



**GENETICS
GRADUATE PROGRAM
HANDBOOK
2018-2019**

1. Description of the Genetics Graduate Program

John V. Planz, Ph.D., Graduate Advisor

Center for BioHealth, Rm 360

Phone: 817-735-2397

E-mail: john.planz@unthsc.edu

Program website: www.unthsc.edu/graduate-school-of-biomedical-sciences/genetics/

Graduate Faculty: Allen; Barber; Budowle; Chakraborty; Coble; Cross; Phillips; Planz; Warren; Woerner; Zhang

Genetics is a broad interdisciplinary field that unites biochemistry, microbial and cellular biology, molecular processes, biotechnology, computational biology, biogeography and human disease to gain an integrated understanding of environmental and clinical observations. The Genetics program offers training in analytical techniques and computational methods necessary for studies in the different fields of applied genetics. Program faculty have broad research interests as most analytical approaches to genetics studies are applicable to myriad biological processes. Faculty programs are funded by multiple sources including the federal government, state government, private foundations and industry, and collaboration between the various UNTHSC programs and schools is strongly supported. Students may undertake research in areas such as cancer genetics, computational genetics, pharmacogenetics, evolutionary genetics, medical genetics, microbial genetics, and many other interrelated disciplines.

The faculty of Program in Genetics have identified Student Learning Outcomes specific to the discipline. In addition to the GSBS competencies graduates will:

- Demonstrate mastery of cutting edge research approaches in genetics/genomics;
- Describe, critically evaluate, and apply current theoretical perspectives in genetics;
- Demonstrate proficiency in analytical and statistical procedures appropriate for genetic analyses; and
- Describe role of genetic and genomic assessment in clinical practice, including applications in disease screening, diagnosis, and pharmacogenetics.

Students may enter the program with a variety of academic backgrounds, provided they have fulfilled prerequisite courses in molecular biology, biochemistry, genetics, and statistics, or their equivalent and have completed their required rotations with a minimum of one (1) Genetics Program faculty. Experience in laboratory methods, computer programming and bioinformatics is strongly recommended. Students wishing to enter the program should meet with the Graduate Advisor at the earliest possible time to obtain program application forms and information on the discipline approval process. Students may apply to join the Program in Genetics at the end of the first semester. Students must have completed the first semester GSBS core courses and been enrolled in a rotation with a minimum of one Genetics Program faculty member prior to submitting a discipline change form to the GSBS Dean's Office. Although the program has several uniform course requirements, we try to work with each student in tailoring a program that fits his/her particular interests and goals. Students wishing to join the Program must enroll in the two discipline specific courses: MIMG 6301-Molecular Genetics and MIMG 6302-Medical Genetics for the Spring semester of their first year. Students are expected to score a minimum B grade in the GSBS core courses and a Grade of A in both Genetics Program advanced courses. Acceptance into the Genetics Program is dependent on the approval of

the Program faculty and the signing a Designation/Compact between the graduate student and a research advisor/mentor.

Students in the Program in Genetics are required to enroll and participate in the Genetics Program's Journal Club course (MIMG 5170) beginning in the Spring semester and during all long semesters for the duration of their enrollment. The faculty encourage students to explore the other areas of biomedical science that are available at UNTHSC. Students are advised to discuss course selection with their mentor and advisors to determine the courses from Genetics, as well as other academic programs, that are most advantageous for achieving their individual goals and objectives.

Students will receive extensive training in the foundations and techniques of contemporary molecular genetics in their laboratories and through elective courses. Students will perform original, publishable research, and present their research findings at scientific meetings. Doctoral students are required to have a minimum of one paper published in their dissertation research area prior to applying to defend their dissertation. In addition, students are required to present an update on their research and solicit suggestions during the Department of Microbiology, Immunology and Genetics Works in Progress (WIPs) (MIMG 5140) sessions held weekly. With the consent of their research mentor, students present their research progress at the annual UNTHSC Research Appreciation Day (RAD). Students should be aware that the timeline for their successful completion of the degree program will vary depending upon the nature of their research, their time management skills and their level of academic development.

Graduates with advanced degrees typically find employment in higher education, industry and government agencies.

Graduate Faculty and Specific Research Programs

Michael Allen, Ph.D.

