Identify scientific data, including tools of informatics, and other information for assessing the well-being of a community.	F.11. Articulate how biological, chemical and physical agents affect human health. I.1.1. Describe major direct and indirect human health and safety effects of major environmental or occupational agents or conditions I.2.1. Explain the general mechanisms of toxicity in eliciting a toxic response to various environmental or occupational exposures I.2.2. Describe how chemical agents are tested for acute, sub-chronic and chronic health effects, including reproductive, developmental and carcinogenic effects, and use of "omics" methods, and interpret toxicological data in terms of relevance to human health.	A.1. Retrieve and organize literature; synthesize and critically evaluate scientific literature in environmental health, public health and other relevant fields.	A.1. Judge, critique and interpret reports of individual environmental health studies; evaluate strengths and limitations of environmental health reports
2. Accurately and effectively communicate through an oral presentation such environmental health risks stemming from GxE.	2.4. Communicate health information to a wide range of audiences through an array of media. 2.5. Conduct a literature search on a health issue using a variety of academic and public resources.	F. 5. Demonstrate effective written and oral skills for communicating with different audiences in the context of professional public health activities. F.8. Engage in dialogue and learning from others to advance public health goals. F.11. Articulate how biological, chemical and physical agents affect human health. I.10.1. Organize information and data, prepare technical reports and give oral presentations on environmental contaminants and impacts. K5.8. Develop strategies to motivate others for collaborative problem solving, decision-making, and evaluation.	A.1. (see above) A.3. Evaluate seminars and presentations in environmental health and distill the critical and salient issues from them. E.1. Prepare presentation materials including outlines, posters, and Powerpoint presentations. E.2. Deliver effective oral presentations individually and as part of a team.	A.1. (see above) E. 1. Gauge the cultural background, knowledge base and skills of an audience to appropriately customize communications for the target audience E.2. Organize and make oral presentations to professionals ranging from brief scientific presentations of research findings to longer presentations

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3. Write an effective communication piece that digests recent and relevant scientific information on GxE and presents it clearly for a general audience.	2.4 Communicate health information to a wide range of audiences through an array of media. 2.5. Conduct a literature search on a health issue using a variety of academic and public resources.	F. 5. (see above) F.11. (see above) I.10.1. (see above)	A.1. (see above) A.3. (see above)	A.1. (see above) E. 1. (see above)
4. Learn to provide a critical evaluation of current topical scientific literature in the field of GxE.		C.6. Identify key sources of data and use existing databases to provide background or supportive data to address research questions F.14. Apply evidence-based principles and the scientific knowledge base to critical evaluation and decision-making in public health. F.15. Differentiate between qualitative and quantitative evaluation methods in relation to their strengths, limitations, and appropriate uses, and emphasizes on reliability and validity.	A.1. (see above) A.3. (see above)	A. 1. (see above)

Lecture, Reading & Assignments Schedule:

Topic	Date	Lecturer	Lecture Topic	Readings
1-Introduction	04/04	Allard	1- Introduction, Course overview and expectations	-
	04/06	Allard	2- The complexity of genes and of the environment.	-
2- Toxicity	04/11	Allard	3- Dealing with the high number of environmental contaminants	-
	04/13	Allard	4- Once chemicals enter the body: TK and TD.	http://www.ncbi.nlm.nih.gov/pubmed/10022330
3- GxE in disease	04/20	Allard	5- Environment in the etiology of human disease and early origin of adult disease	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3401752/
	04/25	Allard	6- Epidemiology for GxE identification in disease	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3545765/
4- Genomic tools for GxE	05/02	Allard	7- Understanding genome wide studies	http://www.nature.com/nrg/journal/v9/n5/full/nrg2344.html http://www.genetics.org/content/187/2/367.long
	05/04	Allard	8- Identifying GxE with GWAS: a case study.	http://journals.plos.org/plosgenetics/article?id=10.1371/journal.pgen.1002522
5- Metabolism & Diet	05/09	Allard	9- Metabolism: diet, obesity and obesogens	http://www.ncbi.nlm.nih.gov/pubmed/20689419
	05/11	Allard	10- Diet as a GxE modifier	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3990510/

6- Epigenetics	05/16	Allard	11- The epigenome: connecting the genome to the world	http://www.ncbi.nlm.nih.gov/pubmed/21636976
	05/18	Allard	12- Redefining inheritance: transgenerational effects	http://www.ncbi.nlm.nih.gov/pubmed/25102229
7- Microbiome & big data	05/23	Allard	13- Understanding the microbiome	http://www.nature.com/nrg/journal/v13/n4/full/nrg3182.html
	05/25	Allard	14- Networks and big data science through the lens of the microbiome	http://www.pnas.org/content/109/2/594.full
8- Presentations	05/30	Student	15- 2 student presentations	
	06/01	Student	16- 2 student presentations	
9- Presentations	06/06	Student	17- 2 student presentations	
	06/08	Student	18- 2 student presentations	
Final's week		TERM PAPER DUE		

Research paper and Student presentation:

Each student will choose a topic that is directly connected to the field of GxE: a disease, a technological advancement, the significance of a recent genetic discovery, etc. The student will be expected to explore and integrate these concepts into a coherent narrative about the significance of the topic.

The students will be then be expected to produce a short but condensed paper as an exploration of the topic in 4 pages in length (not including references), double spaced, and extensively anchored in current scientific literature. The papers will be graded for both style and content, with grading emphasis on the clarity of integration of multiple aspects of the issue discussed. The paper will be made available to the class and will be graded by the teacher. **All research papers will be submitted and processed through turn-it-in for plagiarism checking. The software will pick up text found on the web as well as previously submitted term papers at UCLA and other institutions.**

In addition, the students will be expected to “defend” their paper in front of the class in a 35 minute long presentation + question times. All students are expected to participate.

Statement on Disability

In compliance with the Federal Rehabilitation Act of 1973, as amended (Public Law 93-112) and the Americans with Disabilities Act of 1990 (Public Law 101-336), University of California policy prohibits unlawful discrimination on the basis of disability in its programs, services, and activities. If you wish to request accommodations for a disability, please contact the Office for Students with Disabilities (OSD) as soon as possible at A255 Murphy Hall, 310.825.1501 or 310.206.6083 (telephone device for the deaf). Website: www.osd.ucla.edu. In addition to registering with OSD, please feel free to contact the professors privately.

Statement on Academic Integrity

All policies in the UCLA Student Code of Conduct regarding academic integrity apply to this course, including policies regarding cheating and plagiarism. When warranted, infractions will be reported to the Dean of Students and may result in disciplinary

action. UCLA's complete policy regarding academic dishonesty can be found on the website for the Office of the Dean of Students: <http://www.studentgroups.ucla.edu/dos/>

Technology in the Classroom

The use of technology in the classroom for educational purposes is encouraged. Feel free to use laptops or other devices—but please be mindful of your classmates and do not allow technology to become a distraction. Please silence all devices, especially cell phones, and do not take calls or text during class. If we determine that your electronic devices are repeatedly distracting you or others, your participation grade may suffer and you will be asked to refrain from using your devices during class.