ENBC - BIOCOMPUTATIONAL ENGINEERING

ENBC301 Introduction to Biocomputational Engineering (1 Credit)
Provides practical tools to help Biocomputational Engineering majors to think critically about their goals and career paths and to utilize their major to set their career trajectory.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department; and must be in the Biocomputational Engineering major.

ENBC311 Python for Data Analysis (3 Credits)
Provides an introduction to structured programming, computational methods, and data analysis techniques with the goal of building a foundation allowing students to confidently address problems in research and industry. Fundamentals of programming, algorithms, and simulation are covered from a general computer science perspective, while the applied data analysis and visualization portion makes use of the Python SciPy stack.
Prerequisite: Minimum grade of C- in MATH241; and minimum grade of C- in BIOE241 or approved prior study in Matlab.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department; and must be in the Biocomputational Engineering major.
Credit Only Granted for: BIOE489A, BIOE442 or ENBC311.

ENBC312 Object Oriented Programming in C++ (3 Credits)
Provides a solid foundation for object-oriented programming using the C++ programming language. It introduces fundamental conceptual tools and their implementation of object-oriented design and programming such as: object, type, class, implementation hiding, inheritance, parametric typing, function overloading, polymorphism, source code reusability, and object code reusability. Fundamental principles of object-oriented design and programming are stressed while covering the language details.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department; and must be in the Biocomputational Engineering major.

ENBC331 Applied Linear Systems and Differential Equations (3 Credits)
Applications of linear algebra and differential equations to bioengineering and biomolecular systems. Designed to instruct students to relate mathematical approaches in bioengineering to their physical systems. Examples will emphasize fluid mechanics, mass transfer, and physiological systems.
Prerequisite: Minimum grade of C- in MATH241; and minimum grade of C- in BIOE241 or approved prior study in Matlab.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department; and must be in the Biocomputational Engineering major.
Credit Only Granted for: BIOE371 or ENBC331.

ENBC332 Statistics, Data Analysis, and Data Visualization (3 Credits)
Instructs students in the fundamentals of probability and statistics through examples in biological phenomenon and clinical data analysis. Data visualization strategies will also be covered.
Prerequisite: Minimum grade of C- in MATH241; and minimum grade of C- in BIOE241 or approved prior study in Matlab.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department; and must be in the Biocomputational Engineering major.
Credit Only Granted for: BIOE372, ENBC332 or STAT464.

ENBC341 Biomolecular Engineering Thermodynamics (3 Credits)
A quantitative introduction to thermodynamic analysis of biomolecular systems. The basic laws of thermodynamics will be introduced and explained through a series of examples related to biomolecular systems.
Prerequisite: Minimum grade of C- in MATH246 and PHYS260.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department; and must be in the Biocomputational Engineering major.
Credit Only Granted for: BIOE232, ENBC341 or CHBE301.

ENBC342 Computational Fluid Dynamics and Mass Transfer (3 Credits)
Principles and applications of fluid mechanics with a focus on bioengineering topics. Content includes conservation of mass, momentum, and energy, as well as the application of these fundamental relations to hydrostatics, control volume analysis, internal and external flow, and boundary layers. Applications to biological and bioengineering problems such as tissue engineering, bioprocessing, imaging, and drug delivery.
Prerequisite: Minimum grade of C- in ENBC341; and minimum grade of C- in BIOE241 or approved prior study in Matlab; and must have earned a minimum grade of C- or be concurrently enrolled in ENBC331.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department; and must be in the Biocomputational Engineering major.
Credit Only Granted for: BIOE331 or ENBC342.

ENBC351 Quantitative Molecular and Cellular Biology (3 Credits)
Provides a quantitative analysis of the behavior of cellular and molecular systems. The focus will be the construction and application of mechanistic models of biomolecular interaction rate processes, which form the foundation of most biological functions. The course will also provide in-depth, practical exploration into data analysis of key bioengineering techniques.
Prerequisite: Minimum grade of C- in BSCI170 or BIOE120.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department; and must be in the Biocomputational Engineering major.