Associate Professor, Department of Microbiology, Immunology & Genetics

Research in the Allen Laboratory focuses on microbiology of vector-borne diseases and microbiome-host studies of human and animal systems. The former includes testing of all ticks submitted to the state of Texas for the presence of specific bacterial pathogens, and research into the factors influencing disease transmission and pathology. Microbiome research includes investigation of complex bacterial communities and their interactions with a wide variety of hosts (humans, arthropod vectors of disease, etc.), defining factors that disrupt or support microbial community assembly and structure, exploring community dynamics in polymicrobial diseases of different organ systems (e.g. gut, lung), development of genetically engineered probiotics for the treatment of disease, and applications of microbiome research to problems in forensic science.

Robert Barber, Ph.D.

Associate Professor, Department of Pharmacology & Neuroscience

Research projects in Dr. Barber's group include investigations of how DNA methylation and microRNA expression impact risk for neurodegeneration; efforts to use patterns of DNA variation to predict the age at onset of Alzheimer's disease (AD); and scanning the intestinal microbiome to determine how an individual's profile of gut bacteria may impact their cognitive ability as they age. I am also interested in AD pathophysiology among Mexican Americans and how disease mechanisms differ between members of this underrepresented ethnic group and Caucasians. Students in my lab are trained in the analysis of large genetic and biomarker data sets through collaborations with researchers at UNTHSC and other Texas Alzheimer's Research & Care Consortium institutions as well as the University of North Carolina at Chapel Hill. Active collaborative projects are ongoing with Drs. O'Bryant, Allen, Hall, Cunningham and others at UNTHSC; Drs. Sohrabji and Miranda at Texas A&M Health Science Center; Drs. Huebinger and Reisch at UT Southwestern; Drs. Royall and Palmer at UT Health Science Center at San Antonio and Drs. Wilhelmsen and Tilson at the University of North Carolina at Chapel Hill. Work in his lab is focused on personalized medicine. They are interested in how an individual's genetic makeup, epigenetic profile and microbiome impact risk for disease, rate of disease progression or likelihood of responding to various treatment options. Our work is focused on neurodegeneration and dementia (primarily Alzheimer's disease), but many of the tools and discoveries we make can be readily applied to other conditions and treatments.

Bruce Budowle, Ph.D.

Professor, Department of Microbiology, Immunology & Genetics, Director UNT Center for Human Identification

Forensic genetics traditionally has been dedicated to analysis of human DNA markers for identity purposes to support criminal and civil investigations.

However, with the demands of stakeholders and advances in technologies and bioinformatics, there is a substantial expansion of the applications of forensic genetics (or better yet forensic genomics). In addition to identification of humans associated with crime or missing persons due to mass disasters or other crimes, other areas of application include molecular autopsy and microbial forensics. Our research group has an advanced forensic genomics program using cutting edge genomics and technologies to effectively bolster current forensic and biosecurity capabilities. Some areas of interest are: computational genomics and bioinformatics; mixture interpretation; development of genetic diagnostics and detection capabilities; identification of novel genetic markers for human identification; population genetics studies; human microbiome studies for identification purposes; molecular autopsy (i.e. pharmacogenetics); and molecular mechanisms for DNA repair. These research efforts support a healthier and safer society as well as the government in achieving its mission of law enforcement, combatting terrorism, and providing biosafety and preserving national biosecurity.

Ranajit Chakraborty, Ph.D.

Professor, Department of Microbiology, Immunology & Genetics

Dr. Chakraborty's research involves four related but distinct areas of investigations. In the area of molecular population genetics and evolution, Dr. Chakraborty is working on intra- and inter-population variation of genome-wide genetic markers of different rates and patterns of mutations (e.g., Short Tandem Repeats, Single Nucleotide Polymorphisms, Copy Number Variations, simple insertion/deletion polymorphisms, etc.) with an emphasis on how these types of markers assist in identifying underlying genetic risk of complex diseases (such as cancer, diabetes, cardiovascular diseases, etc.). In addition, by devising statistically validated algorithms of combining data on these different markers, he also addresses questions of missing heritability, and genome-wide genetic risk scores for such diseases and how they impact characterizing gene-environment interactions. Dr. Chakraborty's research relates to developing individualized scores of health disparity using standard epidemiological data on health disparity analyzed by technologies that he helped to develop multidimensional genomic score of disease risks.

Michael D. Coble, Ph.D.

