

## **ELECTIVE COURSE TO AUDIT**

(Trainees work with their mentors on selecting electives for 2<sup>nd</sup> year)

### **Basic Electives**

#### **MATSCI 382: Bio-chips, Imaging, and Nanomedicine**

The course covers state-of-the-art and emerging bio-sensors, bio-chips, imaging modalities, and nano-therapies which will be studied in the context of human physiology including the nervous system, circulatory system and immune system. Medical diagnostics will be divided into bio-chips (in-vitro diagnostics) and medical and molecular imaging (in-vivo imaging). In-depth discussion on cancer and cardiovascular diseases and the role of diagnostics and nano-therapies.

Course Information:

[URL link for course description](#)

#### **BIOE 222: Multimodality Molecular Imaging in Living Subjects**

Focuses on instruments, algorithms and other technologies for imaging of cellular and molecular processes in living subjects. Introduces preclinical and clinical molecular imaging modalities, including strategies for molecular imaging using PET, SPECT, MRI, Ultrasound, Optics, and Photoacoustics. Covers basics of instrumentation physics, the origin and properties of the signal generation, and image data quantification.

Course Information:

[URL link for course description](#)

### **Advanced Electives**

#### **BIOSCI 214: Cell Biology of Physiological processes**

Mechanisms of membrane and cellular biogenesis in relation to physiological processes. Emphasis is on regulatory and signaling mechanisms involved in coordinating complex cellular phenomena such as cellular organization, function, and differentiation. Topics: cellular compartmentalization, transport and trafficking of macromolecules, organelle biogenesis, cell division, motility and adhesion, and multicellularity. Prerequisites: Biological Sciences core. Open to graduate and medical students. Undergraduates may enroll with consent of instructor and prerequisites Biological Science core and Biochemistry 205. (R. Kopito, W. Nelson)

Course Information:

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#### **CBIO 280: Cancer Biology Journal Club**

Required of and limited to first- and second-year graduate students in Cancer Biology. Recent papers in the literature presented by graduate students. When possible, discussion relates to and precedes cancer-related seminars at Stanford. Attendance at the relevant seminar required.

Course Information:

[URL link for course description](#)

#### **MATSCI 346: Nanophotonics**

Recent developments in micro- and nanophotonic materials and devices. Basic concepts of photonic crystals. Integrated photonic circuits. Photonic crystal fibers. Superprism effects. Optical properties of metallic nanostructures. Sub-wavelength phenomena and plasmonic excitations. Meta-materials. Prerequisite: Electromagnetic theory at the level of 242.

Course Information:

[URL link for course description](#)

**EE 292L: Nanomanufacturing**

Fundamentals of nanomanufacturing technology and applications. Topics include recent developments in process technology, lithography and patterning. Technology for FinFET transistors, NAND flash and 3D chips. Manufacturing of LEDs, thin film and crystalline solar cells. Flip classroom model is used supplementing classroom lectures with short videos. Guest speakers include distinguished engineers, entrepreneurs and venture capitalists actively engaged in nanomanufacturing. Prerequisite: background in device physics and process technology. Recommended: EE116, EE216, EE212

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