ENV H 593 Syllabus, Winter Quarter 2020

ENV H 593 A: Current Topics in Risk Assessment

Winter Quarter 2020: Biomarkers for Risk Assessment

Credits: 2

Instructors:

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Course Times and Locations:

Day/Time: Tuesday, 1:30 pm - 3:20 pm
Location: 4225 Roosevelt Way NE in Roosevelt 2228

Course Description:

This journal club is designed to present a risk based introduction to state-of-the-art biomarkers and their use and abuse in public health, personalized medicine, as well as environmental and occupational assessment. The course will provide fundamentals of designing biomarkers including classical characterization using sensitivity and specificity and then quickly move to a series of biomarkers that will illustrate issues of design, application (including issues of timing, multiple assessments and targeted and untargeted approaches), multiple complex responses across omics (e.g. transcriptomics, metagenomics and metabolomics), and complex health endpoints (stress and epigenetics). Interesting recent abuses with Olympic athletes and race horses will provide interesting current controversies in biomarker applications and identify needs for future uses. Developing appropriate biomarkers for emerging drugs of abuse will be the final discussion topic for this course. Based on student interest we will have case studies designed to assist students in their own research to be informed by biomarkers.

Winter 2020 Learning Objectives:

- Identify biomarkers used in four disciplines of health (environmental, occupational, clinical, and pharmacology)
- Learn fundamentals of designing biomarkers
- Discuss and evaluate applications of biomarkers for complex mixtures and endpoints
- Learn how to characterize sensitivity and specificity of biomarkers
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- Assess state-of-the-art biomarkers for *omic* responses
- Identify how biomarkers are used in risk assessment and management

**Additional Generic Learning Objectives:**

1. Think critically about risk assessment by completing reading assignments and participating in class discussions.
2. Communicate the concept of integrated risk assessment and risk communication.
3. Explain the risk assessment framework as it relates specifically to the current quarter topic.
4. Analyze assigned readings and interpret their relevance to not only the quarter topic but also their applicability and generalizability to risk assessment topics at large.
5. Summarize key points from assigned journal articles or other required readings.
6. Prepare and deliver an oral presentation(s) discussing the required reading.
7. Critique risk assessment applications as they relate to the current quarter topic.
8. Identify risk assessment strengths and challenges, as well as the role of uncertainty.
9. Develop skills to think critically about the methods and tools used for assessment, management, and communication of risk.

**Course Requirements**

Reminder this class is a journal club so please come to each session prepared to share your articles or sections with your colleagues. Please use the “Article Report Form Template” to structure your review. Please feel free to share a few slides that share these highlights in a manner you wish to share. We will always be able to pull up the original article but sometimes your tailored slides facilitate the discussion.

You will be requested to review two articles for each class and to complete 5 of the article report forms. If you will be missing class, please send your review by email.

You will also, by the end of the class, be requested to complete one “Research Relevancy Report Form Template”. Note that this report can cover more than one article and be more of a summary of lessons learned from the sessions. Total page limits for this assignment is 3 pages double spaced. We will discuss further in class the purpose and intent of this report.

**Grading:**

- **50% Weekly Discussion Participation and Related Assignments:** Weekly summations and presentation (i.e. slides) of key points from your readings and reports. Respectful engagement is an important component of this class.
- **25% FIVE Article Reports** - See the template at the end of the syllabus and limit your responses to 2 pages double spaced. Reports will be graded for completeness and thoughtfulness. Reports should be submitted each week before class starts. You will need to submit five Article Reports throughout the quarter.
- **25% Research Relevancy Report and Presentation** - Presentation or demonstration of the applications to your own research or interest area. Please use the Research Relevancy Report Template at the end of this syllabus and limit your response to 3 pages double spaced. You will be required to submit ONE
research relevancy report for the quarter. In addition to the report, please prepare a brief presentation (i.e. slides) (about 10 minutes) with 2-3 figures/tables to support your observations.

**Academic Integrity Statement:**
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.

**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 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.

**Multi-cultural Inclusion Commitment from Environmental Health:**
The UW School of Public Health seeks to ensure all students are fully included in each course. We strive to create an environment that reflects community and mutual caring. We encourage students with concerns about classroom climate to talk to your instructor, your advisor, a member of the departmental or SPH Diversity Committee and/or the program director. DCinfo@uw.edu is a resource for students with classroom climate concerns.

