DEPARTMENT: Environmental Health

COURSE NUMBER: EH590R(HLTH485)  SECTION NUMBER:001  SEMESTER: Spring 2015

CREDIT HOURS: 2

COURSE TITLE: Genome, Exposome, and Health

COURSE LOCATION: Claudia Nance Rollins Building, Room 1051

REQUIRED READING: The Exposome: A Primer by Gary W. Miller

INSTRUCTOR:
Gary W. Miller, PhD
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OFFICE HOURS: By appointment

TEACHING ASSISTANT: Kristine Dennis
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BRIEF COURSE DESCRIPTION

Fridays 1:00-2:50PM

This course is designed to introduce students to emerging concepts and approaches for understanding human health and disease. The course focuses on explaining how the exposome concept can be effectively used to promote and advance environmental health science research. In an informative and interactive setting, the course will cover four units as outlined below.

1) Assessing Complex Environmental Exposures (External Exposures)
2) Biomonitoring (Internal Exposures)
3) Cumulative Impact of Exposures (Biological Consequences)
4) Exposome Bioinformatics: Data Integration and Modeling

COURSE OBJECTIVES

- To gain an understanding of innovative approaches to environmental health sciences research
- To learn about new technologies and current strategies for measuring the exposome such as –omics, bioinformatics techniques and smartphone apps
- To learn about the concept of the exposome and how it can be used to improve human health
- To be able to articulate the potential benefits and limitations of the discussed topics

EVALUATION

The assignments are built around a single independent class project. A topic is selected and key articles are reviewed. An outline for a written paper is developed and based upon instructor feedback and full-length paper is prepared on a particular exposure or disease. Each student will give a brief (5 min) presentation of the project at the end of the semester.

Paper Reviews (5 total, 5% each) (25%) **due dates denoted by asterisks
Outline of class project (10%)
Class project due April 17 (25%)
Participation in labs (20%)
Presentation of class project (20%)
Lecture Schedule
Lectures will be held Fridays, 1:00-2:50PM in CNR 1051. Occasional labs (see schedule) will be held in GCR P45

Unit 1: Assessing Complex Environmental Exposures
January 16  
Introduction—Gary W. Miller (Ch. 1)  
Discussion

January 23  
Exposure Biology—Jeremy Sarnat (Ch. 4)  
Practical applications

January 30  
Remote Sensing—Yang Liu (Ch. 5)  
Practical applications

February 6 (LAB) **  
Spatial Stats/GIS—Lance Waller

Unit 2: Biomonitoring
February 13  
Analytical Chemistry/Biomarkers—Dana Barr (Ch. 3)  
Practical applications

February 20**  
Toxicogenomics/high throughput toxicology—Gary W. Miller  
Practical applications—Mike Caudle

February 27  
Microbiome—Jennifer Mulle  
Practical applications

March 6 (LAB) **  
Metabolomics—Dean Jones & Doug Walker

March 13  
Spring break

Unit 3: Cumulative Impact of Exposures
March 20**  
The Human Genome—Alison Bernstein (Ch. 2)  
Genome-wide association studies—Jennifer Mulle

March 27  
An Introduction to Epigenetics—Alison Bernstein  
Epigenomics/gene-environment interactions—Yan Sun

April 3 (LAB)**  
Environmental Epidemiology—Matt Strickland  
EWAS lab

Unit 4: Exposome Bioinformatics: Data Integration and Modeling
April 10  
Environmental-wide association studies—Chirag Patel (Ch. 6)  
Practical applications (Environmental Epi)—Kristine Dennis

April 17 (paper due)  
Systems Biology: making sense of complex data sets—Eberhard Voit

April 24  
Student Presentations

May 1  
Next steps—Gary W. Miller (Ch. 7)  
Discussion