Associate Professor, Department of Microbiology, Immunology & Genetics, Associate Director, UNT Center for Human Identification

DNA evidence from crime scenes (including evidence from victims of sexual assault) can often contain mixtures of two or more contributors and can be challenging for the forensic scientist to interpret. Our research focuses on issues associated with DNA mixture interpretation and probabilistic methods of interpretation using software analyses. Other areas of research include haploid marker systems for forensic testing (mitochondrial DNA and Y-chromosome testing), and non-traditional marker systems (e.g. X-chromosomal STRs, insertion-deletion markers, etc.) to increase genetic information from challenged samples.

Deanna Cross, Ph.D.

Assistant Professor, Department of Microbiology, Immunology & Genetics

Dr. Cross's research interests focus on translating genetic and genomic advances into patient care. Her projects include implementation of family health history tools for improvement of patient care, as well as creation of tools that explain genetic and genomic advances to diverse patient populations. She is particularly interested in identifying and eliminating barriers to implementation of genetic and genomic medicine in populations that have been traditionally underrepresented in genomic research and medical testing. With rapidly growing fields such as epigenetics and genomic sequencing there is a need to determine the clinical utility of burgeoning tests. Dr. Cross, utilizes large patient populations to interrogate real world applications for genetics in healthcare. She is particularly interested in the correct application of genetic testing throughout a patient's life from pre-conception through healthy aging.

Nicole Phillips, Ph.D.

Assistant Professor, Department of Microbiology, Immunology & Genetics

Dr. Phillips' research interests lie in the study of genetic interactions that contribute to one's risk for developing complex, age-related diseases. The bulk of her wet lab work has focused on the role of mitochondrial genetics in the progression of late onset Alzheimer's disease. She has investigated several indices of mitochondrial DNA integrity as related to disease progression using the longitudinal samples from the Texas Alzheimer's Research and Care Consortium (TARCC). These studies have opened many avenues for further work in this space, which she is currently pursuing here at UNTHSC. In addition to mitochondrial genetics, she has also worked extensively with whole genome data sets. Dr. Phillips served as one of the primary analysts in a genome wide association (GWA) analysis of the same TARCC Alzheimer's disease cohort. This work aimed to identify genomic regions that are associated with the blood-based biomarkers associated with Alzheimer's disease (Sid O'Bryant et al., 2011, Dementia and geriatric cognitive disorders) and regions associated with the mitochondrial DNA integrity indices established in her laboratory. Dr. Phillips continues to build on her prior work with TARCC, using both *in silico* and experimental approaches. While she has found her passion in the study of Alzheimer's disease, she also looks forward to extending her skill set to the study of other age-related, complex diseases. She is currently the Director of Genomics Research for the Osteopathic Research Center here at UNTHSC, where she oversees genetic testing for PRECISION TEXAS, a North Texas low-back pain registry.

John V. Planz, Ph.D.

Associate Professor, Department of Microbiology, Immunology & Genetics

Dr. Planz's research interests are in the areas of molecular evolutionary genetics and population genetics applications for studying inter- and intra-specific diversity and the effects of admixture on energy metabolism, genetic diseases and the genetics aspects of health disparities. Dr. Planz's lab is currently optimizing approaches related to Nanopore sequencing which allow for long read (>10KB) direct sequencing of genomic DNA. These methods will allow for direct phasing of polymorphisms in gene regions, exon/intron junctions and

recombination hotspots. These approaches are being applied to mitochondrial genome studies, microbial genome characterization and evaluation of recombination signatures and their biomedical impact in admixed populations, especially Hispanics.

Joseph E. Warren, Ph.D.

Assistant Professor, Department of Microbiology, Immunology & Genetics

Dr. Warren's main research interests include the following: Mitochondrial DNA mutation rate analysis and implications for human identity testing; Metal ions and their effect as PCR inhibitors; Improvements in DNA testing methods for increased recovery and quality of DNA extracts from skeletal remains; and Training methods for Bloodstain Pattern Analysis. Dr. Warren also serves as Graduate Advisor for the Forensic Genetics Masters Program.

August Woerner, Ph.D.

Research Assistant Professor, UNT Center for Human Identification

Dr. Woerner is a Research Assistant Professor in Dr. Budowle's research group. He has a M.S. in Computer Science and Ph.D. in Genetics from the University of Arizona. His research interests are generally in the areas of computation and population genetics, with a focus in forensics, bioinformatics and machine learning. His current research projects run the gamut from streamlining bioinformatics pipelines, making them faster and more user friendly, to machine learning and statistical approaches to processing and calling sequencing data, to inference problems in population genetics and genomics.

