

Chemistry 26:160:592 Syllabus

Special Topics in Materials Chemistry: Hybrid biomaterials

- Class Time:** Thursday 6:00 – 9:00 PM (Spring recess 3/12/2022-3/20/2022)
- Location:** First two lectures:
Jan 20 & Jan 27, Zoom Meetings.
*Remote class effective until 01/31, please see details posted on Canvas.
Zoom link will be provided before the first lecture under Announcement.*
Other lectures after January:
Life Science Center II, Room 130
- Instructor:** Prof. Fei Zhang, Ph.D.
- Email:** fei.zhang@rutgers.edu
- Office Location:** Olson Hall 342
- Office Hour:** Friday 9:00 – 10:00 am (please email me before attending the office hour)

Course Description

Functional biomaterials with more than one chemical component are emerging research topics that involves the fundamentals of chemistry, biology, physics, material science, and nanotechnology. Such materials generally exhibit unique structures at the molecular level and their heterogeneity properties promise broad applications such as biosensing, bioimaging, nanomedicine, tissue engineering, etc. This course introduces the fundamentals of biomaterials and nanotechnology, focusing on selected research topics including biomineralization, design artificial photo synthesis materials, heterogenous hydrogel, materials for synthetic cell. Upon successful completion of this course, students will acquire the knowledge of biomaterials, practice literature presentation skills, learn scientific assay writing, and have a holistic view of multidisciplinary research activities.

Course Objectives

Upon successful completion of this course:

- Students will acquire the knowledge of biomaterials.
- Students will gain an understanding of bioengineering, biosensing, bioimaging, and nanomedicine.
- Student will learn the cutting-edge techniques in structural design and molecular programming for hetero-materials that involve biological molecules.
- Students will have a holistic view of interdisciplinary research activities.

Reading List

- Classic and recent research papers and review articles will be provided in the lectures.
- All the recommended reading material will be available on Canvas: (1) Direct your URL to <https://canvas.rutgers.edu/> (2) Sign in with your NetID (3) Click “Course” and connect to this course (4) Course material will be found under “Modules”.
- No textbook is required.

Grading

Class Participation	10%
Literature summary	30%
Presentation	30%
Term paper	30%

Class Participation: Each student should participate the discussion sections in classes.

Literature summary: Each student will write a literature summary: minimum 1000 words (around 2 pages), Times New Roman 12-point font size, single spaced, 1-inch margins, minimum 3 references.

Presentation: Students will present their literature study. Each student will select and present research papers (up to 3) in the related research fields. Each presentation is 30 minutes. The presentation slides should include background introduction, motivation, current solution, discussion, and outlook.

Term paper: The term paper ideally is the natural extension of the literature summary. Each student needs to schedule an appointment with the instructor to discuss the topic of the term papers. The term paper is minimum 2500 words (around 5 pages), Times New Roman 12 pt, single spaced, 1-inch margins, minimum 10 references.

Approximate Grading Boundaries:

A = 90.0-100%; B+ = 85.0-89.9%; B = 80.0-84.9%; C+ = 75.0-79.9%;
C = 60.0-74.9%; F = 0-59.9%

A/B+/B, etc., grade designations will be made at the discretion of the instructor depending on overall class performance. We reserve the right to adjust the score requirements for each letter grade depending on the overall performance of the class. It is the responsibility of the student to retain evidence of his/her grades should a dispute regarding grades arise. Final percentage grades are rounded to the nearest tenth of a percent.

Course Schedule

Week	Date	Topics	Due Date
1	Jan 20	Course introduction – Zoom	
2	Jan 27	Functional biomaterials - Zoom	
3	Feb 3	SNP (inorganic – bio 1)	
4	Feb 10	Biomineralization (inorganic – bio 2)	
5	Feb 17	Top-down meets bottom-up (inorganic – bio 3)	
6	Feb 24	Artificial photo synthesis (organic – bio 1)	
7	Mar 3	Sponge-like biomaterials (organic – bio 2)	
8	Mar 10	Heterogenous hydrogel (bio – bio 1)	Literature summary due
9	Mar 24	Student Presentations	
10	Mar 31	Student Presentations	
11	Apr 7	Synthetic enzyme cascade (bio – bio 2)	
12	Apr 14	Synthetic membrane (bio – bio 3)	
13	Apr 21	Brush polymer (poly – bio 1)	
14	Apr 28	PEG in materials (poly – bio 2)	
15	May 5		Term paper Due

Academic Integrity

As an academic community dedicated to the creation, dissemination, and application of knowledge, Rutgers University is committed to fostering an intellectual and ethical environment based on the principles of academic integrity. Academic integrity is essential to the success of the University's educational and research missions, and violations of academic integrity constitute serious offenses against the entire academic community. The entire Academic Integrity Policy can be found here: <http://academicintegrity.rutgers.edu/academic-integrity-policy/>

Accommodation and Support

Rutgers University Newark (RU-N) is committed to the creation of an inclusive and safe learning environment for all students. RU-N has identified the following resources to further the mission of access and support:

- **Students with Disabilities:** Rutgers University welcomes students with disabilities into all of the University's educational programs. The Office of Disability Services (ODS) is responsible for the determination of appropriate accommodations for students who encounter barriers due to disability. In order to receive consideration for reasonable accommodations, a student with a disability must contact ODS, register, have an initial appointment, and provide documentation. Once a student has completed the ODS process (registration, initial appointment, and documentation submitted) and reasonable accommodations are determined to be necessary and appropriate, a Letter of Accommodation (LOA) will be provided to the student. The student must give the LOA to each course instructor, followed by a discussion with the instructor. This should be completed as early in the semester as possible as accommodations are not retroactive. More information can be found at ods.rutgers.edu. Contact ODS: (973) 353-5375 or ods@newark.rutgers.edu.
- **Religious Holiday Policy and Accommodations:** Students are advised to provide timely notification to instructors about necessary absences for religious observances and are responsible for making up the work or exams according to an agreed-upon schedule. The Division of Student Affairs is available to verify absences for religious observance, as needed: (973) 353-5063 or DeanofStudents@newark.rutgers.edu.
- **Counseling Services:** Counseling Center Room 101, Blumenthal Hall, (973) 353-5805 or <http://counseling.newark.rutgers.edu/>.
- **Students with Temporary Conditions/Injuries:** Students experiencing a temporary condition or injury that is adversely affecting their ability to fully participate in their courses should submit a request for assistance at: <https://temporaryconditions.rutgers.edu>.
- **Students Who are Pregnant:** The Office of Title IX and ADA Compliance is available to assist students with any concerns or potential accommodations related to pregnancy: (973) 353-1906 or TitleIX@newark.rutgers.edu.
- **Gender or Sex-Based Discrimination or Harassment:** Students experiencing any form of gender or sex-based discrimination or harassment, including sexual assault, sexual harassment, relationship violence, or stalking, should know that help and support are available. To report an incident, contact the Office of Title IX and ADA Compliance: (973) 353-1906 or TitleIX@newark.rutgers.edu. To submit an incident report: tinyurl.com/RUNReportingForm. To speak with a staff member who is confidential and does NOT have a reporting responsibility, contact the Office for Violence Prevention and Victim Assistance: (973) 353-1918 or run.vpva@rutgers.edu.

Learning Resources

- **Rutgers Learning Center** (tutoring services)

Room 140, Bradley Hall

(973) 353-5608

<https://sasn.rutgers.edu/student-support/tutoring-academic-support/learning-center>

- **Writing Center** (tutoring and writing workshops)

Room 126, Conklin Hall

(973) 353-5847

nwc@rutgers.edu