

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).

- 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 122 graduate credit hours (or 123 with the quantitative human genetics concentration) to earn both degrees. The 24 shared credits are listed below.

Shared credits

Course	Title	Hours
Credits shared by both programs		
HGEN 501	Introduction to Human Genetics	3
HGEN 502	Advanced Human Genetics	3
HGEN 510	Classic Papers in Human Genetics	1
OVPR 601	Scientific Integrity	1
HGEN 690	Genetics Research Seminar (required in both programs; two credits from each satisfy requirements in the other program) ¹	4
Ph.D. requirements counted toward the M.S.		
BIOS 543	Graduate Research Methods I (satisfies three credits toward M.S. electives)	3
or HGEN 651	Statistics for Genetic Studies I	
HGEN 611	Data Science I (satisfies two credits toward M.S. electives)	3
IBMS 620	Laboratory/Clinical Rotations (two credits satisfy M.S. requirement HGEN 601)	2
M.S. requirements counted toward the Ph.D.		
ANAT 612	Human Embryology (satisfies two credits toward Ph.D. electives)	2
HGEN 600	Clinical Genetics (satisfies one credit for Ph.D. requirement HGEN 606)	3
PATH 691	Special Topics in Modern Instrumental Methods (satisfies two credits toward Ph.D. electives)	2
Total Hours		24

1

HGEN 690 should be taken every fall and spring semester.

Curriculum requirements for the dual degree with no concentration

Course	Title	Hours
Ph.D. requirements		
• Core courses		
HGEN 501	Introduction to Human Genetics (shared course; required in both programs)	3
HGEN 502	Advanced Human Genetics (shared course; required in both programs)	3

HGEN 510	Classic Papers in Human Genetics (shared course; required in both programs)	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	7
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)	8
IBMS 600	Laboratory Safety	1
IBMS 620	Laboratory/Clinical Rotations (two-credit course taken for three rotations; satisfies M.S. requirement HGEN 601)	6
• Additional courses		
BIOS 543	Graduate Research Methods I (satisfies three credits toward M.S. electives)	3
or HGEN 651	Statistics for Genetic Studies I	
HGEN 614	Pathogenesis of Human Genetic Disease	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		5
Four credits satisfied by M.S. requirements ANAT 612 and PATH 691; dual students will select an additional elective credit		
HGEN 697	Directed Research in Genetics	41
M.S. in Genetic Counseling requirements		
• 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 502	Advanced Human Genetics (shared course; required in both programs)	3
HGEN 510	Classic Papers in Human Genetics (shared course; required in both programs)	1
HGEN 525	Practice of Genetic Counseling	3
HGEN 526	Practice of Genetic Counseling	3
HGEN 527	Medical Genetics	3
HGEN 528	Medical Genetics	3
HGEN 600	Clinical Genetics (repeated three times; one credit satisfies Ph.D. requirement HGEN 606)	9
HGEN 601	Research in Genetic Counseling (satisfied by Ph.D. requirement IBMS 620)	2
HGEN 607	Processes in Genetic Counseling I	1
HGEN 608	Processes in Genetic Counseling II	1
HGEN 615	Techniques in Genetic Counseling	3

HGEN 622	Cancer Genetic Counseling	3
HGEN 690	Genetics Research Seminar (shared course; two credits satisfy Ph.D. requirement)	4
HGEN 697	Directed Research in Genetics	8
PATH 691	Special Topics in Modern Instrumental Methods (when topic is diagnostic genetic testing, satisfies two credits toward Ph.D. electives)	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 BIOS 543 or HGEN 651 and HGEN 611		
Total Hours		122

The minimum number of graduate credit hours required for this degree is 122.

Curriculum requirements for the quantitative human genetics concentration

Course	Title	Hours
Ph.D. requirements		
• Core courses		
HGEN 501	Introduction to Human Genetics (shared course; required in both programs)	3
HGEN 502	Advanced Human Genetics (shared course; required in both programs)	3
HGEN 510	Classic Papers in Human Genetics (shared course; required in both programs)	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	7
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)	8
IBMS 600	Laboratory Safety	1
IBMS 620	Laboratory/Clinical Rotations (two-credit course taken for three rotations; satisfies M.S. requirement HGEN 601)	6
• Concentration courses		
ANAT 620	Scientific Writing and Grantsmanship	2
HGEN 603	Mathematical and Statistical Genetics	3
HGEN 619	Quantitative Genetics	3
HGEN 652	Statistics for Genetic Studies II	3
• Additional courses		

