



Master of Science in Genetic Counseling (MSGC) Program

Course Descriptions

GNC 420: Foundations in Medical Genetics, 5 credits

Course Director: Eran Tallis, MD

Semester: Fall 1st year

Through exploration of the human genome and genetic variation, together with select genetic disorders, students will build a foundation essential for practice in the field of Medical Genetics. This course facilitates in-depth understanding of multiple fundamental concepts including, but not limited to, organization of the human genome, gene expression, genetic variations causing disease and disease risk, genetic testing methodologies, and the clinical genetics approach to diagnosis and management. Concepts will be reinforced throughout the course as students learn about a range of genetic disorders that commonly present in the Pediatric Genetics setting.

GNC 403: Embryology & Reproductive Genetics, 3 credits

Course Director: Diana Bailey, MS, CGC

Semester: Fall 1st year

This course covers normal and abnormal human embryology and the influence of genetic disorders and teratogens. This course will also cover the common indications for prenatal genetic counseling and the available prenatal diagnostic and screening techniques. Topics include congenital birth defects, teratology, prenatal screening tests, prenatal diagnostic tests, preimplantation genetic testing, infertility, carrier testing, and fetal care coordination.

GNC 430: Foundations of Genetic Counseling, 2 credits

Course Director: Audrey Schroeder, MS, CGC

Semester: Fall 1st year

This course explores the genetic counseling profession from a historical and modern perspective, and supports development of skills necessary for management of genetic counseling cases. Students will gain skills in pedigree construction and analysis, client education, and psychosocial counseling that support client well-being, informed decision-making, and adaptation to risk or genetic conditions. Additionally, students will explore genetic counselors' roles in conducting research, and participation in projects and efforts aimed at improving diversity, equity, and inclusion within the genetic counseling profession.



GNC 410: Genetics Bioethics, 2 credits

Course Director: Alex V. Levin, MD, MHSc, FAAP, FAAO, FRCSC

Semester: Fall 1st year

This course provides students with a historical, theoretical, and practical approach to biomedical ethics as it relates to the field of human genetics. Sessions will be part didactic and mostly seminar discussion-based, using case examples and problem solving. Students will be encouraged to explore all sides of the bioethics challenges in genetics so as to develop fluency in their ability to recognize and discuss issues as they arise in clinical practice and research settings, with a solid theoretical background for their considerations and practice.

BST 463: Introduction to Biostatistics, 3 credits

Course Director: Hongmei Yang, PhD

Semester: Fall 1st year

BST 463 will focus on statistical application in health and medical sciences, while providing an understanding of the development of statistical methodology. Topics to be covered are: data collection; summarization of data through numerical and graphical descriptive statistics; basic probability, including Bayes' Theorem and its applications in diagnostic testing; theoretical probability distributions, including the uniform, Bernoulli, binomial, Poisson, normal, Student's t, and chi-squared distributions; sampling distributions, and inferential statistics, including point estimation, confidence intervals, one- and two-sample hypothesis tests involving means and proportions, and sample size calculations. Other topics to be introduced include analysis of variance (ANOVA), nonparametric hypothesis testing, contingency tables and related chi-squared tests, correlation analysis, linear regression, and logistic regression. Special topics (Mixed-effect models with SAS/R implementation, etc) will be introduced at the end. Each topic will be illustrated with real data examples.

GNC 520: Molecules to Cells (MTC), 8 credits

University of Rochester Medical Education course

Course Director: Chin-To Fong, MD

Semester: Spring 1st year (begins off-calendar in early January, and ends early March)

Providing foundations in biochemistry, genetics and cell biology curriculum, this nine-week course teachings through lectures, problem based learning cases and large group patient encounters. It is organized into seven theme blocks: biochemical basics and systems integration; intermediary metabolism; molecular genetics and cell biology; cell growth control, development, cancer and aging; medical genetics; genetic-- environmental interactions; nutrition. Assessment is done through multiple choice examinations and problem-based learning (PBL) performance.



GNC 497: Genetic Counseling in Clinical Practice, 2 credits

Course Director: Emily Calamaro, MGC, CGC

Semester: Spring 1st year

This genetic counseling course further builds upon skills that are utilized in everyday clinical genetic counseling practice. Through participation in a variety of discussion-based seminars and case-based activities, students will develop an in-depth understanding of case management and related counseling skills, and an appreciation of genetic counselors' roles within the greater healthcare system. This course emphasizes development of clinical case management plans including case preparation, clinical documentation, patient communication, and follow-up. In addition to advancing pedigree assessment skills, students will learn how to identify and utilize a wide range of resources and databases necessary for direct patient care, facilitation and interpretation of genetic testing, research study involvement, and patient and family support.

GNC 447: Client-Centered Genetic Counseling, 2 credits

Course Director: Jessica Salamone, ScM, CGC

Semester: Spring 1st year

The National Society of Genetic Counselors' definition of genetic counseling includes "the process of helping people understand and adapt to the medical, psychological and familial implications of genetic contributions to disease." A critical component of this is "counseling to promote informed choices and adaptation to the risk or condition." This course provides students with the framework for psychosocial assessment and client-centered counseling. A range of counseling abilities and skills are reinforced through case-based and discussion-based learning.

GNC 465: Medical Genetics by Subspecialty, 4 credits

Course Director: Audrey Schroeder, MS, CGC

Semester: Summer (ends late July)

In this course, students will continue to expand upon their knowledge of medical genetics and genetic disorders through content presented in the following subspecialty blocks: Cancer, Neurology, Ocular, and Cardiology Genetics. These blocks are taught by faculty experienced in diagnosing and managing patients in these specialty areas. Each subspecialty block includes overview of the genetic evaluation and diagnostic process within that subspecialty, different groups of genetic disorders that are evaluated for, and the natural history, management, and treatment of select genetic disorders.



