SYSTEMS/SYNTHETIC/PHYS BIOLOGY (SSPB)

SSPB 501 - PHYSICAL BIOLOGY
Short Title: PHYSICAL BIOLOGY
Department: Systems/Synthetic/Phys Biology
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Basic introduction to a biophysical view of living systems, from the subcellular to the multicellular scales. Topics include: biomolecular dynamics, cellular biomechanics, cell motility and cell division, calcium signaling, action potential propagation, and tissue organization. Cross-list: BIOC 501, BIOE 502.

SSPB 502 - INTRO COMPUTATIONAL SYSTEMS BIOLOGY: MODELING & DESIGN PRINCIPLES OF BIOCHEM NETWORKS
Short Title: INTRO SYSTEMS BIOLOGY MODELING
Department: Systems/Synthetic/Phys Biology
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: The course summarizes techniques for quantitative analysis and simulations of basic circuits in genetic regulation, signal transduction and metabolism. We discuss engineering approaches adapted to computational systems biology and aim to formulate evolutionary design principles explaining organization of networks in terms of their physiological demands. We discuss biochemical simulation methodology and software as well as recent advances in the field. Topics include end-product inhibition in biosynthesis, optimality and robustness of the signaling networks and kinetic proofreading. More emphasis on recent advances in the field - paper reading and presentations. Cross-list: BIOE 552. Recommended Prerequisite(s): Basic knowledge of biochemistry, cell biology, linear algebra, and ordinary differential equations is expected.

SSPB 503 - SYNTHETIC BIOLOGY
Short Title: SYNTHETIC BIOLOGY
Department: Systems/Synthetic/Phys Biology
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Design of biology at scales from molecules to multicellular organisms will be covered by lecture, primary literature, and student presentations. Students will write a research proposal at the end of the course. Cross-list: BIOE 508.

SSPB 550 - GRADUATE SEMINAR
Short Title: GRADUATE SEMINAR
Department: Systems/Synthetic/Phys Biology
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to students with a major in Systems/Synthetic/Phys Biology. Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Seminar course to introduce SSPB students to current research topics and activities in the systems, synthetic, and physical biology fields. Repeatable for Credit.

SSPB 575 - INTRODUCTION TO RESEARCH
Short Title: INTRODUCTION TO RESEARCH
Department: Systems/Synthetic/Phys Biology
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Research
Credit Hours: 2
Restrictions: Enrollment is limited to students with a major in Systems/Synthetic/Phys Biology. Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Introduction of first-year graduate students to the research programs and laboratories of individual faculty members. Repeatable for Credit.

SSPB 599 - GRADUATE TEACHING IN SSPB
Short Title: GRADUATE TEACHING IN SSPB
Department: Systems/Synthetic/Phys Biology
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Internship/Practicum
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Supervised instruction in teaching systems, synthetic, and physical biology. Repeatable for Credit.

SSPB 601 - NAVIGATING INTERDISCIPLINARY TEAMS IN SCIENCE AND ENGINEERING
Short Title: INTERDISCIPLINARITY I
Department: Systems/Synthetic/Phys Biology
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Covers team science literature on the assumptions that guide scientific practice, communication, and group integration. Instructor Permission Required.

SSPB 602 - INNOVATIONS AND CHALLENGES IN BIOELECTRONICS RESEARCH
Short Title: INTERDISCIPLINARITY II
Department: Systems/Synthetic/Phys Biology
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): SSPB 601
Description: Covers literature on past biotechnological innovations that required interdisciplinary collaboration for success. Instructor Permission Required.
SSPB 610 - INTERDISCIPLINARY BIOELECTRONICS RESEARCH
COLLOQUIUM
Short Title: BIOELECTRONICS COLLOQUIUM
Department: Systems/Synthetic/Phys Biology
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Covers effective oral communication in the interdisciplinary field of bioelectronics. Repeatable for Credit.

SSPB 620 - INTERDISCIPLINARY BIOELECTRONICS PEER WRITING GROUPS
Short Title: BIOELECTRONICS WRITING
Department: Systems/Synthetic/Phys Biology
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Covers effective written communication in the interdisciplinary field of bioelectronics. Repeatable for Credit.

SSPB 677 - SPECIAL TOPICS
Short Title: SPECIAL TOPICS
Department: Systems/Synthetic/Phys Biology
Grade Mode: Standard Letter
Course Type: Internship/Practicum, Lecture, Seminar, Laboratory
Credit Hours: 1-4
Restrictions: Enrollment is limited to Graduate or Visiting Graduate level students.
Course Level: Graduate
Description: Topics and credit hours vary each semester. Contact department for current semester's topic(s). Repeatable for Credit.

SSPB 700 - INTERDISCIPLINARY BIOELECTRONICS RESEARCH
Short Title: BIOELECTRONICS RESEARCH
Department: Systems/Synthetic/Phys Biology
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Research
Credit Hours: 1-3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Covers research in the interdisciplinary field of bioelectronics. Repeatable for Credit.

SSPB 800 - GRADUATE RESEARCH
Short Title: GRADUATE RESEARCH
Department: Systems/Synthetic/Phys Biology
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Research
Credit Hours: 1-15
Restrictions: Enrollment is limited to students with a major in Systems/Synthetic/Phys Biology. Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Graduate students will conduct independent research/thesis project under the direction of their advisor. Repeatable for Credit.