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ENVH 7234 - Environmental Toxicology

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**GEORGIA SOUTHERN UNIVERSITY
JIANN-PING HSU COLLEGE OF PUBLIC HEALTH**

ENVH 7234 – ENVIRONMENTAL TOXICOLOGY

FALL 2016

<u>INSTRUCTOR:</u>	DR. EVANS AFRIYIE-GYAWU, PHD., MPH.
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<u>OFFICE HOURS:</u>	TUESDAY 11:00 AM – 4:00 PM ALSO BY APPOINTMENT
<u>CLASS MEETINGS:</u>	MONDAYS 6:00 - 8:45 PM HENDRICKS HALL, ROOM 3001

-- Course schedules can be found at: <http://www.collegesource.org/displayinfo/catalink.asp> --

Prerequisites: Biology (Basic) and/or Environmental Health (ENVH 6532)

Catalog Description: This course introduces students to concepts associated with the lethal and sub-lethal effects of environmental and occupational stressors on humans and other living organisms.

Required Textbook: Ming-Ho Yu, Humio Tsunoda, & Masashi Tsunoda. 2011. Environmental Toxicology: Biological and Health Effects of Pollutants, CRC Press, Third Edition

Supplemental Texts: Klaassen, Curtis D (Editor). 2008. *Casarett & Doull's Toxicology: The Basic Science of Poisons*. Mc-Graw Hill Companies, Inc.; 7th Ed.

Richards, I. and Bourgeois, M. 2013. Principles and Practice of Toxicology in Public Health. Jones and Bartlett Publishers. 2nd Ed

MPH Core Student Learning Outcomes (CORE):

1. Demonstrate proficiency and effectiveness in the communication of core public health principles and practices, both oral and written.
2. Demonstrate proficiency in the integration of the core public health disciplines (Biostatistics, Epidemiology, Environmental Health, Health Policy/Management, and Social/Behavioral Science) in practice and research.
3. Demonstrate proficiency in problem solving, critical thinking, and public health leadership.

MPH Environmental Health Sciences Student Learning Outcomes (ENVH)

1. Apply appropriate investigative tools to measure environmental hazards and associated health outcomes, particularly in the context of rural and underserved areas.
2. Conduct environmental health research and translate into public health interventions using appropriate research designs and evidence based analytic techniques.
3. Employ and evaluate the principles and practices of environmental exposure assessment to address community risk, and effectively communicate the risk to all stakeholders.
4. Analyze and apply the outcomes of environmental impact studies to prevent, mitigate and/or predict future environmental hazard exposures, to support and promote health policy development.
5. Assess and communicate how cultural, socio-economic, and behavioral factors may influence the risk of exposure to environmental hazards and related health outcomes, particularly in the context of rural and underserved populations.
6. Communicate environmental health principles and concepts to lay and professional audiences through both oral and written communication.

MPH Core Competencies in Environmental Health Sciences:

At the completion of this program the student will be able to:

1. Describe major environmental health hazards (physical, chemical and biological), and assess their genetic, physiologic, and socio-economic impacts on vulnerable and susceptible populations with special emphasis on rural and underserved communities.
2. Apply research ethics and current research principles, including hypothesis generation, experimental design, and current research methodology, to the qualitative and quantitative measurement and analysis of environmental stressors on human health and ecosystems.
3. Apply the outcomes of environmental monitoring and environmental impact assessments to prevent, mitigate and/or forecast future exposures to environmental hazards and utilize this information to support or advocate for environmental health policy development.

4. Demonstrate current health risk assessment methods, directed toward management of environmental hazards and provide technical assistance and leadership to address the concerns of communities including environmental justice and equity; as utilized by federal, state, and local regulatory programs, and non-governmental guidelines and authorities.
5. Communicate about environmental health hazards and associated health outcomes to community, stakeholders and professional audiences through oral and written communication and within the appropriate community-based intervention studies.

