

# HUMAN GENETICS, DOCTOR OF PHILOSOPHY (PH.D.)/GENETIC COUNSELING, MASTER OF SCIENCE (M.S.) [DUAL DEGREE]

Advanced study in human genetics and genetic counseling is available through a dual degree program sponsored by the Department of Human and Molecular Genetics in the School of Medicine.

The dual degree Ph.D. in Human Genetics and M.S. in Genetic Counseling program allows students to earn two degrees with a minimum of 122 credits (or 123 with a concentration) rather than the 146 credits necessary if the two were pursued separately. This efficiency lowers the overall cost of tuition while also reducing time to earning both degrees.

## Program goals

The objectives of this dual degree program are to:

- **Provide training in human genetics and competency in genetic counseling**  
The program is designed to provide students with the skills required to advance to positions as researchers and trainers in a broad spectrum of positions in human genetics and genetic counseling. The structure of the program provides a framework for the progressive development of a mastery of the current state of the subject matter in human genetics and an ability to synthesize this information and apply this foundation to the identification of key areas of investigation and experimentation in this discipline. The program relates the above framework to the development of the ability to design, implement and interpret experimental approaches that address the questions identified. In addition, the program will develop skills in the various means of communicating both the core of human genetics knowledge and the expression of experimental design, results and interpretation to a variety of potential audiences.
- **Eligibility for certification by the American Board of Genetic Counseling**  
To prepare individuals for careers in genetic counseling and human genetics, successful candidates will demonstrate competency in all four genetic counseling domains: I – genetics expertise and analysis; II – interpersonal, psychosocial and counseling skills; III – education; and IV – professional development and practice.

The Department of Human and Molecular Genetics offers training that combines preparation for a career as a genetic counselor with research-based doctoral training in a coordinated program that integrates the complementary aspects of these two degree categories. In order to be admitted to this dual degree program, an applicant must be accepted into both programs individually, as well as the inter-program agreement to allow the student to pursue the dual degree.

Among the many benefits offered by participation in the dual degree program are the following:

- Students holding these degrees may be more competitive in genetic counseling careers in academic institutions, notably in terms of professorial advancement or tenure eligibility.
- Students with a dual degree may be more highly sought after in leadership positions in academic training programs.

- Students may be more competitive in roles traditionally requiring doctoral-level qualifications that would benefit from clinical genetic counseling perspectives (e.g., diagnostic laboratory director).
- Students will be prepared for clinician-scientist positions and for advancing the genetic counseling field through research, including being competitive for research funding.

The diplomas for this dual degree program are awarded simultaneously, although all requirements for the Ph.D. are first completed prior to beginning clinic rotations for the M.S. in Genetic Counseling degree (typically the final year of the program).

## Student learning outcomes

See each degree program page for student learning outcomes.

## Other information

### Advising

The graduate program directors from each separate program and the director of the dual degree program help to develop a plan of study for the student. By the end of their first year, the student will have identified a research adviser to guide them through their dissertation project. By their second year, the student will have formed their graduate committee, which meets annually to monitor progress in their dissertation research. The director of the dual degree program meets with the student on a regular basis to ensure appropriate academic progress and designated entry into master's studies pending doctoral research progress. After the student completes Ph.D. dissertation work and enters into dedicated genetic counseling studies, the director of the dual degree program will serve as the student's primary adviser.

### Admission requirements

See the individual program pages for admission deadlines and other requirements.

Applicants must meet all **general admission requirements of the VCU Graduate School**.

In order to be considered for this dual degree program, an applicant must apply to and be accepted into both the M.S. and Ph.D. programs and meet each program's admissions requirements.

- Applicants to the dual degree program must complete individual applications for each program (Ph.D. in Human Genetics and M.S. in Genetic Counseling):
  - Applications for the Ph.D. program must be submitted to the Biomedical Sciences Doctoral Portal – School of Medicine – Ph.D. selected from the drop-down menu of programs on the VCU online application form. The dual degree box on the application must also be checked.
  - Applications for the M.S. in Genetic Counseling are submitted through the VCU Office of Admissions (graduate programs). To apply for the master's program, in the "Intended Program of Study" screen, select the appropriate term of entry, then "Masters" as your intended level of study, and then "Genetic Counseling-MS" as your planned course of study. The dual degree box on the application must also be checked.
- Non-native English speakers must pass a test of English literacy, consistent with general VCU graduate admissions requirements ([https://www.vcu.edu/admissions/apply/international/graduate-applicants/#accordion\\_193128](https://www.vcu.edu/admissions/apply/international/graduate-applicants/#accordion_193128)).

