Computational Precision Health (CPH)

Courses

CPH C100 Foundations for Computational Precision Health 3 Units

Terms offered: Fall 2025
Students will build expertise in developing machine-learning tools to address challenges in health care. The course emphasizes both "how to formulate useful computational health problems", and "how to develop computational solutions". On the health side, we'll get clinical guest lectures exploring challenges across diverse areas of healthcare (e.g., cardiology, cancer, primary care). On the computational side, the course will cover machine learning and deep learning foundations, state-of-the-art neural networks, and then advanced research topics. The course will emphasize rigorous evaluation, algorithmic bias, deployment, and auditing. The class will culminate in an open-ended final project, integrating skills learned in the course.

Objectives & Outcomes

Course Objectives: Articulate the key challenges in diverse areas of healthcare, including cancer, cardiology, and emergency care.
Develop machine learning methods to leverage, text, images, volumes and time-series data
Formulate precise computational research questions to improve healthcare.
Understand and perform clinically-informed evaluation analyses of predictive ML tools
Understand the role of the various information modalities (e.g., radiology, pathology, labs) in health care. This means understanding why the various modalities are acquired, what they physically capture, and what decisions they enable.

Rules & Requirements

Prerequisites: Data C100 and Data C140

Hours & Format

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

Additional Details

Subject/Course Level: Computational Precision Health/Undergraduate

Grading/Final exam status: Letter grade. Alternate method of final assessment during regularly scheduled final exam group (e.g., presentation, final project, etc.).

Instructors: Yala, Chen

Also listed as: DATA C146

CPH 215 Lab Rotation 1 - 8 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
For first-year CPH graduate students, this course will provide an introduction to experimental methods and research approaches in the different areas of Computational Precision Health. Ten week laboratory rotations spread out over the fall and spring semesters (summer will be on a needed basis). Research is conducted under the direction of an individual faculty member.

Objectives & Outcomes

Course Objectives: Student will be able to identify an appropriate lab setting for conducting their dissertation research.
Students will be able to apply one or more computational or analytic methods to specified problems.

Students will be able to identify and define a real-world problem in computational terms.

Students will review, evaluate, and select appropriate computational or analytic methods for specified problems.

Rules & Requirements

Prerequisites: Instructor permission required

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

Hours & Format

Fall and/or spring: 10 weeks - 5-26 hours of laboratory per week

Summer: 10 weeks - 2-21 hours of laboratory per week

Additional Details

Subject/Course Level: Computational Precision Health/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

CPH 270 Computational Precision Health Seminar 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Computational precision health is a rapidly evolving field at the intersection of the computational (to include computer science, data science, and statistics) and the health sciences (clinical medicine, population health, clinical research). The seminar series will consist of a combination of journal club-style discussion of recent literature in Computational Precision Health, guest faculty speakers drawn from across the program's faculty and beyond, presentations by second-year students on work completed during lab rotations, and presentations by third-year students on "work in progress" on active dissertation research. Each cohort of PhD and DE students will have their own breakout sections to build community within that year.

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction. Students may enroll in multiple sections of this course within the same semester.

Hours & Format

Fall and/or spring: 10 weeks - 1 hour of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computational Precision Health/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

CPH 290 Special Topics in Computational Precision Health 2 Units

Terms offered: Fall 2024
Computational precision health (CPH) is a rapidly evolving field at the intersection of the computational (to include computer science, data science, and statistics) and the health sciences (clinical medicine, population health, clinical research). The advent of generative AI models has significantly boosted the rapid progress of CPH research, with new major contributions occurring within very short spans of time. Because this field is rapidly evolving, some of the most exciting recent advancements could not be covered in traditional foundational courses and warrant a dedicated thematic lecture series. This course will involve a set of invited lectures by world-leading experts who made fundamental contributions in the fields of computation

Objectives & Outcomes

Course Objectives: Familiarize students with the leading researchers in CPH; 3) complement student education in basic sciences with domain-specific research advances in areas relevant to CPH.
Educate students on the most recent advances in the field of computational precision health.

Hours & Format

Fall and/or spring: 10 weeks - 2 hours of lecture per week

Additional Details

Subject/Course Level: Computational Precision Health/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

CPH 299 Individual Research 1 - 12 Units

Terms offered: Fall 2025, Summer 2025 8 Week Session, Spring 2025
Individual research under the supervision of a faculty member

Rules & Requirements

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

Hours & Format

Fall and/or spring: 15 weeks - 0-0 hours of independent study per week

Additional Details

Subject/Course Level: Computational Precision Health/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.