

Course Title: BME 4321 – Dynamics of cellular processes

Catalog Description: The course covers experimental techniques for imaging molecular transport and inter-molecular interactions inside living cells combined with quantitative analysis of experiments using mathematical models of diffusion and reaction. Examples from the cell biology literature are used to introduce students to current research in the field.

Prerequisites: Seniors are allowed if they have taken thermodynamics/transport and/or kinetics.

Objectives: Upon completion of this course, a student should be able to:

- Describe the green fluorescent protein and its use in live-cell imaging
- Describe the principles of fluorescence imaging and specialized imaging methods: FRET, FRAP, TIRF
- Quantitatively interpret live-cell experiments on imaging dynamics of the cytoskeleton
- Model random walks in biology with applications in molecular diffusion, and cellular dynamics
- Model signaling networks and use MATLAB to compute dynamical properties of biological systems

Instructor: Tanmay Lele, Associate Professor of Chemical Engineering
329 Chemical Engineering Bldg. (CHE)
Phone: 392-0317 email: tlele@che.ufl.edu
Office Hours: W 1:45-3:15 pm

Class Meetings: T R period 6 (12:50-1:40 pm), RNK 0110
M period 7 (1:55-2:45 pm), PSY 0130

Reference Textbook [Molecular Biology of the Cell](#) (click on the hyperlink to get access for free-only works on campus)

Grading Criteria: There will be a flat grading scale: A: 90+; A-: 85-90; B+:80-85; and so on. Depending on the overall performance, I may alter the grading scale (only if it favors students). Graduate students will be graded separately from undergraduate students.

There are *no exams*. Homework will be assigned occasionally. Quizzes will be assigned occasionally on Thursdays. The quizzes will generally cover lecture material from the previous few class periods and will require 15 minutes to complete. If you attend class and pay attention, you should do well on the quiz.

Quizzes: 30 %; Homework: 35 %; Project: 35 %

Quiz policy No cellphones allowed. All quizzes are closed book, closed notes.

Quizzes: Quizzes will be given at the end of most non-exam weeks. The quizzes will generally cover lecture material from the previous few class periods and will require 15-30 minutes to complete.

Homework: HW must be prepared neatly and professionally to receive full credit. Include your name, date, and HW number on the first page. Staple all pages together. Students are encouraged to help each other on HW, but copying someone else's solution or allowing someone else to copy yours is

cheating and a violation of academic honesty policy. Rule of thumb: Discuss the HW, but don't look at any one else's work or show them your work.

Project: Each student will prepare a project report, single-spaced, 5-10 pages in length. You are encouraged to search for papers on www.pubmed.com. Find papers in journals with impact factors exceeding at least 4 or 5. The papers must be connected to the topics discussed in class. There will be no presentation.

Computing: The College of Engineering requires that all engineering students have access to a *mobile (notebook)* computer with wireless computing capability. Specific laptop and software requirements from the College are listed at <http://www.eng.ufl.edu/computerrequirements.htm>. MATLAB will be used in this course so you are encouraged to get access to it and familiarize yourself with it.

Honesty Policy: All students admitted to the University of Florida have signed a statement of academic honesty committing them to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

Accommodation for Students with Disabilities Students requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

UF Counseling Services Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

- UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
- Career Resource Center, Reitz Union, 392-1601, career and job search services.

Software Use All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.