- It is recommended that all prerequisite courses have been completed within 10 years of application.

## Degree requirements

As standalone programs, the M.S. in Genetic Counseling requires 60 credits, and the Ph.D. in Human Genetics requires a minimum of 86 to complete; thus a minimum of 146 total graduate credit hours would be required. Students in this dual degree program must complete a minimum of 117 graduate credit hours (or 119 with the quantitative human genetics concentration) to earn both degrees. The 25-27 shared credits are listed below.

### Shared credits

Course	Title	Hours
<b>Credits required in both programs</b>		
HGEN 501	Introduction to Human Genetics	3
HGEN 690	Genetics Research Seminar (required in both programs; one credit from the Ph.D. satisfies one credit toward the requirement in the M.S. program) <sup>1</sup>	1
HGEN 697	Directed Research in Genetics (required in both programs; eight credits in Ph.D. will satisfy M.S. requirements)	1-15
OVPR 601 or OVPR 602 or OVPR 603	Scientific Integrity Responsible Scientific Conduct Responsible Conduct of Research	1
<b>Ph.D. requirements counted toward the M.S.</b>		
HGEN 502	Advanced Human Genetics (satisfies HGEN 609 in M.S.)	3
HGEN 611	Data Science I (satisfies two credits toward M.S. electives)	3
IBMS 621	Laboratory Rotation I (satisfies M.S. requirement HGEN 601)	2
<b>M.S. requirements counted toward the Ph.D.</b>		
ANAT 612	Human Embryology (satisfies two credits toward Ph.D. electives only in no concentration option; not shared in concentration option)	2
HGEN 527	Medical Genetics (satisfies three credits toward Ph.D. electives in no concentration and concentration option)	3
HGEN 600	Clinical Genetics (satisfies one credit for Ph.D. requirement HGEN 606)	3
HGEN 618	Evidence Based Genetic Counseling (satisfies one credit for Ph.D. requirement HGEN 690)	1
<b>Total Hours</b>		<b>25-27</b>

1

HGEN 690 should be taken every semester until the student successfully defends the PhD dissertation; then it should be taken every spring semester.

## Curriculum requirements for the dual degree with no concentration

Course	Title	Hours
<b>Ph.D. requirements</b>		
• Core courses		
HGEN 501	Introduction to Human Genetics (shared course; required in both programs)	3
HGEN 502	Advanced Human Genetics (satisfies M.S. requirement HGEN 609)	3
HGEN 510	Journal Club I	1
HGEN 606	Introduction to Clinical Genetics (satisfied by one credit of M.S. requirement HGEN 600)	1
HGEN 610	Current Literature in Human Genetics (taken every spring and fall semester during PhD training, starting spring semester of the first year)	1
HGEN 611	Data Science I (satisfies two credits toward M.S. electives)	3
HGEN 690	Genetics Research Seminar (shared course; two credits satisfy M.S. requirement)	1
IBMS 600	Laboratory Safety	1
IBMS 621	Laboratory Rotation I (satisfies M.S. requirement HGEN 601)	2
IBMS 622	Laboratory Rotation II	2
IBMS 623	Laboratory Rotation III	2
• Additional courses		
BIOS 543 or HGEN 651	Graduate Research Methods I Statistics for Genetic Studies I	3
HGEN 614	Pathogenesis of Human Genetic Disease	3
OVPR 601 or OVPR 602 or OVPR 603	Scientific Integrity (shared course; required in both programs) Responsible Scientific Conduct Responsible Conduct of Research	1
<b>Electives</b>		<b>5</b>
Five credits satisfied by M.S. requirements ANAT 612 and HGEN 527		
HGEN 697	Directed Research in Genetics (eight credits satisfy M.S. requirements)	1-15
<b>M.S. in Genetic Counseling requirements</b>		
• Core courses		
ANAT 612	Human Embryology (satisfies two credits toward Ph.D. electives)	2
HGEN 501	Introduction to Human Genetics (shared course; required in both programs)	3
HGEN 525	Practice of Genetic Counseling	3
HGEN 526	Practice of Genetic Counseling	3
HGEN 527	Medical Genetics (satisfies Ph.D. elective requirement)	3
HGEN 528	Medical Genetics	3

