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
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Anne Brunet
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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 your for 90-days after date of enrollment via your mystanford 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.