Computational Biology

Under the auspices of the Center for Computational Biology, the Computational Biology Graduate Group offers the PhD in Computational Biology as well as the Designated Emphasis in Computational and Genomic Biology, a specialization for doctoral students in associated programs. The PhD is concerned with advancing knowledge at the interface of the computational and biological sciences and is therefore intended for students who are passionate about being high functioning in both fields. The designated emphasis augments disciplinary training with a solid foundation in the different facets of genomic research and provides students with the skills needed to collaborate across disciplinary boundaries to solve a wide range of computational biology and genomic problems.

Admission to the University

Applying for Graduate Admission

Thank you for considering UC Berkeley for graduate study! UC Berkeley offers more than 120 graduate programs representing the breadth and depth of interdisciplinary scholarship. The Graduate Division hosts a complete list (https://grad.berkeley.edu/admissions/choosing-your-program/list/) of graduate academic programs, departments, degrees offered, and application deadlines can be found on the Graduate Division website.

Prospective students must submit an online application to be considered for admission, in addition to any supplemental materials specific to the program for which they are applying. The online application and steps to take to apply can be found on the Graduate Division website (https://grad.berkeley.edu/admissions/steps-to-apply/).

Admission Requirements

The minimum graduate admission requirements are:

1. A bachelor's degree or recognized equivalent from an accredited institution;

2. A satisfactory scholastic average, usually a minimum grade-point average (GPA) of 3.0 (B) on a 4.0 scale; and

3. Enough undergraduate training to do graduate work in your chosen field.

For a list of requirements to complete your graduate application, please see the Graduate Division's Admissions Requirements page (https://grad.berkeley.edu/admissions/steps-to-apply/requirements/). It is also important to check with the program or department of interest, as they may have additional requirements specific to their program of study and degree. Department contact information can be found here (https://guide.berkeley.edu/graduate/degree-programs/).

Where to apply?

Visit the Berkeley Graduate Division application page (http://grad.berkeley.edu/admissions/apply/).

Admission to the Program

Applicants for the Computational Biology PhD are expected to have a strong foundation in relevant stem fields, achieved by coursework in at least two computational biology subfields (including, but not limited to,

advanced topics in biology, computer science, mathematics, statistics). Typical students admitted to the program have demonstrated outstanding potential as a research scientist and have clear academic aptitude in multiple disciplines, as well as excellent communication skills. This is assessed based on research experience, coursework & grades, essays (statement of purpose (https://grad.berkeley.edu/admissions/steps-to-apply/requirements/statement-purpose/) & personal history (https://grad.berkeley.edu/admissions/steps-to-apply/requirements/personal-statement/)), and letters of recommendation. Three letters of recommendation are required, but up to five can be submitted.

The GRE is no longer accepted or used as part of the review (this includes both the general and subject exams). The program does *not* offer a Masters degree in Computational Biology.

Normative Time Requirements

Normative Time to Advancement: Two years

Please refer to the PhD page on the CCB website (https://ccb.berkeley.edu/academics/phd-in-computational-biology/) for the most up-to-date requirements and information.

Year 1
Students perform three laboratory rotations with the chief aim of identifying a research area and thesis laboratory. They also take courses to advance their knowledge in their area of expertise or fill in gaps in foundational knowledge. With guidance from the program, students are expected to complete six total graded courses by the end of the second year (not including the Doc Sem, Seminar Series or Ethics courses). Please see the program's website for more detailed course and curriculum requirements.

Year 2
Students attend seminars, complete course requirements, and prepare a dissertation prospectus in preparation for their PhD oral qualifying examination. With the successful passing of the orals, students select their thesis committee and advance to candidacy for the PhD degree.

Normative Time in Candidacy: Three years

Years 3 to 5
Students undertake research for the PhD dissertation under a three or four-person committee in charge of their research and dissertation. Students conduct original laboratory research and then write the dissertation based on the results of this research. On completion of the research and approval of the dissertation by the committee, the students are awarded the doctorate.