HGEN 600	Clinical Genetics (repeated four times; one credit satisfies Ph.D. requirement HGEN 606)	3
HGEN 601	Research in Genetic Counseling (satisfied by Ph.D. requirement IBMS 621)	2
HGEN 607	Processes in Genetic Counseling I	1
HGEN 608	Processes in Genetic Counseling II	1
HGEN 609	Clinical Genomics (satisfied by Ph.D. requirement HGEN 502)	3
HGEN 615	Techniques in Genetic Counseling	3
HGEN 616	Cultural Diversity in Genetic Counseling	1
HGEN 618	Evidence Based Genetic Counseling (satisfies one credit of Ph.D. HGEN 690 requirement)	1
HGEN 622	Cancer Genetic Counseling	3
HGEN 690	Genetics Research Seminar (shared course; one credit satisfies Ph.D. requirement)	1
HGEN 697	Directed Research in Genetics (satisfied by Ph.D. requirements)	1-15
PATH 691	Special Topics in Modern Instrumental Methods	2
• Additional courses		
OVPR 601	Scientific Integrity (shared course; required in both programs)	1
or OVPR 602	Responsible Scientific Conduct	
or OVPR 603	Responsible Conduct of Research	
• Electives		
Satisfied by Ph.D. requirements two credits of HGEN 611		

**Total Hours 117**

**Curriculum requirements for the quantitative human genetics concentration**

Course	Title	Hours
<b>Ph.D. requirements</b>		
• Core courses		
HGEN 501	Introduction to Human Genetics (shared course; required in both programs)	3
HGEN 502	Advanced Human Genetics (satisfies M.S. requirement HGEN 609)	3
HGEN 510	Journal Club I	1
HGEN 606	Introduction to Clinical Genetics (satisfied by one credit of M.S. requirement HGEN 600)	1
HGEN 610	Current Literature in Human Genetics (taken every spring and fall semester during Ph.D. training, starting spring semester of the first year)	1
HGEN 611	Data Science I (satisfies two credits toward M.S. electives)	3
HGEN 690	Genetics Research Seminar (satisfied by Ph.D. requirement)	1
IBMS 600	Laboratory Safety	1

IBMS 621	Laboratory Rotation I (satisfies M.S. requirement HGEN 601)	2
IBMS 622	Laboratory Rotation II	2
IBMS 623	Laboratory Rotation III	2
• Concentration courses		
ANAT 620	Scientific Writing and Grantsmanship	2
HGEN 603	Mathematical and Statistical Genetics	3
HGEN 619	Quantitative Genetics	3
or HGEN 612	Data Science II	
HGEN 652	Statistics for Genetic Studies II	3
• Additional courses		
HGEN 651	Statistics for Genetic Studies I	3
OVPR 601	Scientific Integrity (shared course; required in both programs)	1
or OVPR 602	Responsible Scientific Conduct	
or OVPR 603	Responsible Conduct of Research	
Electives		
Satisfied by M.S. requirement HGEN 527		
HGEN 697	Directed Research in Genetics (eight credits satisfy M.S. requirements)	1-15

**M.S. in Genetic Counseling requirements**

• Core courses		
ANAT 612	Human Embryology	2
HGEN 501	Introduction to Human Genetics (shared course; required in both programs)	3
HGEN 525	Practice of Genetic Counseling	3
HGEN 526	Practice of Genetic Counseling	3
HGEN 527	Medical Genetics (satisfies Ph.D. elective requirements)	3
HGEN 528	Medical Genetics	3
HGEN 600	Clinical Genetics (repeated four times; one credit satisfies Ph.D. requirement HGEN 606)	3
HGEN 601	Research in Genetic Counseling (satisfied by Ph.D. requirement IBMS 621)	2
HGEN 607	Processes in Genetic Counseling I	1
HGEN 608	Processes in Genetic Counseling II	1
HGEN 609	Clinical Genomics (satisfied by Ph.D. requirement HGEN 502)	3
HGEN 615	Techniques in Genetic Counseling	3
HGEN 616	Cultural Diversity in Genetic Counseling	1
HGEN 618	Evidence Based Genetic Counseling	1
HGEN 622	Cancer Genetic Counseling	3
HGEN 690	Genetics Research Seminar (satisfied by Ph.D. requirement)	1
HGEN 697	Directed Research in Genetics (satisfied by Ph.D. requirement)	1-15
PATH 691	Special Topics in Modern Instrumental Methods	2
• Additional courses		
OVPR 601	Scientific Integrity (shared course; required in both programs)	1

or OVPR 602	Responsible Scientific Conduct	
or OVPR 603	Responsible Conduct of Research	
• Electives		2
Satisfied by Ph.D. requirement HGEN 611		
<b>Total Hours</b>		<b>119</b>

The minimum number of graduate credit hours for this degree is 117.

