

## Fundamentals of Genetics: The Genetics You Need to Know (XGEN101)

### Course Syllabus

#### Course Description

The field of genetics is rich with discovery. Mapping the human genome, conducting genetic testing, and identifying new vaccines are just a few of the many ways genetics can have a powerful impact on our world. This course provides a stair-step introduction of genetics from the basic concepts to exploring more complex topics, including molecular biology, gene mapping and screening, and reverse and forward genetic research. You will explore both what is known about genes as well as how we use genetics research to better understand basic biology. This course will create the solid foundation needed to be successful in the subsequent courses within the program.

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

#### Course Topics

##### Module 1: Class Introduction

*Mike Snyder*

##### Module 2: Mendelian Genetics

*Will Greenleaf, Barry Starr*

Module Exercises-

- Activity: Punnett Square Game
- Activity: Drosophila Lab

##### Module 3: Genetics at the Molecular Level

*Will Greenleaf, Barry Starr, Ruth Tennen*

Module Exercises-

- Reading

##### Module 4: Mutations and Mechanisms of Nuclear and Extranuclear Inheritance

*Will Greenleaf, Barry Starr*

Module Exercises-

- Activity: Biocomputation Activity

##### Module 5: Population Genetics

*Kasia Bryc*

##### Module 6: Concepts of Reverse Genetics

*Monte Winslow, Barry Starr, Ruth Tennen*

*-Interview with Jennifer Doudna*

Module Exercises-

- Reading

##### Module 7: Applications in Genetic Analysis

*Monte Winslow*

Module Exercises-

- Readings

### **Instructors**

Michael Snyder

*Academic Director, Stanford Genetics and Genomics Certificate  
Professor and Chair in Genetics, Stanford University*

Will Greenleaf

*Assistant Professor of Genetics, Stanford University*

Barry Starr

*Program Director, Stanford Genetics and Genomics Certificate  
Director, Outreach Activities, Stanford University*

Ruth Tennen

*Lecturer, Stanford University*

Kasia Bryc

*Population Geneticist, 23andMe*

Monte Winslow

*Assistant Professor of Genetics and of Pathology, 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 and may not be able to be completed on all mobile platforms. Notes about these requirements will be included in the assignment instructions and noted where applicable.

### **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](mailto:stanford-genetics@stanford.edu) or 650-263-4700. Available 8:30am- 4:30pm Pacific Time, Monday- Friday.

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