Structural Anatomy & Rehabilitation Sciences Discipline Handbook 2020-21

The information provided in this document serves to supplement the requirements of the Graduate School of Biomedical Sciences detailed in the UNTHSC Catalog with requirements specific to the discipline of Structural Anatomy and Rehabilitation Sciences.

Table of Contents

Structural Anatomy and Rehabilitation Sciences Discipline

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The Structural Anatomy and Rehabilitation Sciences (SARS) discipline is a collaborative, inter-professional discipline offered by the Center for Anatomical Sciences and the Department of Physical Therapy. Our discipline offers both M.S. and Ph.D. degrees aligned with research opportunities, coursework, and teaching experiences. These activities are designed to develop and train students who will be qualified to serve as faculty members and independent researchers in various departments at health science centers and universities. The discipline will focus on anatomy, biomechanics, and movement science using advanced experimental, computational, and clinical tools. The major impetus of the research in the discipline will consist of but not be limited to: 1) biomechanics, including the study of the structure, function, evolution/adaptive significance, and mechanical behavior of musculoskeletal soft and hard tissues, 2) neuroscience of movement production, learning and control; 3) anatomical studies linked to clinical applications in orthopedics and physical therapy, 4) the analysis, design, and/or development of rehabilitation protocols, assessment tools and techniques, assistive devices and instrumentation used in rehabilitation practice, 5) studies of educational pedagogy in anatomy/movement science through the development of novel educational tools, techniques, and assessment strategies.

All students entering the discipline will complete an integrated biomedical science core curriculum that includes fundamental principles of biochemistry, cellular and molecular biology, microbiology and immunology, pharmacology, physiology, and neurobiology. Beginning with the second semester, students will enroll in additional elective courses for the discipline such as Applied Biomechanics, Principles of Movement and Motor Control, Structural Anatomy, or system-specific anatomy courses, to be completed during their graduate career. Students are required to participate in seminars, work in progress (WIP) presentations, and journal club for the duration of their graduate career. Students will conduct original, publishable research and will be expected to present their results at the annual UNTHSC Research Appreciation Day (RAD) and at national scientific conferences. The completion of the M.S. degree typically requires two to three years; the Ph.D. degree is generally completed in four to five years.

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

Structural Anatomy and Rehabilitation Sciences Discipline Faculty

Cara Fisher, PhD
Assistant Professor, Physiology and Anatomy

My research focuses on anatomical variation and its relationships to pathology and clinical practice. At UNTHSC, I serve as the course director for the MPAS 5401 (Physician Assistant) gross anatomy courses. I am also a laboratory instructor for dissection-based anatomy courses for first-year medical and graduate students, and I mentor advanced medical and graduate students in elective dissection courses. I am involved with outreach programs supported by the Center for Anatomical Sciences. These programs are designed to get K-12 and college students interested in science and medicine as future career choices by exposing them to the unique opportunities found in medical and/or graduate school.

Lauren Gonzales, PhD
Assistant Professor, Physiology and Anatomy

The overarching goal of my research program is to understand how key changes in primate sensory anatomy have influenced primate and anthropoid evolution. My approach uses comparative anatomy (via CT scans) and ecology of living animals as a reference to reconstruct the functional and adaptive implications of anatomical and behavioral changes in extinct species. Currently, this work centers on two primary areas of study: the semicircular canals of the inner ear and the evolution of the brain. I am also an avid field paleontologist and have developed two field programs aimed at recovering an early fossil record for tropical South American and renewing excavations for Middle Miocene fossil sites on Maboko Island, Kenya. Both localities document a critical period known as the Middle Miocene Climacic Optimum (MMCO), a brief period of global warming followed by a sharp drop in temperatures and increased aridification. At this time many modern taxa make a first appearance. As part of this work, my lab has begun a large mass digitization project aimed at creating a 3-dimensional archive of fossils collected at both sites. Our goal is to expand this part of the project into outreach workshops aimed at introducing free digital anatomy collections to rural communities and classrooms.

Emma K. Handler, MA, PhD
Assistant Professor, Physiology and Anatomy

My research examines the morphological consequences of selection for non-aggressive behavior. Animal domestication and human "self-domestication" theories posit that reduced aggression is the underlying cause of many unintended physical features that emerge in domesticated animals, including tooth size diminution. My research specifically focuses on how hormones mediating aggression (i.e., testosterone, serotonin, etc.) also play regulatory roles during dental development and how selection affecting aggressive behavior yields unintended changes to dentition. Through a collaborative project between the University of Iowa, the University of North Texas Health Science Center, and the Institute of Cytology and Genetics in Novosibirsk, Russia, my work assesses dental size and composition across strains of tame, aggressive, and unselected (wild type) foxes to measure the impact of behavioral selection on dental structures. My work so far has demonstrated that, as expected, tameness does cause dental size reduction. These results support long held, yet untested postulations that heritable aspects of behavior have pleiotropic effects on dental tissue development. Those interested in domesticated foxes can check out some of the numerous popular science articles about them and any of the scientific articles describing their domestication process.