## Suggested five-year plans of study for dual degree

### Suggested five-year plan of study for dual degree with no concentration

Course	Title	Hours
<b>Year one</b>		
Fall semester		
BIOS 543	Graduate Research Methods I	3
or HGEN 651	Statistics for Genetic Studies I	
HGEN 501	Introduction to Human Genetics (shared course; required in both programs)	3
HGEN 510	Journal Club I	1
HGEN 611	Data Science I (satisfies M.S. electives)	3
HGEN 690	Genetics Research Seminar (required in both programs)	1
IBMS 600	Laboratory Safety	1
IBMS 621	Laboratory Rotation I (satisfies M.S. requirement HGEN 601)	2
IBMS 622	Laboratory Rotation II	2
Term Hours:		16
Spring semester		
HGEN 502	Advanced Human Genetics (satisfies M.S. requirement HGEN 609)	3
HGEN 610	Current Literature in Human Genetics	1
HGEN 690	Genetics Research Seminar (required in both programs)	1
HGEN 697	Directed Research in Genetics	2
IBMS 623	Laboratory Rotation III	2
Term Hours:		9
Summer semester		
HGEN 697	Directed Research in Genetics	3
Term Hours:		3
<b>Year two</b>		
Fall semester		
HGEN 610	Current Literature in Human Genetics	1
HGEN 614	Pathogenesis of Human Genetic Disease	3
HGEN 690	Genetics Research Seminar (required in both programs)	1
HGEN 697	Directed Research in Genetics	3
OVPR 601	Scientific Integrity (shared course; required in both programs)	1
or OVPR 602	Responsible Scientific Conduct	
or OVPR 603	Responsible Conduct of Research	

Term Hours:		9
Spring semester		
HGEN 610	Current Literature in Human Genetics	1
HGEN 690	Genetics Research Seminar (required in both programs)	1
HGEN 697	Directed Research in Genetics (required in both programs)	8
Term hours:		10
Summer semester		
HGEN 697	Directed Research in Genetics	3
Term Hours:		3
<b>Year three</b>		
Fall semester		
HGEN 610	Current Literature in Human Genetics	1
HGEN 690	Genetics Research Seminar (required in both programs)	1
HGEN 697	Directed Research in Genetics	7
Term Hours:		9
Spring semester		
ANAT 612	Human Embryology (satisfies Ph.D. electives)	2
HGEN 610	Current Literature in Human Genetics	1
HGEN 690	Genetics Research Seminar (required in both programs)	1
HGEN 697	Directed Research in Genetics	6
Term Hours:		10
Summer semester		
HGEN 697	Directed Research in Genetics	3
Term Hours:		3
<b>Year four</b>		
Fall semester		
HGEN 525	Practice of Genetic Counseling	3
HGEN 610	Current Literature in Human Genetics	1
HGEN 615	Techniques in Genetic Counseling	3
HGEN 697	Directed Research in Genetics	3
PATH 691	Special Topics in Modern Instrumental Methods	2
Term Hours:		12
Spring semester		
HGEN 526	Practice of Genetic Counseling	3
HGEN 610	Current Literature in Human Genetics	1
HGEN 622	Cancer Genetic Counseling	3
HGEN 697	Directed Research in Genetics	3
Term Hours:		10
Summer semester		
HGEN 600	Clinical Genetics (satisfies Ph.D. requirement HGEN 606)	3
Term Hours:		3
Prior to the final year, the student must defend their dissertation and will take the M.S. first-year comprehensive exam. Then they will undergo a year of clinical training (clinic rotations and some additional M.S.-specific classes), followed by the final M.S. comprehensive exam.		
<b>Year five</b>		

Fall semester		
HGEN 527	Medical Genetics (satisfies Ph.D. electives)	3
HGEN 600	Clinical Genetics	3
HGEN 607	Processes in Genetic Counseling I	1
HGEN 616	Cultural Diversity in Genetic Counseling	1
HGEN 618	Evidence Based Genetic Counseling	1
Term Hours:		9
Spring semester		
HGEN 528	Medical Genetics	3
HGEN 600	Clinical Genetics (two sections of HGEN 600)	6
HGEN 608	Processes in Genetic Counseling II	1
HGEN 690	Genetics Research Seminar	1
Term Hours		11