Performance-Based Objectives Linked to Course Activities (Note: Activities Described in Next Section)

Students will be able to:

1. Demonstrate competence in using the basic concepts and terminology pertinent to environmental toxicology (Activity 1).
2. Analyze potential interactions of physical, chemical, and biological agents within the environment and their public health significance (Activity 2).
3. Discuss how a changing environment and exposure to environmental toxicants may be linked to (or cause) deleterious effects on living organisms (Activity 3).
4. Demonstrate the ability to analyze and interpret toxicological data to determine the potential for exposure to prevalent environmental toxicants and risk of adverse health outcomes (Activity 4).
5. Identify several factors that influence toxicity of environmental toxicants and associated health outcomes in diverse human populations (Activity 5).
6. Demonstrate ability to communicate toxicological principles, concepts, and other pertinent information verbally or in writing to lay and professional audiences (Activity 6).

Assessment of Student Learning (Activities)

1. *Activity 1:* Use course lectures, handouts, in-class discussions, and term projects to explain the basic terminology and definitions of environmental toxicology, including, but not limited to, toxicology, toxicants, toxicity, toxic substances, xenobiotics, teratogen, exposure, additive effects, synergism, potentiation, antagonism, biomarkers, absorption, distribution, metabolism (or biotransformation), excretion, toxicokinetics, toxicodynamics, acute & chronic effects, birth defects, adverse effects, particulate matter, endocrine disrupters, carcinogenesis, mutagenesis, metastasis, dose-response, and risk assessment. Competence in basic terminology will be evaluated using four assessment tools: 1) pop quizzes, 2) mid-term exam, 3) term project, and 4) final exam.

2. *Activity 2:* Use course lectures, in-class discussions, published articles, and case studies to explain the basic application of environmental toxicology principles, effects of various environmental toxicants on human health and the environment, and existing policies to mitigate the adverse effects of toxic agents. Competence on ability to analyze potential interactions of physical, chemical, and biological agents within the environment and their public health significance will be evaluated using four assessment tools: 1) pop quizzes, 2) mid-term exam, 3) term project, and 4) final exam.
3. *Activity 3:* Use course lectures, handouts, peer-reviewed articles, and in-class discussions to demonstrate competence in the ability discuss how a changing environment and exposure to environmental toxicants may be associated with deleterious effects on living organisms. Competence in the ability to integrate concepts to determine exposure to xenobiotics and associated effects will be evaluated using four assessment tools: 1) term project, 2) mid-term exam, 3) field trips & write-up, and 4) final exam.
4. *Activity 4:* Utilize lectures, case studies (existing toxicological data), and in-class discussions to demonstrate the ability to analyze and interpret toxicological data to determine toxicant exposure and risk of adverse health outcomes. Competence will be evaluated using: 1) assignment on toxicological data analysis and interpretation, 2) mid-term exam, and 3) final exam.
5. *Activity 5:* Use course lectures, handouts, peer-reviewed articles, term project report and presentation, and in-class discussions to demonstrate ability to identify factors that influence toxicity of environmental toxicants and associated health outcomes in diverse human populations. Competence will be evaluated using: 1) term project report and presentation, 2) mid-term exam, 3) pop quizzes, and 4) final exam.
6. *Activity 6:* Use in-class discussions, term project report, and term project presentation to demonstrate ability to communicate orally and in writing the toxicological principles and concepts and other relevant information to lay and professional audiences. Competence will be evaluated using: 1) in-class participation, 2) term project report, and 3) term project presentation.

Overview of the Content to be Covered during the Semester:

Week & Date	Topic	Readings	Assignment
1 08/15	Introduction: Environmental Toxicology	Chapter 1 C&D – Ch. 30 - 33	
2 (08/22)	Environmental Changes & Health	Chapter 2	Review Ques. – pg. 35- Project Description <i>Due!!!</i>
3 08/29	Toxicants/Pollutants: Occurrence, Exposure, and Toxic Action	Chapters 3 and 4	Review Ques. – pg. 69-
4 (09/05)	LABOR DAY HOLIDAY		
5 09/12	Toxicokinetics – ADME; Factors Influencing Xenobiotic Action	Chapters 5 & 6; C&D – Chaps. 5 - 7	Review Questions - pg. 89- and 103-
6 (09/19)	Responses to Environ. Toxicants	Chapter 7	Project Plan <i>Due!!!</i> Review Ques. – pg. 113-
7 09/26	Air pollution – Inorganic Gases & Particulate Matter	Chapters 8 & 9 C&D – Chapter 28	Review Questions - pg. 138- and 155-
8 10/03	Environmental Fluoride	Chapter 10	Review Ques. - pg. 178- Mid-Term Exam (Take home)
9 10/10	Volatile Organic Compounds PHCL or Field Trip	Chapter 11	Mid-Term Exam DUE Review Ques. – pg. 193-
10 10/17	Soil and Water Pollution - Environmental Metals/Metalloids	Chapter 12 C&D – Chapter 23	Review Ques. - pg. 231-
11 10/24	Pesticides and Related Materials Endocrine Disruption	Chapter 13 Chapter 15	Review Questions - pg. 261- and 293-
12 10/31	Occupational Toxicology	Chapter 14	Review Ques. - pg. 277- Toxicology Data - Due
13 11/07	Mutagenic Pollutants Environmental Cancer	Chapters 16 & 17	Project Report Draft <i>Due!!!</i> Rev. Ques. - pg. 305 & 324
14 11/14	Introduction to Risk Assessment Review session for Final Exam	Richards – Chapter 23	
15 (11/21)	HAPPY THANKSGIVING!!!		
16 11/28	Oral (PowerPoint) Presentations	Main concepts highlighted in class	Final Project Report <i>Due!!!</i>
17 12/05	Final Exam @ 6:00 PM		

Instructional Methods: Class meetings will consist of lectures, in-class discussions, and field-trips. Written assignments, oral presentations, and exams constitute the basis of student evaluation. *Additional handouts may be given to you as deemed appropriate by the instructor, and information from these handouts may be part of your assignments or exams. Lab assignment dates may change as deemed necessary.*

Exam Schedule and Final Examination:

Scheduled dates for the *Mid-term Exam, Written Assignments, Oral Presentations, and Final Examination* are indicated in the table on page 4 of this syllabus. Pop quizzes will be administered in class and only the instructor knows the schedule; thus, students must always be prepared for the quizzes by reading the assigned chapter(s) in the textbook(s).

Grading: Weighting of assignments for grading purposes will be as follows:

<i>Assignments</i>	<i>Chapters Covered</i>	<i>Points</i>
Mid-Term Exam	1 – 10	100
Pop Quizzes (4)	1 - 17	40
Field Trip(s) & Write-up	----	30
Term Project Plan, Draft and Oral Presentation	1 – 17	40
Term Project - Final Report	1 – 17	30
Toxicology Data Analysis & Interpretation	1 - 17	30
In-Class Participation	1 - 17	10
Final Exam	1 – 17	120
TOTAL	ALL LECTURES	400

The following point scale system will be utilized in grading:

A	360 – 400	D	240 – 279.9
B	320 - 359.9	F	239.9 and below
C	280 - 319.9		

Your grades **will not** be posted. All exams and assignments will be graded and returned promptly so that students may accurately calculate their grades at any point in time during the semester.

There are times when extraordinary circumstances occur (e.g., serious illness, death in the family, etc.). In such circumstances, and/or if you need additional time to satisfactorily complete any course requirement, please consult with the instructor within a reasonable amount of time.

Nota Bene: Extensions are not guaranteed and will be granted solely at the instructor’s discretion.

Academic Misconduct: As a student registered at this University, it is expected that you will adhere to only the strictest standards of conduct. It is recommended that you review the latest edition of the *Student Conduct Code* book, as well as the latest *Undergraduate & Graduate Catalog* to familiarize yourself with the University's policies in this regard. Your continued enrollment in this course is an implied contract between you and the instructor on this issue; from this point forward, it is assumed that you will conduct yourself appropriately.

Academic integrity relates to the appropriate use of intellectual property. The syllabus, lecture notes, and all materials presented and/or distributed during this course are protected by copyright law. Students are authorized to take notes in class, but that authorization extends only to making one set of notes for personal (and no other) use. As such, students are not authorized to sell, license, commercially publish, distribute, transmit, display, or record notes in or from class without the express written permission of the instructor.

