

2026-2027 MCB Area of Interest Course Information

Computational Biology

Please check the University of Washington Time Schedule for the most updated course information.

Area Directors

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FOUNDATIONAL COURSES

Foundational Course One:

Course Number: GENOME 541

Course Title: Introduction to Computational Molecular Biology: Molecular Evolution

Instructor (s): TBD

Location (e.g., UW, FH, SLU): TBD

Credits: 4.0

Quarter, Weeks, and Frequency course is offered: Spring, weeks 1-10, every year.
Will be offered in Spring 2027.

Schedule for 2026-27: TBD

Synopsis: Computational methods for studying molecular evolution. Students must be able to write computer programs in Python/R for data analysis.

Prerequisite: Prior coursework in biology and probability.

Foundational Course Two:

Course Number: GENOME 559

Course Title: Introduction to Statistical and Computational Genomics

Instructor(s): TBD

Location: UW

Credits: 3.0

Quarter, Weeks, and Frequency course is offered: Winter, weeks 1-10, every year.
Will be offered in Winter 2027.

Schedule for 2026-27: TBD

Synopsis: Emphasis on basic probability and statistics, and in introduction to computer programming. This course is intended to introduce students with non-computer science background to the major concepts of programming and statistics. After taking this course, students will be able to describe and perform basic analysis tasks relating to biological sequence analysis, phylogenetics, pedigree analysis, genetic association studies, population genetics and microarray analysis. Students

will be able to demonstrate an understanding of fundamental statistical concepts, such as p-values, t-tests, chi-squared tests and multiple testing correction. Finally, students will be able to write computer programs to perform statistical and bioinformatics analysis.

Instructions: Add code required. For those with very little or no programming experience, contact instructor to obtain permission to enroll.

Foundational Course Three:

Course Number: GENOME 560

Course Title: Introduction to Statistical Genomics

Instructor (s): TBD

Location: TBD

Credits: 3.0

Quarter, Weeks, and Frequency course is offered: Spring, weeks 1-10, every year.
Will be offered in Spring 2027.

Schedule for 2026-27: TBD

Synopsis: An introduction to fundamental concepts necessary for the analysis of genetic and genomic data including, basic elements of probability theory, parameter estimation, and hypothesis testing.

Instructions: Contact instructor for approval.

Foundational Course Four:

Course Number: MCB 536

Course Title: Tools for Computational Biology

Instructor (s): Arvind "Rasi" Subramaniam

Location: FH

Credits: 3.0

Quarter, Weeks, and Frequency course is offered: Autumn, weeks 1-10, every year. *Will be offered in Autumn 2026.*

Schedule for 2026-27: Tues, Thurs. 3:30-4:50 p.m.

Synopsis: Introduction to established best practices in computational biology. Learn to organize unstructured data into standard formats, transform data for statistical analyses, and visualize the transformed data. Learn workflows for reproducible research such as version control, project organization, and code documentation. Gain basic experience with Linux command line tools and the Python and R programming languages. Classes will involve hands-on learning through coding exercises, collaborative problem solving, and extensive use of online learning resources.

Instructions: Contact graduateeducation@fredhutch.org for add code.

ELECTIVE COURSES

Elective Course One:

Course Number: BIOST 544 (offered jointly with BIOST 546)

Course Title: Machine Learning for Biomedical Data

Instructor (s): Kevin Lin

Location: UW

Credits: 3.0

Quarter, Weeks, and Frequency course is offered: Autumn, Spring, weeks 1-10.
Will be offered in Autumn 2026.

Schedule for 2026-27: Mon, Wed. 12:30-2:20 p.m.

Synopsis: Provides an introduction to statistical learning and machine learning for biomedical and public health data.

Instructions: Contact instructor for approval.

Elective Course Two:

Course Number: CSE 512

Course Title: Data Visualization

Instructor (s): TBD

Location: TBD

Credits: 4.0

Quarter, Weeks, and Frequency course is offered: Spring, weeks 1-10, every year.
Will be offered in Spring 2027.

Schedule for 2026-27: TBD

Synopsis: Covers techniques and algorithms for creating effective visualizations based on principles from graphic design, visual art, perceptual psychology, and cognitive science. Topics include data and image models; visual encoding; graphical perception; color; animation; interaction techniques; graph layout; and automated design. Lectures, reading, and project.

Elective Course Three:

Course Number: CSE 527

Course Title: Computational Biology

Instructor (s): TBD

Location: TBD

Credits: 4.0

Quarter, Weeks, and Frequency course is offered: Winter, weeks 1-10. *Will be offered in Winter 2027.*

Schedule for 2026-27: TBD

Synopsis: Introduces computational methods leveraging artificial intelligence (AI) and machine learning (ML) techniques to understand biological systems and enhance healthcare. Utilizes various AI/ML techniques, including explainable AI, interpretable ML, deep learning, probabilistic graphical models, and causal inference. Explores diverse problem areas such as genetics, epigenomics, transcriptomics, proteomics, imageomics, and electronic health records.

