

# OSE 4721 Biophotonics

Days & Times	Room	Instructor	Meeting Dates
MoWe 12:00PM - 1:15PM	CROL A214	Sean Pang	08/22/2022 - 12/11/2022

The course addresses basic topics and current trends in the use of light in medical sciences. Students will develop an understanding of:

- light-matter interactions, optical imaging, optical technology and metrology
- opportunities for optics and photonics in biomedicine

The course will involve critical reading and current research evaluation. The course is open to non-majors; programming experience (Matlab) preferable

Key topics include a review of relevant optical principles (basic physics required) and phenomena related to light-tissue interaction. Other topics will cover aspects of optical imaging methods, super-resolution and label-free microscopy as well as an assessment of biomedical imaging processing.

## Detailed list of topics

1. Overview of Biophotonics (Wk 0.5)
2. Scattering (Wk 0.5-1.5)
3. Classical microscopy (Wk 1.5-2)
4. Aberration and the pupil function (Wk 3)
5. Fluorescence microscopy (Wk 5-6)
6. Raman Spectroscopy (Wk 6.5)
7. Interferometry and OCT (Wk 6.5-8)
8. Super resolution Microscopy (Wk 9)
9. Computational Microscopy & Fourier Ptychography (Wk 10 – 11.5)
10. Adaptive Optics (Wk 12)
11. Photoacoustic tomography and optofluidics (Wk 13)
12. Wavefront Engineering, Other novel methods. (Wk 14)
13. Student's presentation (Wk 15&16)

**Recommended texts** (but not strictly required)

- *Biomedical optics, Principles and Imaging*, L. V. Wang and Hsin-I Wu, Wiley-Interscience
- *Introduction to Biophotonics*, Paras Prasad, Wiley-Interscience

**Other useful reading**

- *Optics*, E. Hecht, Addison-Wesley
- *Fundamentals of Photonics*, B. Saleh, Wiley-Interscience
- *Biomedical Photonics Handbook*, T. Vo-Dinh ed., CRC Press

Requirements for class attendance and make-up exams, assignments, and other work are consistent with university policies.

**Office hours**

Arrange zoom or in-person session, please email [pang@creol.ucf.edu](mailto:pang@creol.ucf.edu) .

**Grading**

- 60% Homework (5-6 assignments)
- 20% Course presentation
- 20% Final exams