Yan Zhang, Ph.D.

Research Assistant Professor, Department of Microbiology, Immunology & Genetics

Dr. Zhang has interests in how the microbiome and host interact in health and disease. Her projects include tick microbiome and disease associated human microbiome, using genomic and metagenomic approaches to investigate the microbiome dynamics and understand its role in disease development (such as tick born disease, Phenylketonuria, Alzheimer's disease, inflammation after severe injury and etc). Dr. Zhang provides services for Next Generation Sequencing using IonTorrent and Miseq platform. She also develops bioinformatics and statistical tools for metagenomic analysis.

2. Course Offerings

2.1 GSBS and Genetics required Courses

Genetics students are required to take the following BMSC and MIMG core courses:

BMSC 5160 – Biomedical Ethics
BMSC 5315 – Principles of Scientific Communication
BMSC 6100 – Scientific Communication Competencies
BMSC 6200 – Introduction to Experimental Design and Biostatistical Methods
BMSC 6201 – Fundamentals of Biomedical Science I
BMSC 6202 – Fundamentals of Biomedical Science II
BMSC 6203 – Fundamentals of Biomedical Science III
BMSC 6204 – Fundamentals of Biomedical Science IV
MIMG 6301 – Molecular Genetics
MIMG 6302 – Medical Genetics

A student who receives a single “C” in BMSC 6201, BMSC 6202, BMSC 6203, or BMSC 6204, but maintains an overall GPA of 3.0 or better after the first semester will be allowed to enter the Genetics Program and enroll in MIMG 6301 and MIMG 6302.

A student who receives a “C” or “F” in one of the discipline-specific required courses (MIMG 6301 or MIMG 6302) will be allowed to self-remediate the course and still take the oral qualifying exam in the summer of year 1 or the Fall of year 2. A student who receives two or more “C’s” or “F’s” in the discipline-specific required courses must retake those courses in their entirety the following year. If the remediating student receives “A’s” and/or “B’s” upon retaking the courses, they will be allowed to take the oral qualifying exam. Remediation must be completed prior to scheduling the Oral Qualifying Exam. Failure to obtain a minimum B upon retaking in the discipline-specific required courses will result in dismissal from the Genetics Program.

2.2 Advanced Courses and Technique Courses (4-6 SCH for M.S. students and 8-10 SCH for Ph.D. students). Students are encouraged to select elective courses from the following and explore offerings from other programs under the advice of their Advisory Committee.

MIMG 6303 Statistical Genetics (3 SCH)
Offered Spring odd years
MIMG 6304 Introduction to Genomics and Bioinformatics (3 SCH)
Offered Fall odd years
MIMG 6200 Mitochondria and Complex Diseases (2 SCH)
Offered Fall even years
MIMG 5500 Emerging Role of the Microbiome in Health and Disease (2 SCH)
Offered Spring even years
MIMG 6340 Molecular Evolutionary Genetics (2 SCH)
Offered Fall odd years
MIMG 6202 Advanced Molecular Biology: Techniques and Principles (2 SCH)
Offered Fall odd years
MIMG 6230 Practical Laser Capture Microdissection (1 SCH)

Offered every Fall
MIMG 6250 Molecular and Cell Biology of Cancer (2 SCH)
Offered every Spring
MIMG 6206 Fundamentals of Microbiology (2 SCH)
Offered every Spring
MIMG 6203 Advanced Cell Biology (2 SCH)
Offered every Spring
NTER 5200 Introduction to Bioinformatics (2 SCH)
Offered every Summer
NTER 6440 Methods in Molecular Biology (4 SCH)
Offered every Summer

2.3 Journal Clubs and Seminar Courses (taken every long semester)

MIMG 5140 Seminar in Current Topics (1SCH)
MIMG 5170 Journal Club in Genetics (1 SCH)

2.4 Degree Plans

M.S. Degree Plan for Genetics

Year 1: Fall

BMSC 6200 Introduction to Experimental Design and Biostatistical Methods	2 SCH
BMSC 6201 Fundamentals of Biomedical Science I	2 SCH
BMSC 6202 Fundamentals of Biomedical Science II	2 SCH
BMSC 6203 Fundamentals of Biomedical Science III	2 SCH
BMSC 6204 Fundamentals of Biomedical Science IV	2 SCH
BMSC 5150 Lab Rotations (2)	<u>2 SCH</u>
	12 SCH