Total Normative Time: 5-5.5 years

Time to Advancement

Curriculum

Courses Required

CMPBIO 293	Doctoral Seminar in Computational Biology	2
CMPBIO 294A	Introduction to Research in Computational Biology (rotation units, Fall semester)	2-12
CMPBIO 294B	Introduction to Research in Computational Biology (rotation units, Spring semester)	2-12
CMPBIO 275	Computational Biology Seminar/Journal Club	1

STAT 201A	Introduction to Probability at an Advanced Level (Stat 200A and 201A are the same content, but offered on different schedules. Students only take one of these.)	4
STAT 201B	Introduction to Statistics at an Advanced Level (Stat 200B and 201B are the same content, but offered on different schedules. Students only take one of these.)	4
COMPSCI 61A	The Structure and Interpretation of Computer Programs (or demonstrate they have completed the equivalent in another course; a syllabus is required for approval. Note: Students will need to complete CS61B and CS70 or the equivalent in order to enroll in upper division CS courses.)	4

CS 61A is a minimum requirement and students who demonstrate they have completed the equivalent in another course (via syllabus), should take an advanced CS course of their choosing in it's place.

Three additional courses, drawn from existing campus offerings. These courses are intended to resolve deficiencies in training and ensure competency in the fundamental knowledge of each discipline. Students are expected to develop a course plan for remaining program requirements (such as biology coursework) and any additional electives, and to consult with the Head Graduate Advisor before the Spring semester of their first year. The course plan will take into account the student's undergraduate training areas and goals for PhD research areas.	12
MCELLBI 293C Responsible Conduct in Research	1

Complete an experimental training component in one of three ways: 1) complete a laboratory course at Berkeley (or equivalent) with a minimum grade of B, 2) complete a rotation in an experimental lab (w/ an experimental project), with a positive evaluation from the PI, 3) demonstrate proof of previous experience, such as: a biological sciences undergraduate major with at least two upper division laboratory-based courses, a semester or equivalent of supervised undergraduate experimental laboratory-based research at a university, or previous paid or volunteer/internship work in an industry-based experimental laboratory. Students will provide a brief summary of this experience to the Head Graduate Advisor for approval before taking the QE.

Lab Rotations

Students conduct three 10-week laboratory rotations in the first year. The thesis lab, where dissertation research will take place, is chosen at the end of the third rotation in late April/early May.

Qualifying Examination

The qualifying examination will evaluate a student's depth of knowledge in his or her research area, breadth of knowledge in fundamentals of computational biology, ability to formulate a research plan, and critical thinking. The QE prospectus will include a description of the specific research problem that will serve as a framework for the QE committee members to probe the student's foundational knowledge in the field and area of research. Proposals will be written in the manner of an NIH-style grant proposal. The prospectus must be completed and submitted to the chair no fewer than four weeks prior to the oral qualifying examination. Students are expected to pass the qualifying examination by the end of the fourth semester in the program.

Time in Candidacy
Advancement

After passing the qualifying exam by the end of the second year, students have until the beginning of the fifth semester to select a thesis committee and submit the Advancement to Candidacy paperwork to the Graduate Division.

Dissertation

Primary dissertation research is conducted in years 3-5/5.5. Requirements for the dissertation are decided in consultation with the thesis advisor and thesis committee members. To this end, students are required to have yearly thesis committee meetings with the committee after advancing to candidacy.

Dissertation Presentation/Finishing Talk

There is no formal defense of the completed dissertation; however, students are expected to publicly present an Exit Talk about their dissertation research in their final year.

Required Professional Development
Presentations

All computational biology students are expected to attend the annual retreat, and will regularly present research talks there. They are also encouraged to attend national and international conferences to present research.

Teaching

Computational biology students are required to teach for one or two semesters (either one semester at 50% (20hrs/wk) or two semesters at 25% (10hrs/wk)) and may teach more. The requirement can be modified if the student has funding that does not allow teaching.

Curriculum/Coursework

Please refer to the DE page on the CCB website (https://ccb.berkeley.edu/academics/designated-emphasis/) for the most up-to-date requirements and information.