Instructions: Contact instructor for approval.

Elective Course Four:

Course Number: CSE 583

Course Title: Software Development for Data Scientists

Instructor (s): David Beck, Bryna Hazelton

Location: UW

Credits: 4.0

Quarter, Weeks, and Frequency course is offered: Autumn, weeks 1-10. *Will be offered in Autumn 2026.*

Schedule for 2026-27: Tues, Thurs. 11:30 a.m. – 12:50 p.m.

Synopsis: Provides students outside of CSE with a practical knowledge of software development that is sufficient to do graduate work in their discipline. Modules include Python basics, software version control, software design, and using Python for machine learning and visualization.

Elective Course Five:

Course Number: CSE 590

Course Title: Computational Biology Seminar (Seminar C)

Instructor(s): Su-In Lee

Location: UW

Credits: 1.0 – 3.0

Quarter, Weeks, and Frequency course is offered: Autumn, Winter, Spring, weeks 1-10, every year. *Will be offered in Autumn 2026, Winter 2027, and Spring 2027.*

Schedule for 2026-27: 1:00-1:50 p.m.

Synopsis: A taste of current research in Computational Biology (local and non-) + critical reading of literature + presentation skills. Students, with faculty advice, pick and present CompBio papers from recent journals/conferences. Students & faculty also present their own research (mostly in Spring, but may be sprinkled throughout, depending on schedules). Background knowledge of biology is not assumed; come learn!

Instructions: Contact ugrad-adviser@cs.washington.edu for add code.

Elective Course Six:

Course Number: GENOME 540

Course Title: Introduction to Computational Molecular Biology: Genome and Protein Sequence Analysis

Instructor (s): TBD

Location: TBD

Credits: 4.0

Quarter, Weeks, and Frequency course is offered: Winter, weeks 1-10, every year. *Will be offered in Winter 2027.*

Schedule for 2026-27: TBD

Synopsis: Algorithmic and probabilistic methods for analysis of DNA and protein analysis. Students must be able to write computer programs for data analysis. Prior coursework in biology and probability is highly desirable.

Elective Course Seven:

Course Number: GENOME 545 (offered jointly with BIOST 545 and PHG 545)

Course Title: Biostatistical Methods for Big Omics Data

Instructor (s): Not available

Location: Not available

Credits: 3.0

Quarter, Weeks, and Frequency course is offered: Spring, weeks 1-10.

Information on next offering not available.

Schedule for 2026-27: Not available

Synopsis: Practical introduction to statistical methods for high dimensional omics data, using R and Bioconductor to extract, query, integrate, visualize, and analyze real-world biological datasets (RNAseq, single-cell, epigenomics).

Prerequisite: BIOST 512, 514, or 517.

Elective Course Eight:

Course Number: GENOME 554

Course Title: Genomic Informatics

Instructor (s): Not available

Location: Not available

Credits: 1.5

Quarter, Weeks, and Frequency course is offered: Spring. **Information on next offering not available.**

Schedule for 2026-27: Not available

Synopsis: Many complete genome sequences are known. Each of these encodes the instructions for making an entire organism, but how can we hope to decipher the code? Focuses on methods for analyzing genome sequences, ranging from large-scale organizational pattern to gene prediction and detailed local alignment methods.

Elective Course Nine:

Course Number: GENOME 569

Course Title: Bioinformatics Workflows for High-Throughput Sequencing Experiments

Instructor (s): TBD

Location: TBD

Credits: 1.5

Quarter, Weeks, and Frequency course is offered: Spring, weeks 1-5, every year. *Will be offered in Spring 2027.*

Schedule for 2026-27: TBD

Synopsis: Programming skills and software tools for building automated bioinformatics pipelines and computational biology analyses. Emphasis on UNIX tools and R libraries for distilling raw sequencing data into interpretable results. For students familiar with UNIX and with some programming experience in Python, R, or C/C++.

Elective Course Ten:

Course Number: STAT 509 (offered jointly with CSSS 509/ECON 580)

Course Title: Econometrics I: Introduction to Mathematical Statistics

Instructor (s): Thomas Richardson

Location: UW

Credits: 4.0

Quarter, Weeks, and Frequency course is offered: Autumn, weeks 1-10. *Will be offered in Autumn 2026.*

Schedule for 2026-27: Tues, Thurs. 2:30-4:20 p.m.

Synopsis: Examines methods, tools, and theory of mathematical statistics. Covers, probability densities, transformations, moment generating functions, conditional expectation. Bayesian analysis with conjugate priors, hypothesis tests, the Neyman-Pearson Lemma. Likelihood ratio tests, confidence intervals, maximum likelihood estimation, Central limit theorem, Slutsky Theorems, and the delta-method.

Prerequisite: STAT 311; MATH 126 or MATH 136; and MATH 208 or MATH 209.

Instructions: Contact instructor for approval.