EEL 5934   Introduction to Biophotonics

1. Catalog Description – (3 credits) Introduction to the principles of optics, lasers and biology, the interaction of light with cells and tissues, and various optical imaging, sensing and activation techniques and their applications in biomedicine.

2. Pre-requisites – PHY 2049 or equivalent

3. Course Objectives - Biophotonics is the science of generating and harnessing light (photons) to image, detect and manipulate biological materials. The goal of this course is to provide an introduction to the principles of optics and lasers, the basics of biology, the interaction of light with cells and tissues, and the applications of various optical imaging and sensing techniques in biomedicine. This course is highly interdisciplinary and is suitable for graduate and upper-level undergraduate students. This course is also designed to bring together students with various engineering or physics backgrounds.

4. Contribution of course to meeting the professional component (ABET only – undergraduate courses) – N/A

5. Relationship of course to program outcomes: Skills student will develop in this course (ABET only undergraduate courses) – N/A

6. Instructor – Dr. Huikai Xie
   a. Office location: 221 Larsen
   b. Telephone: 846-0441
   c. E-mail address: hlx@ufl.edu
   d. Class Web site: https://lss.at.ufl.edu/
   e. Office hours: Wednesday – Friday, 4:00-5:45 pm

7. Teaching Assistant - TBD
   a. Office location:
   b. Telephone:
   c. E-mail address:
   d. Office hours:

8. Meeting Times – 8th -9th Tuesday, 8th Thursday

9. Class/laboratory schedule - 3 class periods consisting of 50 minutes each

10. Meeting Location – 239 Larsen

11. Material and Supply Fees - None

12. Textbooks and Software Required -
   a. Title: Introduction to Biophotonics
b. Author: Paras N. Prasad

c. Publication date and edition: May 2003

d. ISBN number: 0-471-28770-9

e. Class Notes: developed mainly based on the above book

13. Recommended Reading -

14. Course Outline (provide topics covered by week or by class period) –
- Week 1 Introduction; and Fundamentals Light And Matter
- Week 2 Principles of Lasers, Current Laser Technology and Nonlinear Optics
- Week 3 Light-Matter Interactions and Photobiology
- Week 4 Bioimaging: Principles of Optical Microscopy
- Week 5 Basics of Biology
- Week 6 Fluorescence Microscopy
- Week 7 Confocal Microscopy; Diffusion Optical Tomography
- Week 8 Multiphoton Microscopy; Nonlinear Optical Imaging
- Week 9 Optical Coherence Tomography
- Week 10 MEMS And MEMS-Based Bioimaging
- Week 11 Bioimaging Applications: Cellular, Tissue and In Vivo Imaging
- Week 12 Optical Sensors: Fiber-Optic Sensors and SPR Biosensors
- Week 13 Laser Tweezers
- Week 14 Terahertz Spectroscopy and Imaging

15. Attendance and Expectations - Cell phones and other electronic devices are to be silenced. No text messaging during class or exams.

Requirements for class attendance and make-up exams, assignments, and other work are consistent with university policies that can be found at: [https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx](https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx)

16. Grading –
25% Homework
25% Project
50% Exams (2 exams at 25% each)

17. Grading Scale –

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Undergraduate students, in order to graduate, must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. Graduate students, in order to graduate, must have an overall GPA of 3.0 or better (B or better). Note: a B- average is equivalent to a GPA of 2.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

18. Make-Up Exam Policy - If you have a University-approved excuse and arrange for it in advance, or in case of documented emergency, a make-up exam will be allowed and arrangements can be made for making up missed work. University attendance policies can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Otherwise, make-up exams will be considered only in extraordinary cases, and must be taken before the scheduled exam. The student must submit a written petition to the instructor two weeks prior to the scheduled exam and the instructor must approve the petition.

19. Honesty Policy – All students admitted to the University of Florida have signed a statement of academic honesty committing themselves 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.

“…failure to comply with this commitment will result in disciplinary action compliant with the UF Student Honor Code Procedures (http://www.dso.ufl.edu/sccr/procedures/honorcode.php)

20. 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.

21. 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.

22. 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.