The DE curriculum consists of one semester of the Doctoral Seminar in computational biology (CMPBIO 293, offered Fall & Spring) taken before the qualifying exam, plus three courses, one each from the three broad areas listed below, which may be independent from or an integral part of a student's Associated Program. The three courses should be taken in different departments, only one of which may be the student's home program. *These requirements must be fulfilled with coursework taken with a grade of B or better while the student is enrolled as a graduate student at UC Berkeley. S/U graded courses do not count.* See below for recommended coursework.

Students **do not** need to complete all of the course requirements prior to the application or the qualifying exam. The Doctoral Seminar does not need to be taken in order, ie either Fall or Spring are ok, but should be prior to or in the same semester as the Qualifying Exam. The DE will be rescinded if coursework has not been completed upon graduation (students should report their progress each year to the DE advisor, especially if they wish to change one of the courses they listed for the requirement).

1. Computer Science and Engineering: A single course at the level of CS61A or higher will fulfill this requirement. Students can also take CS 88 (as an alternative to CS61A), though depending on their background, Data 8 may be necessary to complete this course. Students with a more advanced background are recommended to take a higher level CS course to fulfill the requirement.
2. Biostatistics, Mathematics and Statistics: A single course at the level of Stat 131A, 133, 134, or 135 or higher will fulfill this requirement. Students with a more advanced background are recommended to take one of either Stat 201A & 201B or a higher level course to fulfill the requirement. Statistics or probability courses from other departments may be able to fulfill this requirement with prior approval of the program.
3. Biology: please select an appropriate biology course from the list linked below (not up-to-date), or choose a course from current course listings.
4. Computational Biology: CMPBIO C293, Doctoral Seminar, offered Fall & Spring.

More information, including a link to pre-approved courses, can be found on the CCB website (http://ccb.berkeley.edu/academics/designated-emphasis/).

Qualifying Examination and Dissertation

The qualifying examination and dissertation committees must include at least one (more is fine) Core faculty members from the Computational Biology Graduate Group. The faculty member(s) may serve any role on the committee from Chair to ASR. The Qualifying Examination must include examination of knowledge within the area of Computational and Genomic Biology. The Comp Bio Doctoral Seminar must be completed before the QE, as it will be important preparation for the exam.

Seminars & Retreat

Students must attend the annual Computational Biology Retreat (https://ccb.berkeley.edu/outreach/annual-retreat/) (generally held in November) as well as regular CCB Seminar Series (https://ccb.berkeley.edu/outreach/seminars-and-symposia/), or equivalent, as designated by the Curriculum Committee. Students are also strongly encouraged to attend or volunteer with program events during Orientation, Recruitment, Symposia, etc. Available travel funds will be dependent upon participation.

CMPBIO 201 Classics in Computational Biology 3 Units

Terms offered: Fall 2015, Fall 2014, Fall 2013
Research project and approaches in computational biology. An introducton to the diverse ways biological problems are investigated computationally through critical evaluation of the classics and recent peer-reviewed literature. This is the core course required of all Computational Biology graduate students.
Rules & Requirements

Prerequisites: Acceptance in the Computational Biology Phd program; consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Computational Biology/Graduate

Grading: Letter grade.

CMPBIO C210 Introduction to Quantitative Methods In Biology 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
This course provides a fast-paced introduction to a variety of quantitative methods used in biology and their mathematical underpinnings. While no topic will be covered in depth, the course will provide an overview of several different topics commonly encountered in modern biological research including differential equations and systems of differential equations, a review of basic concepts in linear algebra, an introduction to probability theory, Markov chains, maximum likelihood and Bayesian estimation, measures of statistical confidence, hypothesis testing and model choice, permutation and simulation, and several topics in statistics and machine learning including regression analyses, clustering, and principal component analyses.