Year 1: Spring

MIMG 6301 Molecular Genetics	2 SCH
MIMG 6302 Medical Genetics	2 SCH
BMSC 5160 Biomedical Ethics	1 SCH
MIMG 5140 Seminar in Current Topics	1 SCH
MIMG 5170 Journal Club in Genetics	1 SCH
BMSC 5315 Principles of Scientific Communications	2 SCH
BMSC 5998 Individual Research, Advanced Courses (or 1 addl. lab rotation)	<u>3 SCH</u>
	12 SCH

Year 1: Summer

BMSC 5998 Individual Research	1-6 SCH
Advanced Electives and/or Technique Courses	<u>0-5 SCH</u>
	6 SCH

Year 2: Fall

BMSC 5998 Individual Research	4-8 SCH
MIMG 5140 Seminar in Current Topics	1 SCH
MIMG 5170 Journal Club in Genetics	1 SCH
Advanced Electives and/or Technique Courses	<u>2-6 SCH</u>
	12 SCH

Milestone: Complete Research Proposal

Year 2: Spring

BMSC 5395 Thesis	7 SCH
MIMG 5140 Seminar in Current Topics	1 SCH
MIMG 5170 Journal Club in Genetics	<u>1 SCH</u>
(continued enrollment in these courses until completion)	9 SCH

TOTAL **51 SCH**

Ph.D. Degree Plan for Genetics

Year 1: Fall

BMSC 6200	Introduction to Experimental Design and Biostatistical Methods	2 SCH
BMSC 6201	Fundamentals of Biomedical Science I	2 SCH
BMSC 6202	Fundamentals of Biomedical Science II	2 SCH
BMSC 6203	Fundamentals of Biomedical Science III	2 SCH
BMSC 6204	Fundamentals of Biomedical Science IV	2 SCH
BMSC 5150	Lab Rotations (2)	<u>2 SCH</u>
		12 SCH

Year 1: Spring

MIGN 6301	Molecular Genetics	2 SCH
MIGN 6302	Medical Genetics	2 SCH
BMSC 5160	Biomedical Ethics	1 SCH
MIMG 5140	Seminar in Current Topics	1 SCH
MIMG 5170	Journal Club in Genetics	1 SCH
BMSC 5315	Principles of Scientific Communications	2 SCH
BMSC 5998	Individual Research, Advanced Electives (or w/ 1 additional lab rotation)	<u>3 SCH</u>
		12 SCH

Year 1: Summer

BMSC 6998	Individual Research	1-6 SCH
	Advanced Electives and/or Technique Courses	<u>0-5 SCH</u>
		6 SCH

Milestone: Complete Oral Qualifying Exam

Year 2: Fall

BMSC 6998	Individual Research	0-10 SCH
MIMG 5140	Seminar in Current Topics	1 SCH
MIMG 5170	Journal Club in Genetics	1 SCH
	Advanced Electives and/or Technique Courses	<u>0-10 SCH</u>
		12 SCH

Milestone: Complete Research Proposal (Advanced to Candidacy)

Year 2: Spring

BMSC 6998	Individual Research	0-7 SCH
MIMG 5140	Seminar in Current Topics	1 SCH
MIMG 5170	Journal Club in Genetics	1 SCH
	Advanced Electives and/or Technique Courses	<u>0-7 SCH</u>
		9 SCH

Year 2: Summer

BMSC 6998	Individual Research	1-6
	Advanced Electives and/or Technique Courses	<u>0-5 SCH</u>
		6 SCH

Year 3: Fall

BMSC 6998	Individual Research	0-7 SCH
MIMG 5140	Seminar in Current Topics	1 SCH
MIMG 5170	Journal Club in Genetics	1 SCH

