

Standardized Syllabus for the College of Engineering

**EEL4930/ 5934      Introduction to Biophotonics (Spring 2017)**

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: General Physics 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: Prof. Huikai Xie
  - a. Office location: 221 Larsen Hall
  - b. Telephone: (352) 846-0441
  - c. E-mail address: [hkx@ufl.edu](mailto:hkx@ufl.edu)
  - d. Class Web site: Web site: E-Learning (Canvas)
  - e. Office hours: 3:00-4:00pm T,R
7. Teaching Assistant: TBD
  - a. Office location:
  - b. Telephone:
  - c. E-mail address:
  - d. Office hours:
8. Meeting Times: 5:10-6:00 T, 5:10-7:05 R
9. Class/laboratory schedule, i.e., number of sessions each week and duration of each session - 3 class periods consisting of 50 minutes each
10. Meeting Location: Benton 328
11. Material and Supply Fees: N/A

## 12. Textbooks and Software Recommended -

- a. Title: Introduction to Biophotonics
- b. Author: Paras N Prasad
- c. Publication date and edition: May 2003
- d. ISBN number: 0-471-28770-9

Note: Class notes are developed mainly based on the above book.

## 13. Recommended Reading -

- Biomedical Optics: Principles and Imaging, L. V. Wang, H.-I. Wu, 2007, Wiley.
- Introduction to Modern Optics, Grant R. Fowles, 2<sup>nd</sup> ed., 1989, Dover Publications.
- Optical Imaging and Microscopy : Techniques and Advanced Systems, Peter Török and Fu-Jen Kao, 2004, Springer.
- Introduction to Biomedical Imaging, Andrew G. Webb, 2002, IEEE Press.
- Biophotonics International, available on line: <http://www.photonics.com/bio/>

## 14. Course Outline

Week 1	Introduction Fundamentals Light and Matter
Week 2	Principles of Lasers, Current Laser Technology Nonlinear Optics
Week 3	Light-Matter Interactions Photobiology
Week 4	Basics of Biology
Week 5	Bioimaging: Principles of Optical Microscopy
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 Introduction MEMS-Based Bioimaging
Week 11	Bioimaging Applications: Cellular, Tissue and In Vivo Imaging
Week 12	Optical Sensors Fiber-Optic Sensors 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>

## 16. Grading – methods of evaluation

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Homework	20%	20%
Design Project	5%	5% (Optional; Extra credit)
Research Project	10%	15%
Quizzes	10%	10%
Labs	5%	5%
Exams	45%	45%
Attendance	5%	5%
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	100%	100%

## 17. Grading Scale

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
93-100	90-92	87-89	83-86	80-82	77-79	73-76	70-72	67-69	63-66	60-62	0-59

“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.