Objectives & Outcomes

Student Learning Outcomes: Ability to calculate means and variances for a sample and relate it to expectations and variances of a random variable.
Ability to calculate probabilities of discrete events using simple counting techniques, addition of probabilities of mutually exclusive events, multiplication of probabilities of independent events, the definition of conditional probability, the law of total probability, and Bayes' formula, and familiarity with the use of such calculations to understand biological relationships.
Ability to carry out various procedures for data visualization in R.
Ability to classify states in discrete time Markov chains, and to calculate transition probabilities and stationary distributions for simple discrete time, finite state-space Markov chains, and an understanding of the modeling of evolutionary processes as Markov chains.
Ability to define likelihood functions for simple examples based on standard random variables.
Ability to implement simple statistical models in R and to use simple permutation procedures to quantify uncertainty.
Ability to implement standard and logistic regression models with multiple covariates in R.
Ability to manipulate matrices using multiplication and addition.
Ability to model simple relationships between biological variables using differential equations.
Ability to work in a Unix environment and manipulating files in Unix.
An understanding of basic probability theory including some of the standard univariate random variables, such as the binomial, geometric, exponential, and normal distribution, and how these variables can be used to model biological systems.
An understanding of powers of matrices and the inverse of a matrix.
An understanding of sampling and sampling variance.
An understanding of the principles used for point estimation, hypothesis testing, and the formation of confidence intervals and credible intervals.
Familiarity with ANOVA and ability to implementation it in R.
Familiarity with PCA, other methods of clustering, and their implementation in R.
Familiarity with basic differential equations and their solutions.
Familiarity with covariance, correlation, ordinary least squares, and interpretations of slopes and intercepts of a regression line.
Familiarity with functional programming in R and/or Python and ability to define new functions.
Familiarity with one or more methods used in machine learning/statistics such as hidden Markov models, CART, neural networks, and/or graphical models.
Familiarity with python allowing students to understand simple python scripts.
Familiarity with random effects models and ability to implement them in R.
Familiarity with the assumptions of regression and methods for investigating the assumptions using R.

CMPBIO C231 Introduction to Computational Molecular and Cell Biology 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023, Fall 2022
This class teaches basic bioinformatics and computational biology, with an emphasis on alignment, phylogeny, and ontologies. Supporting foundational topics are also reviewed with an emphasis on bioinformatics topics, including basic molecular biology, probability theory, and information theory.

Rules & Requirements

Prerequisites: BIO ENG 11 or BIOLOGY 1A (may be taken concurrently); and a programming course (ENGIN 7 or COMPSCI 61A)

Credit Restrictions: Students will receive no credit for BIO ENG C231 after completing BIO ENG 231. A deficient grade in BIO ENG C231 may be removed by taking BIO ENG 231, or BIO ENG 231.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Computational Biology/Graduate

Grading: Letter grade.

Instructor: Holmes

Also listed as: BIO ENG C231

CMPBIO C249 Computational Functional Genomics 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
This course provides a survey of the computational analysis of genomic data, introducing the material through lectures on biological concepts and computational methods, presentations of primary literature, and practical bioinformatics exercises. The emphasis is on measuring the output of the genome and its regulation. Topics include modern computational and statistical methods for analyzing data from genomics experiments: high-throughput RNA sequencing data, single-cell data, and other genome-scale measurements of biological processes. Students will perform original analyses with Python and command-line tools.

Objectives & Outcomes

Course Objectives: This course aims to equip students with practical proficiency in bioinformatics analysis of genomic data, as well as understanding of the biological, statistical, and computational underpinnings of this field.

Student Learning Outcomes: Students completing this course should have stronger programming skills, practical proficiency with essential bioinformatics methods that are applicable to genomics research, understanding of the statistics underlying these methods, and awareness of key aspects of genome function and challenges in the field of genomics.

Rules & Requirements

Prerequisites: Math 54 or EECS 16A/B; CS 61A or another course in python; BioE 11 or Bio 1a; and BioE 131. Introductory statistics or data science is recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computational Biology/Graduate

Grading: Letter grade.

Instructor: Lareau

Also listed as: BIO ENG C249

CMPBIO C256 Human Genome, Environment and Public Health 4 Units

Terms offered: Spring 2025, Fall 2024, Spring 2024, Spring 2023
This introductory course will cover basic principles of human/population genetics and molecular biology relevant to molecular and genetic epidemiology. The latest methods for genome-wide association studies and other approaches to identify genetic variants and environmental risk factors important to disease and health will be presented. The application of biomarkers to define exposures and outcomes will be explored. Recent developments in genomics, epigenomics and other 'omics' will be included. Computer and wet laboratory work will provide hands-on experience.