We have the privilege of learning together and we have a responsibility to engage in dialogue in a way that supports learning for all of us. Many of the issues we will discuss in this course may concern issues of disproportionate risks, sensitivities, and impacts due to age, gender, race, and/or social inequalities. This is what public health hopes to address, however we know that these can be difficult topics to address, hence we thus feel it is even more important to be sensitive to our colleagues’ experiences and ideas. Here are some practices we as learning community members can strive to use in our learning process:

- My own viewpoint is important—share it. It will enrich others.
- My students’ and colleagues’ viewpoints are important—listen to them. Do not judge them.
• Extend the same listening respect to others I would wish them to extend to me. We all have room to grow to become better listeners in non-judgmental ways.
• Recognize that I might miss things others see and see things others might miss.
• Raise my views in such a way that I encourage others to raise theirs.
• Inquire into others’ views while inviting them to inquire into mine.
• Ask questions when I don’t understand something.
• Surface my feelings in such a way that we make it easier for others to surface theirs.
• Test my assumptions about how and why people say or do things.
• Challenge what was said or done, rather than make assumptions about the individual.
• Beware of either-or thinking.
• Be willing to take risks in moving outside my comfort zones.
• Affirm others
# Draft Course Schedule *(Subject to student interest and involvement)*

<table>
<thead>
<tr>
<th>Session #</th>
<th>Date</th>
<th>Topic</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session 1</td>
<td>01/07/20</td>
<td>Introduction and Definition of Biomarkers and Biological Exposure Indices (BEIs)</td>
<td>No Required Readings</td>
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<tr>
<td>Session 2</td>
<td>01/14/20</td>
<td>Occupational and Environmental Biomarkers</td>
<td>Pesticides Industrial agents (e.g. acrylamide)</td>
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<td>Session 3</td>
<td>01/21/20</td>
<td>Types of Biomarkers</td>
<td>Protein and DNA adducts</td>
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<tr>
<td>Session 4</td>
<td>01/28/20</td>
<td>Dried Blood Spots and Other Tissue Biomarkers (e.g. buccal cells, urine)</td>
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<td>Session 5</td>
<td>02/04/20</td>
<td>Temporal Considerations in Biomarkers: Cases in Metals and Solvents</td>
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<tr>
<td>Session 6</td>
<td>02/11/20</td>
<td>Cortisol (hair), Stress Biomarkers, and Markers of Social Economic Status (SES)</td>
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<tr>
<td>Session 7</td>
<td>02/18/20</td>
<td>Risk Assessment Tools for Biomarkers</td>
<td>BAP example</td>
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<td>Session 8</td>
<td>02/25/20</td>
<td>Targeted and Untargeted Metabolomics</td>
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<tr>
<td>Session 9</td>
<td>03/03/20</td>
<td>Toxic Algae</td>
<td></td>
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<tr>
<td>Session 10</td>
<td>03/10/20</td>
<td>Presentation of Research Relevancy and Summary</td>
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</tbody>
</table>
Article Report Form Template:  
*PLEASE LIMIT RESPONSES TO 2 PAGES DOUBLE SPACED*

Date:
Reviewer Name:
**Title, Author, and Date of Paper**

- What was the purpose of this paper?
- What methods did the author use?
- What were the key results?
- What key issues does the author(s) cite in the discussion?
- How does this article contribute to today’s discussion topic?

Research Relevancy Report Form Template:  
*PLEASE LIMIT RESPONSES TO 3 PAGES DOUBLE SPACED*

Date:
Reviewer Name:
**Title, Authors, and Date of Paper:**

- What was the purpose of this paper?
- What were the key results?
- Describe the most surprising findings from this quarter.
- How can you relate your research expertise to addressing these findings?
- Identify critical data gaps.
**Topics and References**

**DNA adducts, Protein adducts (types in blood and serum)**

**Protein Adducts:**

**DNA Adducts:**

**Dried Blood Spots**


**Buccal cell collection/epithelial cells?**

REFERENCES TO BE ADDED

**Cortisol (hair), stress biomarkers, and markers of social economic status (SES)**


**Temporal considerations in biomarkers: cases in metals and solvents -in hair, nails, and teeth**


**Targeted and untargeted metabolomics**

**BELs (benchmark techniques for quantifying in a regulatory setting)**

REFERENCES TO BE ADDED

**Toxic algae**

**UELs (cells out of urine?) – interest in microRNAs – whether they are predictive or not**
- Weldon BA, Shubin SP, Smith MN, Workman T, Artemenko A, Griffith WC, Thompson B,

**Epigenetics**
REFERENCES TO BE ADDED

**Proteins relevant in aging or biomarkers for disease**