HGEN 651	Statistics for Genetic Studies I (satisfies three credits toward M.S. electives)	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. requirements ANAT 612 and PATH 691		
HGEN 697	Directed Research in Genetics	35
M.S. in Genetic Counseling requirements		
• 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 502	Advanced Human Genetics (shared course; required in both programs)	3
HGEN 510	Classic Papers in Human Genetics (shared course; required in both programs)	1
HGEN 525	Practice of Genetic Counseling	3
HGEN 526	Practice of Genetic Counseling	3
HGEN 527	Medical Genetics	3
HGEN 528	Medical Genetics	3
HGEN 600	Clinical Genetics (repeated three times; one credit satisfies Ph.D. requirement HGEN 606)	9
HGEN 601	Research in Genetic Counseling (satisfied by Ph.D. requirement IBMS 620)	2
HGEN 607	Processes in Genetic Counseling I	1
HGEN 608	Processes in Genetic Counseling II	1
HGEN 615	Techniques in Genetic Counseling	3
HGEN 622	Cancer Genetic Counseling	3
HGEN 690	Genetics Research Seminar (shared course; two credits satisfy Ph.D. requirement)	4
HGEN 697	Directed Research in Genetics	8
PATH 691	Special Topics in Modern Instrumental Methods (when topic is diagnostic genetic testing, satisfies two credits toward Ph.D. electives)	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 BIOS 543 or HGEN 651 and HGEN 611		
Total Hours		123

The minimum number of graduate credit hours required for this degree is 123.

Suggested five-year plans of study for dual degree

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

Course	Title	Hours
Year one		
Fall semester		
BIOS 543	Graduate Research Methods I (satisfies M.S. electives)	3
or HGEN 651	Statistics for Genetic Studies I	
HGEN 501	Introduction to Human Genetics (shared course; required in both programs)	3
HGEN 510	Classic Papers in Human Genetics (shared course; required in both programs)	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 620	Laboratory/Clinical Rotations	4
Term Hours:		16
Spring semester		
HGEN 502	Advanced Human Genetics (shared course; required in both programs)	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	1
IBMS 620	Laboratory/Clinical Rotations (satisfies M.S. requirement HGEN 601)	2
Elective		1
Term Hours:		9
Summer semester		
HGEN 697	Directed Research in Genetics	3
Term Hours:		3
Year two		
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	5
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:		11
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	10
Term hours:		12
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	10
Term Hours:		12
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
PATH 691	Special Topics in Modern Instrumental Methods	2
Term Hours:		12
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	3
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	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 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	3
HGEN 600	Clinical Genetics	3
HGEN 607	Processes in Genetic Counseling I	1
HGEN 690	Genetics Research Seminar	1

HGEN 697	Directed Research in Genetics	1
Term Hours:		9
Spring semester		
HGEN 528	Medical Genetics	3
HGEN 600	Clinical Genetics	3
HGEN 608	Processes in Genetic Counseling II	1
HGEN 690	Genetics Research Seminar (required in both programs)	1
HGEN 697	Directed Research in Genetics	1
Term Hours		9

The minimum number of graduate credit hours required for this degree is 122.

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

Course	Title	Hours
Year one		
Fall semester		
HGEN 501	Introduction to Human Genetics (shared course; required in both programs)	3
HGEN 510	Classic Papers in Human Genetics (shared course; required in both programs)	1
HGEN 611	Data Science I (satisfies M.S. electives)	3
HGEN 651	Statistics for Genetic Studies I (satisfies MS electives)	3
HGEN 690	Genetics Research Seminar (required in both programs)	1
IBMS 600	Laboratory Safety	1
IBMS 620	Laboratory/Clinical Rotations	4
Term Hours:		16
Spring semester		
HGEN 502	Advanced Human Genetics (shared course; required in both programs)	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 620	Laboratory/Clinical Rotations (satisfies M.S. requirement HGEN 601)	2
Term Hours:		10
Summer semester		
HGEN 697	Directed Research in Genetics	3
Term Hours:		3
Year two		
Fall semester		
ANAT 620	Scientific Writing and Grantsmanship (if not taking HGEN 614)	2
HGEN 603	Mathematical and Statistical Genetics	3
HGEN 610	Current Literature in Human Genetics	1
HGEN 619	Quantitative Genetics	3
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	9
Term hours:		11
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	9
Term Hours:		11
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	5
PATH 691	Special Topics in Modern Instrumental Methods	2
Term Hours:		11
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	4
Term Hours:		11
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 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	3
HGEN 600	Clinical Genetics	3
HGEN 607	Processes in Genetic Counseling I	1
HGEN 690	Genetics Research Seminar	1
HGEN 697	Directed Research in Genetics	1
Term Hours:		9
Spring semester		
HGEN 528	Medical Genetics	3
HGEN 600	Clinical Genetics	3
HGEN 608	Processes in Genetic Counseling II	1
HGEN 690	Genetics Research Seminar (required in both programs)	1
HGEN 697	Directed Research in Genetics	1
Term Hours		9

The minimum number of graduate credit hours required for this degree is 123.

Contact

John M. Quillin, Ph.D., M.P.H.

Associate professor and director, dual degree program

john.quillin@vcuhealth.org

(804) 628-1925