
**Bioengineering Related Undergraduate Technical Courses
FALL 2022**

In addition to the courses below, there are many other more general courses not specifically biology-related but that are useful for BIOE training. Please contact the Biological Engineering Grad Advisor for more details. Please see individual departments for more information about these courses.

BIOE 120A, Molecular Bioengineering Introduces students to molecular components of biology with application of engineering principles for analysis. *Instructors: Stowers R S and Dey S, 3 units. T R 11:00 am - 12:15 pm*

CHEM 112A, Biophysical Chemistry Laws of thermodynamics, chemical equilibria and ligand binding, phase equilibria, electrochemistry, nonelectrolyte solutions, applications to biochemical problems. *Instructors: Sepunaru L, 4 units. T R 2:00 pm - 3:15 pm*

CHEM 162A, Drug Design Sources for new drugs. Biochemistry of diseases. Target validation techniques. Mechanism of action of enzymes and receptors. Enzyme inhibition and receptor binding studies. Structure based drug design: conformational analysis, docking and binding affinity calculations. Course also teaches proposal writing skills. *Instructors: Reich N O, 3 units. M W F 11:00 am - 11:50 am*

CMPSC 111, Introduction to Computational Science Introduction to computational science, emphasizing basic numerical algorithms and the informed use of mathematical software. Matrix computation, systems of linear and nonlinear equations, interpolation and zero finding, differential equations, numerical integration. Students learn and use the Matlab language. *Instructors: Gibou F G, 4 units. M W 12:30 am - 1:45 pm*

CMPSC 130A, Data Structures and Algorithms I The study of data structures and their applications. Correctness proofs and techniques for the design of correct programs. Internal and external searching. Hashing and height balanced trees. Analysis of sorting algorithms. Memory

management. Graph traversal techniques and their applications. *Instructors: Vigoda E J, 4 units. M W 9:30 am - 10:45 am*

CMPSC 138, Automata and Formal Languages Formal languages; finite automata and regular expressions; properties of regular languages; pushdown automata and context-free grammars; properties of context-free languages; introduction to Turing machines and computability. *Instructors: Ananth P V, 4 units. M W 11:00 am - 12:15 pm*

CMPSC 165A, Artificial Intelligence Introduction to the field of artificial intelligence, which seeks to understand and build intelligent computational systems. Topics include intelligent agents, problem solving and heuristic search, knowledge representation and reasoning, uncertainty, probabilistic reasoning, and applications of AI. *Instructors: Yan X, 4 units. T R 12:30 pm - 1:45 pm*

CMPSC 174A, Fundamentals of Database Systems Database system architectures, relational data model, relational algebra, relational calculus, SQL, QBE, query processing, integrity constraints (key constraints, referential integrity), database design, ER and object-oriented data model, functional dependence, lossless join and dependency preserving decompositions, Boyce-Codd and Third Normal Forms. *Instructors: Agrawal D, 4 units. T R 3:30 pm - 4:45 pm*

CMPSC 181, Introduction to Computer Vision Overview of computer vision problems and techniques for analyzing the content of images and video. Topics include image formation, edge detection, image segmentation, pattern recognition, texture analysis, optical flow, stereo vision, shape representation and recovery techniques, issues in object recognition, and case studies of practical vision systems. *Instructors: Beyeler M, 4 units. T R 2:00 pm - 3:15 pm*

ECE 179D, Introduction to Robotics: Dynamics and Control Dynamic modeling and control methods for robotic systems. LaGrangian method for deriving equations of motion, introduction to the Jacobian, and modeling and control of forces and contact dynamics at a robotic end effector. Laboratories encourage a problem-solving approach to control. *Instructors: Byl K A, 4 units. T R 2:00 pm - 3:15 pm*

ECE 181, Introduction to Computer Vision Overview of computer vision problems and techniques for analyzing the content of images and video. Topics include image formation, edge detection, image segmentation, pattern recognition, texture analysis, optical flow, stereo vision, shape representation and recovery techniques, issues in object recognition, and case studies of practical vision systems. *Instructors: Beyeler M, 4 units. T R 2:00 pm - 3:15 pm*

ME 128, Design of Biomedical Devices Introductory course addresses the challenges of biomedical device design, prototyping and testing, material considerations, regulatory requirements, design control, human factors and ethics. *Instructors: Laquette S W, 3 units. M W F 12:00 pm - 12:50 pm*

PHYS 144L, Experimental Research in Biophysics Offers qualified undergraduates the opportunity to work in research laboratories in biophysics. *Instructors: TBA, 1-4 units.*

PSTAT 10, Principles of Data Science with R Offers qualified undergraduates the opportunity to work in research laboratories in biophysics. *Instructors: Ravat U V, 5 units. T R 8:00 am - 9:15 am*

PSTAT 122, Design and Elements of Experiments An Introduction to statistical design and analysis of experiments. Covers: principles of randomization, blocking and replication; fixed, random and mixed effects models; block designs, factorial designs and nested designs; analysis of variance and multiple comparison. *Instructors: TBA, 4 units. M W 5:00 pm - 6:15 pm, T R 11:00 am - 12:15 pm*

PSTAT 134, Statistical Data Science Overview and use of data science tools in R and Python for data retrieval, analysis, visualization, reproducible research and automated report generation. Case studies will illustrate practical use of these tools. *Instructors: Oh Sang-Yun, 4 units. M W 2:00 pm - 3:15 pm*