**Suggested five-year plan of study for dual degree with quantitative human genetics concentration**

Course	Title	Hours
<b>Year one</b>		
Fall semester		
HGEN 501	Introduction to Human Genetics (shared course; required in both programs)	3
HGEN 510	Journal Club I	1
HGEN 611	Data Science I (satisfies M.S. electives)	3
HGEN 651	Statistics for Genetic Studies I	3
HGEN 690	Genetics Research Seminar (required in both programs)	1
IBMS 600	Laboratory Safety	1
IBMS 621	Laboratory Rotation I	2
IBMS 622	Laboratory Rotation II	2
Term Hours:		16
Spring semester		
HGEN 502	Advanced Human Genetics (satisfies HGEN 609)	3
HGEN 610	Current Literature in Human Genetics	1
HGEN 652	Statistics for Genetic Studies II	3
HGEN 690	Genetics Research Seminar (required in both programs)	1
IBMS 623	Laboratory Rotation III	2
Term Hours:		10
Summer semester		
HGEN 697	Directed Research in Genetics	3
Term Hours:		3
<b>Year two</b>		
Fall semester		
ANAT 620	Scientific Writing and Grantsmanship	2
HGEN 603	Mathematical and Statistical Genetics	3
HGEN 610	Current Literature in Human Genetics	1
HGEN 619	Quantitative Genetics	3
or HGEN 612	Data Science II	

HGEN 690	Genetics Research Seminar (required in both programs)	1
HGEN 697	Directed Research in Genetics	1
OVPR 601	Scientific Integrity (shared course; required in both programs)	1
or OVPR 602	Responsible Scientific Conduct	
or OVPR 603	Responsible Conduct of Research	
Term Hours:		12

Spring semester		
HGEN 610	Current Literature in Human Genetics	1
HGEN 690	Genetics Research Seminar (required in both programs)	1
HGEN 697	Directed Research in Genetics (required in both programs)	8
Term hours:		10

Summer semester		
HGEN 697	Directed Research in Genetics	3
Term Hours:		3

**Year three**

Fall semester		
HGEN 610	Current Literature in Human Genetics	1
HGEN 690	Genetics Research Seminar (required in both programs)	1
HGEN 697	Directed Research in Genetics	7
Term Hours:		9

Spring semester		
ANAT 612	Human Embryology	2
HGEN 610	Current Literature in Human Genetics	1
HGEN 690	Genetics Research Seminar (required in both programs)	1
HGEN 697	Directed Research in Genetics	5
Term Hours:		9

Summer semester		
HGEN 697	Directed Research in Genetics	3
Term Hours:		3

**Year four**

Fall semester		
HGEN 525	Practice of Genetic Counseling	3
HGEN 610	Current Literature in Human Genetics	1
HGEN 615	Techniques in Genetic Counseling	3
HGEN 697	Directed Research in Genetics	1
PATH 691	Special Topics in Modern Instrumental Methods	2
Term Hours:		10

Spring semester		
HGEN 526	Practice of Genetic Counseling	3
HGEN 610	Current Literature in Human Genetics	1
HGEN 622	Cancer Genetic Counseling	3
HGEN 697	Directed Research in Genetics	4
Term Hours:		11

Summer semester		
HGEN 600	Clinical Genetics (satisfies Ph.D. requirement HGEN 606)	3

Term Hours: 3

Prior to the final year, the student must defend their dissertation and will take the M.S. first-year comprehensive exam. Then they will undergo a year of clinical training (clinic rotations and some additional M.S.-specific classes), followed by the final M.S. comprehensive exam.

#### Year five

##### Fall semester

HGEN 527	Medical Genetics (satisfies Ph.D. electives)	3
HGEN 600	Clinical Genetics	3
HGEN 607	Processes in Genetic Counseling I	1
HGEN 616	Cultural Diversity in Genetic Counseling	1
HGEN 618	Evidence Based Genetic Counseling	1

Term Hours: 9

##### Spring semester

HGEN 528	Medical Genetics	3
HGEN 600	Clinical Genetics (two sections of HGEN 600)	6
HGEN 608	Processes in Genetic Counseling II	1
HGEN 690	Genetics Research Seminar (required in both programs)	1

Term Hours 11

**The minimum number of graduate credit hours for this degree is 117.**

#### Contact

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