

HONORS SEMINAR PROPOSAL FORM

**For guidelines concerning seminar proposal, please refer to the "Seminar Policy."*

**Please attach a copy of your current c.v.*

About the Instructor

Name: Michael Walsh

Title: Assistant Professor

Department: Department of Pathology

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If you are not a faculty member at UIC, please explain the professional expertise in the field of your proposed offering:

1. **Seminar Title:** Advances in Interdisciplinary Research: Bridging the gap between Engineering and Medicine.
2. **Seminar Description (please provide a clear summary of the proposed course in 250 to 500 words.)**

The area of interdisciplinary and translational research towards improving the diagnosis and understanding of diseases is a critical area of research. This course will focus each seminar on an important chronic disease and discuss the background to the disease, the current limitations in clinical management and some of the interesting recent advances made in the field of engineering towards improving the disease management (in particular, highlighting research groups at UIC). Chronic diseases are diseases typically of long duration and slow progressing and represent 63% of all mortalities in the world. Examples of some of the chronic diseases that will be focused on during this seminar series includes; cancer, diabetes, heart disease and neurodegenerative diseases. This course will be broad and introductory enough for engineering students who are interested in learning more about disease processes and current clinical practice, and, for biology/medical students who are interested in learning about some of the exciting cutting edge technologies that are beginning to make an impact in the biomedical community. The course will be structured with a new chronic disease discussed every two weeks. The first week will be a lecture-style seminar describing the background to the disease, basic disease pathology, potential complications, and current clinical practice for diagnosis and treatment. The second week will be more seminar-style to discuss two or three areas of engineering research that are currently being investigated towards either improving diagnosis, treatment or understanding the basis of the disease. Towards the end of the seminar series, groups of three will be formed and each group can choose any chronic disease of interest and each group will then give a 10 minute presentation on the disease and a recent engineering advance.

3. Course outline with major topics (with sub-headings, if necessary) and distribution of hours (should add up to 15 hours).

<u>Topic</u>	<u>Hours</u>
CLASS 1. Introduction to Chronic Diseases	(1hr)
CLASS 2. Introduction to Diabetes (Background, diagnosis, current clinical management)	(1hr)
CLASS 3. Recent Engineering Applications in Diabetes Research	(1hr)
CLASS 4. Introduction to Cancer	(1hr)
CLASS 5. Recent Engineering Applications in Cancer Research	(1hr)
CLASS 6. Introduction to Neurodegenerative Diseases	(1hr)
CLASS 7. Recent Engineering Applications in Neurodegenerative Disease Research	(1hr)
CLASS 8. Introduction to Heart Disease	(1hr)
CLASS 9. Recent Engineering Applications in Heart Disease Research	(1hr)
CLASS 10. Introduction to Chronic Respiratory Diseases	(1hr)
CLASS 11. Recent Engineering Applications in Chronic Respiratory Disease Research	(1hr)
CLASS 12. Preparation for Group Presentations in weeks 14 and 15 - Assign groups, examples topics, how to research and cite references and structuring the presentation)	(1hr)
CLASS 13. Lab exercise in Dr. Walsh's Bioimaging lab. There will be 4 scheduled times during the week for students to visit the lab and take images of tissues	(1hr)
CLASS 14.	(1hr)

Group discussions on Chronic Disease of Interest (First half of group will present their research)

CLASS 15.

(1hr)

Group discussions on Chronic Disease of Interest (Second half of group will present their research)

4. List required/suggested texts and/or readings. In all instances, give author, title, and date of publication. Provide complete bibliographic information if possible.

SUGGESTED READING

Class 2

- Polonsky KS. "The past 200 years in diabetes". New England Journal of Medicine 367(14):1332-1340 (2012).

Class 4

- Hanahan D, Weinberg RA. "Hallmarks of Cancer: The Next Generation". Cell 144(5):646-674 (2011)

Class 6

- Thompson LN. "Neurodegeneration: A question of balance". Nature 452(7188):707-708 (2008)

Class 8

- Nabel EG, Braunwald EB. A tale of coronary artery disease and myocardial infarction. The New England Journal of Medicine 366(1):54-63 (2012)

Class 10

- Global Initiative for chronic obstructive lung disease - "Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease 2013" Chapter 1-3
URL - http://www.goldcopd.org/uploads/users/files/GOLD_Report_2013_Feb20.pdf

Class 13.

- Walsh MJ, Reddy RK, Bhargava R. "Label-free biomedical imaging with mid-IR spectroscopy" IEEE Journal of Selected Topics in Quantum Electronics 18(4) 1502-1513 (2012)

5. Please explain what tools you plan to use and the standard for evaluating student performance in a pass/fail grading system.

1. Students will be required to attend classes - attendance will be recorded at the end of each seminar as they are leaving where they will sign an attendance sheet. Students must attend all sessions except for one allowable unexcused absence.

2. Students will be expected to take part in discussions - I will observe and records those who are paying attention in class and are contributing. Students who are distracted and not involved in the session will also be noted. Students must remain engaged throughout the seminars to obtain a pass grade.

3. A short 2-page written report will be expected from each of the students to summarize a journal article that they have identified as being an important advance in the field of engineering towards improving clinical practice (example papers and sources to find papers will be given in week 1). The 2-page report will be structured as follows; 1) What is the clinical problem that this paper addresses? 2) Describe the methods that the authors have chosen. 3) How can this advance improve patient care?

4. Students will be required to present their research finding on a chronic disease as part of a small group in one of the final two sessions. The students will be assigned to small groups (approx. 6 groups of 3 students) in class 12 and decide upon a chronic disease of their interest (a list of possible chronic disease will also be provided). The students will then go and research this disease and put together a roughly 12 minute presentation divided into three sections - a) background to the disease, b) current limitations to clinical management and c) an example of an emerging engineering application to improve clinical management. Each of the students will research and present one of these sections and present for approximately 4 minutes using powerpoint. There will be chance after their talks for a few minutes of questions. The students will be assessed on the detail and quality of the research for their assigned section and on the quality of their presentation. In addition, they will be assessed on how well they respond to questions. If students have sufficiently researched their assigned area and presented well they will be assigned a pass grade.

As part of assigning groups, depending on the final distribution of disciplines with students enrolled in this seminar, I would hope to comprise each team of students from varied major backgrounds (Engineering, Biology, Pharmacy etc.)