GRADUATE CHEMICAL SENSORS **SPRING 2017**

Instructor: Professor Mindy Levine

Class Meeting: T/Th 12:30-1:45 PM

Pre-requisites: Graduate standing or permission of the instructor

Suggested Textbook:

"Chemosensors: Principles, Strategies, and Applications." Ed. Wang, B.; Anslyn, E. V. Wiley 2011.

Note: A copy of this book will always be available in my office and in my students' office, and students taking this class are welcome to come at any time to borrow this book.

Other Relevant Review Articles:

1. Chen, Juhong; Andler, Stephanie M.; Goddard, Julie M.; Nugen, Sam R.; Rotello, Vincent M." Integrating recognition elements with nanomaterials for bacteria sensing." Chem. Soc. Rev. 2016, Ahead of Print; DOI: 10.1039/c6cs00313c.
2. Peveler, William J.; Yazdani, Mahdieh; Rotello, Vincent M. "Selectivity and Specificity: Pros and Cons in Sensing." ACS Sensors 2016, 1, 1282-1285.
3. Wu, Jiasheng; Kwon, Bomi; Liu, Weimin; Anslyn, Eric V.; Wang, Pengfei; Kim, Jong Seung "Chromogenic/Fluorogenic Ensemble Chemosensing Systems." Chem. Rev. 2015, 115, 7893-7943.
4. Chapin, Brette M.; Anslyn, Eric V. "Physical Organic Chemistry by Any Other Name Would Smell as Sweet." Israel J. Chem. 2016, 56, 38-45.
5. You, Lei; Zha, Daijun; Anslyn, Eric V. "Recent Advances in Supramolecular Analytical Chemistry Using Optical Sensing." Chem. Rev. 2015, 115, 7840-7892.
6. Le, Ngoc D. B.; Yazdani, Mahdieh; Rotello, Vincent M. "Array-based sensing using nanoparticles: an alternative approach for cancer diagnostics." Nanomedicine 2014, 9, 1487-1498.
7. Diehl, Katharine L.; Anslyn, Eric V. "Array sensing using optical methods for detection of chemical and biological hazards." Chem. Soc. Rev. 2013, 42, 8596-8611.

Classroom Goals and Structure: The overarching goal of this class is to develop an appreciation of the science of chemical sensors, from the design of the sensors through their use and deployment in real-world, complex environments. Readings will be assigned primarily from peer-reviewed scientific articles, and chapters in the textbook "Chemosensors" will also be referenced as appropriate. The class will culminate with a final project, in which students will identify a recent anthropogenic (man-made) environmental contamination event, talk about the detection methods that were used and the shortcomings of such methods, and propose a more efficient chemical sensor-based response to the event.

There will be 1 midterm exam and 1 final exam, both of which will be take-home and based on primary literature sources.

Academic Honesty: Academic honesty is at the core of what we stand for as scientific professionals. Dishonesty in any form will not be tolerated, including but not limited to plagiarism, cheating, data manipulation, and misrepresentation of work effort. Penalties for such dishonesty are at the discretion of the instructor. All instances of academic dishonesty will be reported promptly to the Dean's Office. There are absolutely no exceptions to this policy under any circumstances.

Contact with Dr. Levine: There are no set office hours for this course. You are welcome to either stop by my office (325F) or set up an appointment to meet at your convenience. The best way to reach me is by email: mindy.levine@gmail.com. Please use the following links as helpful guides in initiating email contact.

http://web.wellesley.edu/SocialComputing/Netiquette/netiquetteprofessor.html
http://www.wikihow.com/Email-a-Professor

http://college.usatoday.com/2012/03/15/five-things-to-remember-when-e-mailing-a-professor/

Snow Day and Absenteeism Policy: This class follows the University policies on snow days. If classes are canceled, we will not meet. Otherwise, even in challenging weather, plan to be in class. Please make sure that you are signed up to get email or text alerts from the University system so that you will stay informed. Attendance for this class is not taken, and participation is not graded. Because this is a graduate special topics class, it is expected that by this point in your educational career, you understand the importance of coming to class and fully participating in the learning process. If you will need to miss the midterm or final exam for a legitimate reason, please contact me well in advance so that something can be arranged.

Class Schedule: A tentative class schedule is shown on the next page. This schedule is subject to change with appropriate notice.

NUMBER	DATE	TOPIC
1	1/24/17	Introduction to Sensors: Selectivity vs. Sensitivity
2	1/26/17	Non-Covalent Interactions in Chemosensor Design
3	1/31/17	Non-Covalent Interactions (continued)
4	2/2/17	Covalent Forces for Chemosensor Design
5	2/7/17	Supramolecular Sensors
6	2/7/17	Supramolecular Sensors (continued)
7	2/9/17	Polymer-Based Sensors
8	2/14/17	Nanoparticle Sensors
9	2/21/17	Miscellaneous Sensor Types
10	2/23/17	Computational Principles for Sensor Design
11	2/28/17	Read-Out Signals: 1. Electrochemical Detection
12	3/2/17	2. Mass Spectrometry Detection
13	3/7/17	3. Optical Detection Methods
14	3/9/17	4. Fluorescence-Based Detection
15	3/21/17	5. Indicator Displacement Assays
16	3/23/17	6. Miscellaneous Read-Out Measurements
17	3/28/17	Single Molecule vs. Bulk Molecule Detection
18	3/30/17	Practical Applications Introduction: Solution vs. Solid-State
19	4/4/17	Interfacing Sensors with Modern Technology
20	4/6/17	Sensor for Engineering Applications
21	4/11/17	Sensors for Environmental Applications
22	4/13/17	Sensors for Biological Applications
23	4/25/17	Final Projects
24	4/27/17	Final Projects (continued)