Rules & Requirements

Prerequisites: Introductory level biology/genetics course, or consent of instructor. Introductory biostatistics and epidemiology courses strongly recommended

Credit Restrictions: Students will receive no credit for PB HLTH C256 after completing CMPBIO 156. A deficient grade in PB HLTH C256 may be removed by taking CMPBIO 156.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Computational Biology/Graduate

Grading: Letter grade.

Instructors: Barcellos, Holland

Also listed as: PB HLTH C256

CMPBIO C256A Human Genome, Environment and Human Health 3 Units

Terms offered: Spring 2017
This introductory course will cover basic principles of human/population genetics and molecular biology
relevant to understanding how data from the human genome are being used to study disease and other
health outcomes. The latest designs and methods for genome-wide association studies and other
approaches to identify genetic variants, environmental risk factors and the combined effects of gene and
environment important to disease and health will be presented. The application of biomarkers to define
exposures and outcomes will be explored. The course will cover recent developments in genomics,
epigenomics and other 'omics', including applications of the latest sequencing technology and
characterization of the human microbiome.

Rules & Requirements

Prerequisites: Introductory level biology course. Completion of introductory biostatistics and epidemiology courses strongly recommended and may be taken concurrently

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computational Biology/Graduate

Grading: Letter grade.

Instructors: Barcellos, Holland

Also listed as: PB HLTH C256A

CMPBIO C256B Genetic Analysis Method 3 Units

Terms offered: Prior to 2007
This introductory course will provide hands-on experience with modern wet laboratory techniques and computer analysis tools for studies in molecular and genetic epidemiology and other areas of genomics in human health. Students will also participate in critical review of journal articles. Students are expected to understand basic principles of human/population genetics and molecular biology, latest designs and methods for genome-wide association studies and other approaches to identify genetic variants, environmental risk factors and the combined effects of gene and environment important to human health. Students will learn how to perform DNA extraction, polymerase chain reaction and methods for genotyping, sequencing, and cytogenetics.

Rules & Requirements

Prerequisites: Introductory level biology course. Completion of introductory biostatistics and epidemiology courses strongly recommended and may be taken concurrently with permission. PH256A is a requirement for PH256B; they can be taken concurrently

Hours & Format

Fall and/or spring: 15 weeks - 2-2 hours of lecture and 1-3 hours of laboratory per week

Additional Details

Subject/Course Level: Computational Biology/Graduate

Grading: Letter grade.

Instructors: Barcellos, Holland

Also listed as: PB HLTH C256B

CMPBIO 275 Computational Biology Seminar/ Journal Club 1 Unit

Terms offered: Fall 2025, Spring 2025, Fall 2024
This seminar course will cover a wide range of topics in the field of computational biology. The main goals of the course are to expose students to cutting edge research in the field and to prepare students for engaging in academic discourse with seminar speakers - who are often leaders in their fields. A selected number of class meetings will be devoted to the review of scientific papers published by upcoming seminar speakers and the other class meetings will be devoted to discussing other related articles in the field. The seminar will expose students to both the breadth and highest standards of current computational biology research.

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Computational Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

CMPBIO 276 Algorithms for Computational Biology 4 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
This course will provide familiarity with algorithms and probabilistic models that arise in various computational biology applications, such as suffix trees, suffix arrays, pattern matching, repeat finding, sequence alignment, phylogenetics, hidden Markov models, gene finding, motif finding, linear/logistic regression, random forests, convolutional neural networks, genome-wide association studies, pathogenicity prediction, and sequence-to-epigenome prediction.

Rules & Requirements

Prerequisites: CompSci 70 AND CompSci 170, MATH 54 OR EECS 16A OR an equivalent linear algebra course

Repeat rules: Course may be repeated for credit with instructor consent.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computational Biology/Graduate

Grading: Letter grade.

Instructors: Song, Ioannidis

CMPBIO 290 Special Topics - Computational Biology 1 - 4 Units

Terms offered: Fall 2022, Fall 2021, Spring 2018
This graduate-level course will cover various special topics in computational biology and the theme will vary from semester to semester. The course will focus on computational methodology, but also cover relevant biological applications. This course will be offered according to student demand and faculty availability.

