Division of Environmental and Occupational Hygiene

Course Goals and Outcomes Form

Course number and title:  26-EIH-843 Human Biological Monitoring and Biological Markers
Graduate Credits: 3
Instructor(s) in-charge:  Glenn Talaska, Ph.D.
Course type (underline all that apply):  
Lecture  Laboratory  Field Projects:
Required or Elective: Required for the Biomonitoring and Hazardous Substances Programs, elective for others

Course Schedule:
Lecture: 3 hours per week  1 meetings
Discussion: ___ hours per week  _____ sessions
_____ hours for informal discussion
Field Work  _____ hours per week  _____ hours per survey/project
Outside Study: 9 hours per week
Office Hours: ___as needed______________

Course Assignments:
Homework: 4 assignments
Exams: 1/1 midterms / finals
Reports: 1 required
Project 0 required

Grading Policy:
Grades are based 30% on Midterm, 40% on final , 20% on presentation and 10% on class participation

Course Prerequisites: Permission of Instructor

Catalog Description: The development and use of specific metabolites, DNA and protein adducts and general screening tests of exposure to chemicals and of adverse effects in humans

Textbook and Any Related Course Materials:
BEI Committee (1995) Topics in Biological Monitoring, ACGIH, Cincinnati
Materials also provided as handouts:
Lecture materials (slides) are provided to students on Blackboard

Blackboard: Used for messages:
All course materials including lecture notes and handouts are provided to students via Blackboard

Topics Covered: Each section below is a 3 hour segment
Introduction and Pharmacokinetics and Monitoring Strategies I (Absorption and Distribution)
Metabolism and Pharmacokinetics and Monitoring Strategies III (Elimination)
Solvents I and II and Effect Markers (Pesticides, CO, MetHb)
Program Coordination, Medical Interactions and Lab Methods, Program Monitoring
Effect Markers 2:Postural Sway and Chemical Exposure
Metals I and II (Student Reports)
Genetic Toxicology I, Carcinogen Biomonitoring and Cytogenetic Analysis
Kinetic modeling and The BEI Process

Course goals (and Program Outcomes):
1. Identify circumstances where biological monitoring is appropriate and will add significantly to health risk recognition and control. (A1, B1, B2)
2. Select relevant biomarkers based on principles of pharmacology and toxicology (C1, C2, D1, D2, D3, D4, D5, F1, F2, F3)
3. Interpret data (E1, G1, H2, K1, K2, K3)
4. Evaluate ethical issues related to biomonitoring (G2, G4, I, J1, J2, L)

NOTE: The ABET Program outcome is shown as a capital letter; the number designates the program specific outcome.

Evaluation Criteria: Students must demonstrate an understanding of the principles of toxicology and kinetics relative to biological monitoring. They must be able to apply the knowledge they gain to development of a biomonitoring program. They must demonstrate the ability to read and interpret scientific literature and data.

Relation to Program Educational Objectives:
This is a required course for all Comprehensive Practice majors. The course contributes to the following Program Educational Objectives, as shown:

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Hygiene Science</td>
<td>30%</td>
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<tr>
<td>Basic Science</td>
<td>50%</td>
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<tr>
<td>Design Skills</td>
<td>5%</td>
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<tr>
<td>Professional Skills</td>
<td>10%</td>
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<tr>
<td>Life-long Learning</td>
<td>5%</td>
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</tbody>
</table>

NOTE: EOH faculty define Hygiene Science as all the Knowledge Elements other than the Basic Sciences; Design skills are those necessary to solve real world problems. Professional skills are those that involve teams, management, leadership, written and oral communication, approach to stakeholders and ethics; life-long learning is demonstration of the need for continuing professional development.

Is there a TA? Yes No

Is computer use expected? Yes No
For each ABET Program Outcome (A through L), the EOH Educational Outcomes are shown below by underlining. Upon completion of this course, students will have had the opportunity to acquire knowledge (K), skills (S) and attitudes (A) associated with each of the Educational Outcomes, as noted. Where the educational measurable outcome contributes strongly to the ABET Program Outcome, the K/S/A is shown in upper case; where the contribution is less strong or a minor focus, the k/s/a is shown in lower case letters. (Note, use the Contribution to Knowledge and Skills estimates above to guide your decision. If the % is 50 or more, use upper case.)