Rehana Lovely, PhD
Assistant Professor, Physiology and Anatomy

Dr. Lovely's research broadly focuses on collaborating with physical therapists, surgeons and other clinicians to investigate human anatomical variations, mapping of surface projection of the peripheral nerves and pathophysiology of myofascial pain. I am also interested in anatomy education research involving community outreach programs and medical student education.

Dr. Howe Liu, PT, MS, MD, PhD
Professor, Physical Therapy

Dr. Liu has spent his research career in neuroscience, anatomy and physical therapy, but in last 18 years his research centers more on balance improvement and fall prevention among older individuals (primarily) and clinical anatomy of the musculoskeletal system in Gross Anatomy lab (secondarily). More specifically, he has led his geriatric research group (faculty members, PhD and DPT students) with focuses on 1) effects of inappropriate use of assistive ambulatory devices (AADs) on gait, balance, and posture; 2) interventions with combination of physical therapy exercise and Chinese medicine to improve gait, balance, strength, and posture in general older population, AAD users, and patient-specific older population; and 3) bioengineering modification and testing of assistive ambulatory devices. Dr. Liu is a very active in providing community services to local senior living communities. As a faculty member, he and his team had provided geriatric rehabilitation related community services to local senior living communities in central Arkansas area (2003-2009) and in DFW metropolitan area (2010 – now).

Scott D. Maddux, PhD
Assistant Professor, Physiology and Anatomy

My research focuses on human evolution during the Middle and Late Pleistocene with an emphasis on Neandertal and modern human craniofacial anatomy. In particular, I am interested in the developmental, biomechanical, and stochastic processes which produced the characteristic midfacial prognathism of Neandertals and orthognathism of modern humans. Related to these issues, I have corollary interests in patterns of human craniofacial allometry, integration, sexual dimorphism, and eco-geographic variation. To investigate these topics, my laboratory employs multiple techniques and approaches, including medical imaging and laser scanning modalities, linear and geometric morphometrics, and experimental modeling in non-human species. Current research projects are primarily concentrated in two main areas; the influence of climatically-adaptive variation in human upper respiratory tract anatomy on overall craniofacial morphology; and the "self-domestication" hypothesis as a model for explaining facial retraction as an evolutionary byproduct of selection for increased social tolerance.

Rachel A. Menegaz, PhD
Assistant Professor, Physiology and Anatomy

My research explores the growth and function of the mammalian masticatory apparatus. The biomechanical demands imposed by dietary composition are known to affect chewing behavior and joint kinematics and, over time, the growth trajectories of the craniofacial skeleton and its associated soft tissues (joint cartilages, muscles of mastication, etc.). By modulating diet, we are able to affect the overall growth of these tissues, dental eruption and occlusion, and even the biomineralization of the masticatory skeleton and fiber type composition of masticatory muscles. I am particularly interested in how early life history events (such as weaning and dental eruption/replacement) affect feeding, growth, and adult morphological outcomes. Current research themes include: (1) Variation in maturation rates among tissues of the masticatory complex and how this affects feeding performance and plasticity. What happens during the transition between infant-like suckling and adult-like chewing, and what are the structural and behavioral constraints that limit efficient feeding during early childhood? (2) The role of type I collagen in the growth of the craniofacial skeleton. How do collagen disorders, such as *osteogenesis imperfecta*, affect the facial phenotype? What behavioral and/or pharmaceutical interventions are effective in recovering the phenotype and function in these disorders?

I am also involved in outreach activities through the Center for Anatomical Sciences. I am the director of the Summer Opportunities in Anatomy Research (SOAR) internship program and the co-director of the Summer Bridge Program for Texas Academy of BIomedical Sciences (TABS) 9th grade students.

Kimberly Meyer, MPAS, PhD
Associate Professor, Physician Assistant Studies

Dr. Kim Meyer is a licensed Physician Assistant and holds a PhD in Education. Dr. Meyer's clinical practice was in Neurosurgery before moving full time into education. Now as the Director of the Center for Innovative Learning, Dr. Meyer focuses on educational design to facilitate learning and teaching faculty members to improve their educational design and technology skills. Her research focuses on health sciences education, educational outcome mapping and tracking, and backwards curriculum design.