Rules & Requirements

Prerequisites: Graduate standing in EECS, MCB, Computational Biology or related fields; or consent of the instructor

Repeat rules: Course may be repeated for credit with instructor consent.

Hours & Format

Fall and/or spring: 15 weeks - 1-3 hours of lecture per week

Additional Details

Subject/Course Level: Computational Biology/Graduate

Grading: Letter grade.

CMPBIO 293 Doctoral Seminar in Computational Biology 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
This interactive seminar builds skills, knowledge and community in computational biology for first year PhD and second year Designated Emphasis students. Topics covered include concepts in human genetics/genomics, microbiome data analysis, laboratory methodologies and data sources for computational biology, workshops/instruction on use of various bioinformatics tools, critical review of current research studies and computational methods, preparation for success in the PhD program and career development. Faculty members of the graduate program in computational biology and scientists from other institutions will participate. Topics will vary each semester.

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Computational Biology/Graduate

Grading: Letter grade.

CMPBIO C293 Doctoral Seminar in Computational Biology 2 Units

Terms offered: Spring 2024, Fall 2022, Fall 2021
This interactive seminar builds skills, knowledge and community in computational biology for first year PhD and second year Designated Emphasis students. Topics covered include concepts in human genetics/genomics, microbiome data analysis, laboratory methodologies and data sources for computational biology, workshops/instruction on use of various bioinformatics tools, critical review of current research studies and computational methods, preparation for success in the PhD program and career development. Faculty members of the graduate program in computational biology and scientists from other institutions will participate. Topics will vary each semester.

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Computational Biology/Graduate

Grading: Letter grade.

Instructors: Moorjani, Rokhsar

Also listed as: MCELLBI C296

CMPBIO 294A Introduction to Research in Computational Biology 2 - 12 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
Closely supervised experimental or computational work under the direction of an individual faculty member; an introduction to methods and research approaches in particular areas of computational biology.
Rules & Requirements

Prerequisites: Standing as a Computational Biology graduate student

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2-20 hours of laboratory per week

Additional Details

Subject/Course Level: Computational Biology/Graduate

Grading: Letter grade.

CMPBIO 294B Introduction to Research in Computational Biology 2 - 12 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
Closely supervised experimental or computational work under the direction of an individual faculty member; an introduction to methods and research approaches in particular areas of computational biology.
Rules & Requirements

Prerequisites: Standing as a Computational Biology graduate student

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2-20 hours of laboratory per week

Additional Details

Subject/Course Level: Computational Biology/Graduate

Grading: Letter grade.

CMPBIO 295 Individual Research for Doctoral Students 1 - 12 Units

Terms offered: Summer 2025 10 Week Session, Summer 2024 10 Week Session, Summer 2023 10 Week Session
Laboratory research, conferences. Individual research under the supervision of a faculty member.
Rules & Requirements

Prerequisites: Acceptance in the Computational Biology PhD program; consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-20 hours of laboratory per week

Summer: 10 weeks - 1.5-30 hours of laboratory per week

Additional Details

Subject/Course Level: Computational Biology/Graduate

Grading: Letter grade.

CMPBIO 477 Introduction to Programming for Bioinformatics Bootcamp 1.5 Unit

Terms offered: Prior to 2007
The goals of this course are to introduce students to Python, a simple and powerful programming language that is used for many applications, and to expose them to the practical bioinformatic utility of Python and programming in general. The course will allow students to apply programming to the problems that they face in the lab and to leave this course with a sufficiently generalized knowledge of programming (and the confidence to read the manuals) that they will be able to apply their skills to whatever projects they happen to be working on.
Rules & Requirements

Prerequisites: This is a graduate course and upper level undergraduate students can only enroll with the consent of the instructor

Hours & Format

Summer: 3 weeks - 40-40 hours of workshop per week

Additional Details

Subject/Course Level: Computational Biology/Other professional

Grading: Offered for satisfactory/unsatisfactory grade only.