GNC 491/492/493: Thesis I/II/III, 6 credits total

Thesis Advisor: The thesis advisor will be a faculty member, determined on a case-by-case basis. Typically, students will work with an advisor whose clinical, research, and/or educational interests align with the master's research project topic.

Semesters: Summer (GNC 491 Thesis I), Fall 2nd year (GNC 492 Thesis II), Spring 2nd year (GNC 493 Thesis III)

Students will develop and conduct an independent master's research project on a topic of interest to them, and which will contribute knowledge to the genetic counseling field. This work culminates in the writing of a final written report (dissertation paper and/or manuscript in a format for scholarly journal publication) and the passing of a final oral examination.

GNC 501/502/503/504/505: Clinical Rotation/Fieldwork I/II/III/IV/V, 15 credits total

Fieldwork Coordinator: Emily Calamaro, MGC, CGC

Semesters: Summer (11-week rotation, ends late July), Fall 2nd year (2 8-week rotations), Spring 2nd year (2 8-week rotations)

Students will participate in immersive clinical rotation/fieldwork experiences that provide them with exposure to a variety of genetic specialties, clinical settings, and service delivery models. As students progress through a rotation, and from one rotation to the next, they will develop competencies as required for successful practice as a genetic counselor. Student achievement of competencies will be evaluated as students participate in a variety of cases, case-related activities, and evaluations. Through participation in these rotation/fieldwork experiences, students will meet or exceed the Accreditation Council for Genetic Counseling (ACGC) requirement of accruing at least 50 participatory cases.

Each student is expected to complete **5 clinical rotation/fieldwork experiences** (Placements I-V) in order to complete the MSGC program, for a total of 15 credit hours.

Each student will have all 3 **core** rotations in:

- Pediatric Genetics
- Reproductive (Prenatal) Genetics
- Cancer Genetics

Each student is also required to have 2 of the following **elective** rotations:

- Ocular Genetics
- Adult Medical Genetics (includes Cardiogenetics)
- Neurology/Neuromuscular Genetics
- Industry/Lab



GNC 467: Professional Issues in Genetic Counseling, 2 credits

Course Director: Celeste Wyman, ScM, CGC

Semester: Fall 2nd year

This course explores current and emerging roles, opportunities, and service delivery models in genetic counseling. A wide range of additional professional issues are also addressed such as billing and reimbursement, professional licensure and other policy topics, self-care, and setting goals on both an individual basis and more broadly to advance the genetic counseling profession and its capability to provide equitable genetic services.

GNC 494: Special Topics in Clinical Genetics, 1 credit

Course Directors: Kelly Minks, MS, CGC and Jordan Bontrager, MS, CGC

Semester: Fall 2nd year

Throughout this course, students will examine a number of emerging and thought-provoking topics that impact genetic counseling clinical practice. As a new topic is introduced each week, students will critically assess relevant articles and participate in discussion-based seminars. Students will gain deeper understanding of these issues, and ways in which to incorporate genetic, genomic, medical, scientific, and social science literature into evidenced-based practice. A variety of topics will be explored, ranging from ethical, legal, and social issues, to emerging areas of genetic/genomic testing, technology, and genetic counseling practice.

NSG 429: Diversity and Equity in Health Care, 3 credits

Course Director: Maria Quiñones, PhD

Semester: Fall 2nd year

This course is designed to help students explore, discuss and appreciate the complexities of diversity dimensions as well as the capacity to critically examine the individual, systemic and institutionalized manifestations of oppression that exacerbate disparities of care and other discriminatory issues that disproportionately affect people of color and other minoritized individuals. Additionally, the course activities will focus on developing the learners' capacity to develop a fluency about diversity and identify how they might apply equity-minded practices to mitigate the barriers that prevent race-consciousness and culturally-relevant care, including identifying strategies to improve patient-provider as well as provider-provider communication that contributes to overall quality of care and operations of health care as an equitable industry.



GNC 511: Genetic Counseling Case Seminar I, 1 credit

GNC 512: Genetic Counseling Case Seminar II, 1 credit

Course Director: Lindsay Adamczak, MS, CGC

Semesters: Fall 2nd year (GNC 511) and Spring 2nd year (GNC 512)

This weekly seminar will provide Master of Science Genetic Counseling Program students an additional forum to discuss and process real cases from their clinical rotations. Second-year students will choose cases from their clinical rotations that challenged them or stretched their skills, and present these to fellow students and program faculty for discussion. Through participation in discussions and role plays, students will identify and apply a variety of different counseling skills and techniques.

**Note: First-year MSGC students will attend Case Seminars I and II as a required supplemental, non-credit bearing activity.*

GNC 500: Biopsychosocial Family Experiences with Genetic Conditions, 3 credits

Course Directors: Jenny Speice, PhD and Susan McDaniel, PhD

Semester: Spring 2nd year

This course builds upon psychosocial and counseling skills through in-depth assessment of patients and families adapting to genetic risks and genetic disease. Case-based learning and small group discussions enable students to further develop their ability to assess clients' biopsychosocial needs including relational dynamics and apply advanced patient and family counseling skills in a culturally-attuned manner. Topics include family decision-making, communication patterns, coping, grieving, problem-solving, and the intersection of the genetic condition with the family lifecycle. Students are also invited to examine how their own personal experiences influence their encounters with patients and families.

Last updated 8/1/2024