

Genomics and the Other Omics: The Comprehensive Essentials (XGEN102)

Course Syllabus

Course Description

Genetics and genomics are undergoing an unparalleled revolution. A better understanding of biology and human health can create breakthroughs in disease treatment and introduces the prospect of personalized medicine. This course will begin with an introduction and review of the general principals of genomics and molecular biology. You will then explore in detail the key genomic technologies and computational approaches that are driving advances in prognostics, diagnostics, and treatment. Learn how scientists sequence, assemble, and analyze the function and structure of genomes. Explore methods for determining the heritability of traits & diseases by studying the larger population, and learn how gene identification can help identify targets for therapeutic intervention. Explore how you could use personal genomics to manage your health.

This course is the required second course in the Stanford Genetics and Genomics Certificate.

Course Topics

Module 1: Class Introduction

Michael Snyder

Module 2: Review of Genes and Genomes

Michael Snyder

Module Exercise-

- Activity: Finding Cinderella

Module 3: Population Genetics

Julie Granka

Module 4: Genome-wide Association Studies

Jonathan Pritchard

Module 5: Sequencing Technologies and Applications

Gavin Sherlock

Module 6: Encode

Michael Snyder

Module Exercise-

- Reading

Module 7: Epigenomics

Anne Brunet

Module Exercises-

- Reading

Module 8: Impact of Genomics on Medicine

Michael Snyder

Module 9: Personal Genomics

Michael Snyder

Module Exercises-

- Activity: Blushing from Alcohol

Module 10: Other Omics

Michael Snyder

Module 11: Big Data

Hinco Gierman

Module Exercise-

- Reading

Module 12: Microbiome

Michael Snyder

Module Exercise-

- Reading

Module 13: Non-Medical Uses for Sequencing

Barry Starr

Module 14: Genomics in Practice

Anne Brunet, Gavin Sherlock, Jonathan Pritchard

Instructors

Michael Snyder

Academic Director, Stanford Genetics and Genomics Certificate

Professor and Chair in Genetics, Stanford University

Julie Granka

Population Geneticist, Ancestry.com

Jonathan Pritchard

Professor of Genetics and of Biology, Stanford University

Gavin Sherlock

Associate Professor of Genetics, Stanford University

Anne Brunet

Associate Professor of Genetics, Stanford University

Hinco Gierman

Geneticist, Illumina

Barry Starr

Program Director, Stanford Genetics and Genomics Certificate

Director, Outreach Activities, Stanford University

Course Requirements

Please watch all course videos and complete all course assignments. Successful completion of the assignments, final examination and course evaluation are required to complete this course. The link to the “Final Steps” section of the learning platform will unlock after you have completed all of the other course activities.

The exam consists of multiple choice questions and is done online. You may attempt the final examination multiple times. A score of 90% is required to successfully pass the exam. Once you have passed the examination and completed the evaluation, a digital record of completion will be emailed to you.

Exercises

Each exercise will be submitted via the course assignment submission area within the course learning platform. To successfully complete each exercise, you will need to follow all instructions. You will be receiving instructor feedback on some of your submitted assignments. Feedback on those exercises will be given within the learning platform within 3-5 business days. Please continue to progress through the course while awaiting instructor feedback

Your responses to the exercises will be kept within the learning platform. However, you will not have access to the responses you submitted after 90-day course access has expired. If you would like to keep a copy for your records, please do so separately.

Please note that some assignments may contain Macromedia Flash movies or Java applets. Notes about these requirements will be included in the assignment instructions.

Course Materials

All course materials are provided within the course learning platform. These include the course videos, course handouts and all assignment instructions.

The course learning platform is available to you for 90-days after date of enrollment via your my**stanford** connection account. For more information regarding how to use the course learning platform, please visit

<http://player.vimeo.com/external/99190590.hd.mp4?s=02b5cdd84bc1d9e48f2320ce1d15b25b>

Questions

Please contact SCPD Student Services at stanford-genetics@stanford.edu or 650-263-4700. Available 8:30am- 4:30pm Pacific Time, Monday- Friday.