Advanced Electives and/or Technique Courses	<u>0-7 SCH</u> 9 SCH
<u>Year 3: Spring</u>	
BMSC 6998 Individual Research	0-7 SCH
MIMG 5140 Seminar in Current Topics	1 SCH
MIMG 5170 Journal Club in Genetics	1 SCH
Advanced Electives and/or Technique Courses	<u>0-7 SCH</u> 9 SCH
<u>Year 3: Summer</u>	
BMSC 6998 Individual Research	1-6 SCH
Advanced Electives and/or Technique Courses	<u>0-5 SCH</u> 6 SCH
<u>Year 4: Fall</u>	
BMSC 6998 Individual Research	0-7 SCH
MIMG 5140 Seminar in Current Topics	1 SCH
MIMG 5170 Journal Club in Genetics	1 SCH
Advanced Electives and/or Technique Courses	<u>0-7 SCH</u> 9 SCH
<u>Year 4: Spring</u>	
BMSC 6998 Individual Research	0-7 SCH
MIMG 5140 Seminar in Current Topics	1 SCH
MIMG 5170 Journal Club in Genetics	1 SCH
Advanced Electives and/or Technique Courses	<u>0-7 SCH</u> 9 SCH
<u>Year 4: Summer</u>	
BMSC 6395 Doctoral Dissertation	<u>6 SCH</u> 6 SCH
<u>Year 5: Fall</u>	
BMSC 6395 Doctoral Dissertation	<u>9 SCH</u>
(maintained in continuous enrollment until completed)	9 SCH
TOTAL	114 SCH

3. Advancement to Doctoral Candidacy

Doctoral students must complete the following two-part process to be advanced to candidacy. First, a program-based qualifying examination, designed and administered by the Program's graduate faculty, must be successfully completed. Second, the student must submit and defend their research proposal to their advisory committee. When successfully completed, the student is advanced to candidacy and may enroll in Doctoral Dissertation (BMSC 6395) in the first long semester immediately following approval of the research proposal and maintain continuous enrollment in this course until dissertation is defended and approved.

3.1 Qualifying Examination

The qualifying examination within the Genetics Program must be successfully completed by the end of Summer of Year 1 or Fall of Year 2. The qualifying examination ensures that a doctoral student has sufficient mastery of fundamental principles in the biomedical sciences to be successful as a Ph.D. candidate and subsequently, as an independent researcher. Topics included in the oral qualifying examination consist of fundamental understanding of biomedical sciences, genetics, experimental design, statistics and research techniques based on relevant GSBS core courses and the Genetics Program advanced courses. The student is permitted two attempts to pass the qualifying examination. Failure to pass the qualifying examination after two attempts will result in dismissal from the PhD program.

The qualifying exam will consist of an oral exam administered by the student's advisory committee. The University Member appointed to the student's advisory committee must be in attendance for the oral examination. The student's mentor does not serve on the testing committee or attend the oral qualifying examination. Students are provided the general categories of topics to expect on the exam from their advisory committee. The Graduate Advisor will serve as the examination coordinator and aid the student in scheduling the examination. The oral examination typically is scheduled for a two-hour period. The qualifying examination will be graded on a Pass/Fail basis, following the Scoring Rubric implemented by the GSBS. Following completion of the oral qualifying examination the Graduate Advisor will submit the signed [Oral Qualifying Examination Notice](#) to the Graduate School of Biomedical Sciences Office of Admission and Services (GSBS OAS).

Two attempts to successfully pass the qualifying examination are allowed. Failure of the student to pass the qualifying examination results in dismissal of the student from the doctoral program. A doctoral student who does not pass may be allowed to complete the requirements for a Master of Science degree.

Research Proposal

Following the successful completion of the qualifying examination the student should meet with their advisory committee to establish a tentative timeline for their development of their research proposal and establish a tentative date for their proposal defense. All doctoral students must submit their dissertation research proposal no later than the end of the second year of study. The research proposal is an outline of the dissertation project. It must include a summary of the proposed project, the hypothesis to be investigated, significance of the project, research design and methodology to be used, and a thorough

review of the salient literature that supports or opposes the hypothesis and potential limitations. To take advantage of the advisory committee's expertise and advice, students are encouraged to meet with committee members regularly during the development of their research project. Students should refer to the [GSBS Research Proposal Guidelines](#) in the preparation of their document. The written proposal must be supplied to the Advisory Committee two weeks prior to the scheduled proposal defense date for review. The student must prepare an oral presentation outlining their project and the specific aims in sufficient detail for the Advisory Committee to assess the scientific merit of the project. The research proposal must be approved by the advisory committee and the dean prior to registering in Dissertation (BMSC 6395). The student is required to enroll for dissertation credit and must maintain continuous enrollment in Doctoral Dissertation (BMSC 6395) until the dissertation has been completed.

Upon completion of the qualifying exam and the research proposal, a Ph.D. student will be advanced to candidacy. M.S. students are not required to take the qualifying examination, but are required to complete the research proposal.

4. Additional Information

In addition to all of the information provided in this document, students should consult the [GSBS catalog](#) for admissions information, general degree information, and academic procedure information.