

Ph.D. Program in Genetics

Program Requirements

Required Courses		Credits
GE 501, 511, 521, 531	Experimental Methods Pre-entry, I, II, III (3 research rotations are usually required)	3 each
GE 612	Genetics of Model Organisms	3
GE 636	Regulation of Cell Cycle and Apoptosis	3
GE 637	Advanced Human Genetics	3
GE 651	Pathobiology of Cancer	3
GE 652	Molecular Basis of Cancer	2
GE 710, 720, 730	Seminar	1 each
GE 910, 920, 930	Research	Variable
BI 525	Biochemistry and Molecular Biology – Genetic Information Transfer	3
GC 550	Foundations in Biomedical Sciences	10
GC 633	Topics in Bioinformatics	3
GC 640	Research Ethics: The Responsible Conduct of Research	1
GC 660	Statistical Methods	3

Recommended Elective Courses

GC 730	Planning & Writing Research Grants	1
IMP 505 A and B	Fundamentals of Immunology, Parts 1 and 2	2 each
IMP 600	Microbiology	2
PR 680	Molecular Pharmacology	3

Course Descriptions / Required Courses

GE 501, 511, 521, 531 **Experimental Methods Pre-entry, I, II, III (Syracusa)**

Credits 3

Each semester/session; must complete 3 rotations

Supervised rotations in faculty research laboratories. This course provides formal training in laboratory methods and experimental design obtained by rotations through the laboratories of different preceptors working on diverse problems in genetics. Emphasis is placed on the principles of scientific methodology and experimental design, recording and interpretation of data, and technical reporting of data.

GE 710, 720, 730 **Seminars in Genetics I, II, III (Faculty)**

Credits 1

Fall, Spring I, Spring II

Students and faculty report on recent developments in areas of research interest on departmental research projects. Visiting scientists are also invited to pre-sent seminars. Required for all graduate students in Genetics.

GE 910, 920, 930 **Research (Syracusa)**

Credits variable

Fall, Spring, Summer

Under the supervision of a member of the graduate faculty and guidance of a thesis research committee, the student will learn research design, methodology, and experimental techniques relevant to the graduate program. Research leading to the doctoral thesis is a major requirement for the Ph.D. degree and will occupy a dominant part of the student's time and attention.

BI 525 **Biochemistry and Molecular Biology - Genetic Information Transfer (Hou)**

Credits 3

Prerequisite: GC 550 or equivalent

Spring I

This course focuses on current advances of molecular biology research for the understanding of genetic information transfer from DNA to RNA to protein. Topics include DNA replication, repair, and recombination, RNA transcription, processing, and regulation, protein synthesis, ribosome, and quality control. The course will contain formal lectures, as well as student presentations, and two examinations.

GC 550 **Foundations of Biomedical Sciences (Ellingson)**

Credits 10

Fall

This course is designed to provide a basic knowledge of biochemistry, genetics, molecular biology and cellular biology to the beginning student. The primary goal is to convey knowledge of the molecular and cellular mechanisms controlling cell, tissue and organ system function using material drawn from biochemistry, cell biology, genetics, pharmacology and physiology. The course will familiarize the student with the powerful technologies used in scientific research and will train the student in the communication of science through informal sessions on evaluation of published literature, scientific writing, oral presentations, and information retrieval.

GC 640 **Research Ethics: The Responsible Conduct of Research (Flynn)**

Credits 1

Fall, Spring I, Spring II

This graduate seminar course is designed to familiarize students with the ethical dilemmas inherent to the conduct of research. Topics to be discussed include codes of ethical behavior, research design, conflicts of interest, informed consent and the appropriate use of animals. The student will be required to prepare a paper on the analysis of one or more case studies.

GC 660 **Statistical Methods of Data Analysis** (Diamond, Winter, Crawford)

Credits 3

Fall, Spring I, Spring II

Students learn to apply the principles and techniques of basic statistical analysis, including descriptive and inferential statistics. Applications using the normal, t and chi-square distributions are emphasized. The SAS software package for analysis is included.

(Please refer to specific programs for additional course descriptions.)

Course Check List

First Year

Course Name	Fall (credits)	Spring (credits)		Summer (credits)
		Spring 1 (credits)	Spring II (credits)	
Research Rotation	GE 511 (3)	GE 521 (3)	GE 531 (3)	
Foundations in Biomedical Science	GC 550 (10)			
Biochemistry – Genetic Information Transfer		BI 525 (3)		
Genetics		GE 612 (3)	GE 637 (3)	
Research Ethics (or Fall of 2 nd year)	GC 640 (1)			
Seminar	GE 710 (1)	GE 720 (1)	GE 730 (1)	
Research	GE 910 (5 or 6)	GE 920 (13)		GE 930 (10)
Credits Required for Full-time Enrollment	20	30		10

Second Year

Course Name	Fall (credits)	Spring (credits)		Summer (credits)
		Spring 1 (credits)	Spring II (credits)	
Genetics	GE 636 (3)	GE 652 (2)	GE 651 (3)	
Statistics	GC 660 (2)			
Research Ethics (If not completed 1 st year)	GC 640 (1)			
Bioinformatics			GC 633 (3)	
Elective or “Fundamentals”**	2-3 credits	3 credits	3 credits	
Seminar	GE 710 (1)	GE 720 (1)	GE 730 (1)	
Research	GE 910 (variable)	GE 920 (variable)		GE 930 (10)
Credits Required for Full-time Enrollment	20	30		10

**Fundamentals” courses are: GE 637 (Spring II), IMP 505 (Spring I), IMP 600 (Spring I) and PR 680 (Spring II)