

Open Problems in Soft Interfaces (BEN/BIO/CEN/CHE/PHY 638)

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Time: Mondays and Wednesdays, 5:15 to 6:35 pm

Location: Bowne 414

Website: Group Dropbox Account

Course Description & Learning Outcomes: This course is a seminar on the critical analysis of the current literature on interfaces, whereby we will define the frontiers of interface research by identifying unsolved problems. Small interdisciplinary groups will scour online databases for “hot” articles or research groups associated with a particular research topic. Topics will include: biomaterial interfaces relevant to a particular disease or injury; fundamental interface problems in soft matter physics; techniques for patterning surfaces; mechanisms for bacterial biofilm control; novel mechanisms for drug delivery, among others. Students will lead discussion that critically assesses the methods, outcomes, and implications of the studied work. Placement of the particular paper in the context of the state-of-research in the field will be emphasized, thus requiring literature search and review surrounding the paper. As needed, the professors will provide mini-lectures explaining fundamental issues underpinning the articles discussed. The diverse composition of the teams will challenge the students to find ways of taking advantage of their different expertise and will provide a taste of team grant-writing. At the end of the course you will:

- Be able to perform literature searches using common scientific databases.
- Understand how to critically analyze scientific papers.
- Develop oral and written communication skills concerning the review of scientific work.
- Gain an appreciation for different scientific writing styles and begin to develop your own writing style.

Grades: Students will be graded on the basis of class participation, depth of critical thought evidenced in a literature journal, presentation of papers, and writing assignments.

- Participation ----- 40%
- Presentations ----- 40%
- Written Assignments (2-3) ----- 20%

Academic Accommodations for Students with Disabilities: Students who are in need of disability-related academic accommodations must register with the Office of Disability Services (ODS), 804 University Avenue, Room 309, 315-443-4498. Students with authorized disability-related accommodations should provide a current Accommodation Authorization Letter from ODS to the instructor and review those accommodations with the instructor. Accommodations, such as exam administration, are not provided retroactively; therefore, planning for accommodations as early as possible is necessary.

Approach: During each week, students select two interesting and relevant papers from their assigned journals (from a provided list, below) and “pitch” them to the group for potential in-

depth analysis. A single paper from the pool of pitched papers is selected by popular vote for in-depth analysis. In the subsequent class, several students lead the discussion of the article. (Paper-pitching and discussion leading students are alternated on a rotating basis.) For the paper studied in-depth, the class will critically analyze the paper and conclude with updating a developing list of unsolved problems and fundamentals requiring a lecture or further explanation. This course goes beyond traditional seminar or paper classes by developing appreciation for the process of defining a research project in the context of friendly, interdisciplinary debate that fosters improved scientific communication.

Lectures:

Wednesdays: Two groups of students present a quick overview of a paper they received. The team designated to “pitch” will then be required to prepare the review for following Monday.

Mondays: “Pitch” team present review to class. Class actively participates in review. Class works on drafting a cover letter for paper. Entire class peer-reviews presentation online. Monday’s will also be used to work on Written Work assignments (see below).

Written Work: Students will each have three written assignments, in addition to the weekly activities of the journal article analyses described above. Grades will be assigned for each after one editorial cycle. The written assignments include:

1. **Journal Article Submission Letter** – Feb 4 (1st draft); **February 19** (Final)
2. **Journal Article Peer Review** – **March 2** (1st draft); **March 18** (Final)
3. **Research Rebuttal** -- **April 6** (1st draft); **April 22** (Final)

Text:

No text required. Reference texts to be put on reserve, students are encouraged to use all reliable sources for background.

Soft Interface Topics Examples:

Cell-material interactions	Polymer actuation
Tissue engineering	Responsive and reconfigurable surfaces
Monolayers & bilayers	Self-Assembly
Adsorption	Wetting

Example Journals (Groups will be assigned 4+, with some overlap):

<i>Soft Matter</i>	<i>Langmuir</i>	<i>ACS Macro Letters</i>
<i>Macromolecules</i>	<i>Polymer</i>	<i>ACS Applied Materials and Interfaces</i>
<i>JPS B – Polymer Physics</i>	<i>Nano Letters</i>	<i>Acta Biomaterialia</i>
<i>Biomaterials</i>	<i>Nature Materials</i>	<i>Nature</i>
<i>Physical Review Letters</i>	<i>Science</i>	<i>Physical Review E</i>
Nature Nanotechnology	PNAS	Journal of Physical Chemistry

Faculty On Call: IGERT faculty are on-call to assist you in this course. If your presentation needs some additional insight, please feel free to consult with: Jay Henderson (jhhender@syr.edu); Dacheng Ren (dren@syr.edu), Lisa Manning (mmanning@syr.edu), Cristina Marchetti (mcmarche@syr.edu), Shika Nangia (snangia@syr.edu), Radhakrishna

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