Plagiarism - According to the Academic Dishonesty Policy of GSU, Plagiarism includes (but is not limited to):

- A. Directly quoting the words of others without using quotation marks or indented format to identify them.
- B. Using published or unpublished sources of information without identifying them.
- C. Paraphrasing material or ideas without identifying the source.
- D. Unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic material.

If you are accused of plagiarism by a JPH College of Public Health faculty, the following policy, as per the Judicial Affairs website (<http://students.georgiasouthern.edu/judicial/faculty.htm>) will be enforced.

PROCEDURES FOR ADJUDICATING ACADEMIC DISHONESTY CASES:

First Offense - In Violation Plea:

1. If the professor and the Dean of Students agree that the evidence is sufficient to warrant a charge of academic dishonesty, the professor should contact the Office of Judicial Affairs to determine if this is a first violation of academic dishonesty. The incident will be reported via the following website:
<http://students.georgiasouthern.edu/judicial/faculty.htm>

2. If it is a first violation, the professor should talk with the student about the violation. **If the student accepts responsibility in writing and the professor decides to adjudicate the case, the following procedures will be followed:**
 - a. The student will be placed on disciplinary probation for a minimum of one semester by the Office of Judicial Affairs.
 - b. The student will be subject to any academic sanctions imposed by the professor (from receiving a 0 on the assignment to receiving a failing grade in the class).
 - c. A copy of all the material involved in the case (Academic Dishonesty Report Form and the Request For Instructor to Adjudicate Form) and a brief statement from the professor concerning the facts of the case and the course syllabus should be mailed to the Office of Judicial Affairs for inclusion in the student's discipline record.

First Offense - Not In Violation Plea (student does not admit the violation)

If the professor and the Dean of Students agree that the evidence is sufficient to warrant a charge of academic dishonesty, the professor should contact the Office of Judicial Affairs to determine if this is the first or second violation of academic dishonesty. The student will be charged with academic dishonesty and the University Judicial Board or a University Hearing Officer would hear the case. If the student is found responsible, the following penalty will normally be imposed:

- a. The student will be placed on Disciplinary Probation for a minimum of one semester by the Office of Judicial Affairs.
- b. The student will be subject to any academic sanctions imposed by the professor.

Second Violation of Academic Dishonesty

If the professor and the Dean of Students agree that the evidence is sufficient to warrant a charge of academic dishonesty, and if it is determined this is the second violation, the student will be charged with academic dishonesty and the University Judicial Board or a University Hearing Officer would hear the case.

If the student is found responsible, the following penalty will normally be imposed:

- a. Suspension for a minimum of one semester or expulsion.
- b. The student will be subject to any academic sanctions imposed by the professor.

NOT RESPONSIBLE FINDING

When a student is found not responsible of academic dishonesty, the work in question (assignment, paper, test, etc.) would be forwarded to the Department Chair. It is the responsibility of the Department Chair to ensure that the work is evaluated by a faculty member other than the individual who brought the charge and, if necessary, submit a final grade to the Registrar. For the protection of the faculty member and the student, the work in question should not be referred back to the faculty member who charged the student with academic dishonesty. In the case of a Department Chair bringing charges against a student, an administrator at the Dean's level will ensure that the student's work is evaluated in an appropriate manner.

Academic Handbook: Students are expected to abide by the Academic Handbook, located at <http://students.georgiasouthern.edu/sta/guide/>. Your failure to comply with any part of this Handbook may be a violation and thus, you may receive an "F" in the course and/or be referred for disciplinary action.

University Calendar for the Semester: The University Calendar is located with the semester schedule, and can be found at: <http://students.georgiasouthern.edu/registrar>.

Attendance Policy: Federal regulations require attendance be verified prior to distribution of financial aid allotments. Attendance will not be recorded after this initial period.

One Final Note: The contents of this syllabus are as complete and accurate as possible. The instructor reserves the right to make any changes necessary to the syllabus and course material. The instructor will make every effort to inform students of any changes as they occur. It is the responsibility of the student to know what changes have been made in order to successfully complete the requirements of the course.