A. Identify agents, factors and stressors generated by and/or associated with defined sources, unit operations and/or processes:
   - Identify potential health hazards of workplace processes and operations

B. Describe qualitative and quantitative aspects of generation of agents, factors and stressors:
   - Understand and describe the underlying processes of the generation of hazards in occupational settings
   - Describe qualitative and quantitative aspects of hazards associated with specific occupational or environmental sources

C. Understand physiological and/or toxicological interactions of physical, chemical, biological and ergonomic agents, factors and/or stressors with the human body:
   - Understand the relation between exposures and health outcomes
   - Recognize the potential for differences in response to hazards due to personal factors among some subjects at risk of exposure and the subsequent need to modify programs and practices

D. Assess qualitative and quantitative aspects of exposure assessment, dose-response, and risk characterization based on applicable pathways and modes of entry:
   - Understand how to evaluate potential adverse outcomes of chemical or physical exposures, based on similarity of the exposure to documented hazards
   - Examine occupational hygiene aspects of emerging technologies
   - Understand the basic principles of exposure assessment and evaluation of engineering and non-engineering controls
   - Develop and implement an exposure assessment plan to evaluate potential hazards and controls that are in place
   - Gather, manage and analyze quantitative (e.g., measurements of exposure or system performance) and qualitative (e.g., written programs) data
E. Calculate, interpret and apply statistical and epidemiological data:

- Apply epidemiologic and/or statistical concepts to the interpretation of exposure data

F. Recommend and evaluate engineering, administrative and personal protective equipment controls and/or other interventions to reduce or eliminate hazards:

- Identify and recommend appropriate methods to reduce exposure (using engineering controls, personal protective equipment or administrative controls), or deficiencies in written programs and policies
- Design work process/practice interventions

G. Demonstrate an understanding of applicable business and managerial practices:

- Produce accurate written descriptions of occupational processes and activities, exposure assessment plans and evaluation of occupational and environmental work settings
- Describe approaches to interact with higher-level decision makers in various management structures
- Manage resources effectively
- Display effective leadership

H. Interpret and apply applicable occupational and environmental regulations:

- Understand, interpret and apply occupational and environmental regulations
- Apply guidelines, standards and laws in the interpretation of quantitative and qualitative data

I. Understand fundamental aspects of safety and environmental health

- Apply the professional code of ethics to a scenario

J. Attain recognized professional certification

- Understand the importance of ethics in the practice of occupational and environmental hygiene
- Understand the need for and resources available for continuing professional development after graduation

K. Conduct a research activity resulting in a report that demonstrates mastery of the subject and high level of professional and public communication skills

- Design a research question, develop a plan and conduct research
- Communicate effectively with a variety of stakeholders (e.g., labor, management, government, peers, safety and health professionals, allied professionals)
Produce a technical scientific report on research

L. Demonstrate advanced qualitative and quantitative problem-solving
   Skills
   Function effectively as part of a multidisciplinary team

COURSE MATERIAL AND AVAILABILITY

<table>
<thead>
<tr>
<th>Course Goals/outcomes</th>
<th>Students</th>
<th>Instructor(s)</th>
<th>TA</th>
<th>Division</th>
<th>Department</th>
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<tbody>
<tr>
<td>Lecture notes, assignments</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>X</td>
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<tr>
<td>Samples of homework and</td>
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<td>correct answers</td>
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<td>Samples of reports, graded</td>
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<td>Samples of exams and</td>
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<td>correct answers</td>
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<td>Course evaluation from</td>
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<tr>
<td>students</td>
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<td>Instructor response/actions</td>
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<td>to evaluation comments</td>
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NOTE: Students provide feedback on individual courses through the end-of-class Department and Division evaluation survey instrument. This instrument provides feedback on the course material, organization and presentation, and perceived contribution of the course to the achievement of Program Outcomes. In addition, feedback is received from the continuing, semi-annual Question-feedback process during which students identify Best Learning Experience, Session/presentation that was an endurance test, What would make life as a student better?, If I could do it over, I would…. Opportunities I would like to have but don't seem to be available, Opportunities I would like more of, Aspects of the program the faculty should consider eliminating, Worst part of the UC program, Best part of the UC program, Other comments. A Ph.D. and M.S. student participate in Division faculty meetings. Exit surveys are conducted by the University and the Division as part of the requirements for graduation. All students are urged to participate fully in each of these activities in order to improve the educational experience.