Online Graduate Certificate in Applied Bioinformatics - Course Curriculum

The Online Graduate Certificate in Applied Bioinformatics is offered by the Center for Bioinformatics and Computational Biology (CBCB) at University of Delaware (UD) as a graduate level program ideally suited for working professionals who wish to gain knowledge and practical experience in bioinformatics. Building on the core curriculum of UD's MS, PSM and PhD bioinformatics degree programs, the Online Graduate Certificate will allow students to gain core competency in bioinformatics for real-world applications from genomic medicine to agriculture. All courses engage experiential interactive learning, coupling lecture-based instruction with hands-on exercises and term projects with both team-based and individual e-learning. No previous programming or database experience is required but a familiarity with molecular biology concepts is recommended.

Program Director: Cathy Wu, Ph.D.

Course #/ Title	Semester/ # Credit	Instructors	Course Descriptions
BINF644 Bioinformatics	Spring (3)	Cecilia Arighi, Ph.D. Li Liao, Ph.D.	To introduce the principles of bioinformatics analysis of genes and proteins and to provide basic understanding and practical guides to web accessible bioinformatics resources and tools, including literature, DNA/protein and molecular databases, sequence alignment and homology search, phylogenetic analysis, structure prediction and genome and protein annotation.
BINF694 Systems Biology	Fall (3)	Shawn Polson, Ph.D. Karen Ross, Ph.D.	To introduce experimental methods and bioinformatics analysis in systems biology, applying global analysis of next-generation sequencing (NGS) and omics data to improve understanding of biological systems. Covers: (i) experimental techniques, (ii) genomics and transcriptomics data analysis, and (iii) proteomics and pathway/network data analysis.
BINF640 Databases for Bioinformatics	Fall (3)	Sheng-Chih Chen, Ph.D.	To introduce principles and techniques of the bioinformatics database development cycle: (i) data modeling: collect bioinformatics data and design a relational data model, (ii) database management: implement a relational database and write SQL queries and stored procedures, and (iii) web hosting: create a website to access backend database.
BINF690 Programming for Bioinformatics	Spring (3)	Jaysheel Bhavsar, M.S.	To introduce principles of computer programming using Python language framed within the context of bioinformatics. Covers basic technique, syntax, best practices, advance programming concepts and basic algorithm designs to write, understand, and edit complex programs in Python. Also covers the Git version control and common bioinformatics packages and techniques.