Haylie L. Miller, PhD
Assistant Professor, Physical Therapy

My program of research is focused on investigating *visuomotor integration*–the use of visual information to plan, execute, and modify movement–in Autism Spectrum Disorder (ASD). Visuomotor integration is important for many tasks of daily living, like making a sandwich, walking or playing sports, and driving a car. People with ASD have known differences in eye and body movement. Some people with ASD may also receive a diagnosis of Developmental Coordination Disorder because of the level of difficulty they have with movement and coordination. I work as a principal investigator in the Human Movement Performance Lab, and I lead the Autism and Developmental Disorders Research (ADDR) team. We use a wide variety of methods including neuropsychological assessments, motor assessments, vision screening, mobile eye-tracking, virtual environments, full-body motion-capture, and force plates. We also conduct community-based research using surveys and focus groups, as well as retrospective studies of motor and visual symptoms of ASD using secondary datasets and electronic medical records from local and national sources. Our overarching goal is to understand how visual and motor systems work together to produce functional (or dysfunctional) movement in ASD and related developmental disorders.

Sarah Moudy, PhD
Instructor, Department of Family Medicine and Osteopathic Manipulative Medicine

My background is in sports biomechanics, with specific expertise on detecting measures of neuromuscular function and gait mechanics in relation to injury mechanisms. My research focus is on determining injury risk factors based on gait deviations in individuals with lower-limb pathologies (e.g. amputation, osteoarthritis) and incorporating research into clinic settings for direct patient care impact. I work in the Human Movement Performance Lab. Within the lab, I am developing a new line of research using wearable sensors and machine learning techniques for an easy, cost-effective, and portable approach to examine gait mechanics in clinical settings. Current research themes are: (i) What kinematic parameters are the most indicative of chronic knee pain and joint degeneration and can these parameters be accurately detected by wearable sensors? (ii) Multi-joint coordination and symmetry in individuals with single joint pathologies. Is coordination and symmetry linked to progression of lower-limb injury or onset of injury at a non-injured joint? The overarching goal of this research, in line with the Human Movement Performance lab goals, is to improve knowledge of musculoskeletal and biomechanical functions by aiding physicians in the diagnosis and treatment of lower-limb pathologies.

Rita M. Patterson, PhD
Professor, Department of Family and Osteopathic Manipulative Medicine

My background is in biomedical engineering, with specific training and expertise in applied research in Orthopaedics, human performance, and rehabilitation. I have a unique perspective that can bridge and facilitate technology development in clinical settings and applications. In the department of Orthopaedic Surgery and Rehabilitation at the University of Texas Medical Branch in Galveston TX, I had a successful partnership for 20 years with a hand surgeon investigating the anatomic, biomechanic and kinematics of the carpal bones and the upper extremity. I also worked closely with upper extremity physical therapists and rehabilitation science specialists to understand hand function. At UNTHSC, Dr. Patterson works in the Human Movement Performance laboratory. This lab is devoted to improving knowledge of musculoskeletal function in order to assist physicians in the diagnosis and treatment of medical problems. The goals include improved clinical measurements of biomechanical function, objective methods of evaluation, treatment, and therapy, and mathematical/computer models of muscle, joint, and bone mechanics.

Rustin E. Reeves, PhD
Professor, Physiology and Anatomy

Dr. Reeves' research includes collaboration with physical therapists, orthopedic surgeons, and clinicians to investigate pathological issues from an anatomical and biomechanical perspective. Recent research involves ultrasound diagnosis of ankle injuries and surface mapping of the dorsal scapular nerve for use in pain management. Other areas of interest include K-12 science outreach programs for teachers and students interested in the biomedical sciences. Dr. Reeves is also involved with clinical skills training of area health care professionals utilizing cadavers from the Center's Willed Body Program. The Center for Anatomical Sciences houses the institution's BioSkills Laboratory which offers numerous clinical training activities and serves as a research facility for graduate students, faculty, and orthopedic surgeons in the Dallas-Fort Worth area.

Armando Rosales, MD
Associate Professor, Physiology and Anatomy

My research broadly focuses on human anatomical variation with a particular emphasis on clinically/surgically-relevant structures. I am heavily involved with outreach programs at the UNTHSC Center for Anatomical Sciences. These programs, including Mentors for Life, the Texas Academy of Biomedical Sciences (TABS) Summer Bridge Program, the JAMP summer programs, and the UNTHSC Anatomy Pre-matriculation Workshop, give K-12 and college students interested in pursuing careers in science and/or medicine a unique opportunity to experience human anatomy in a medical school setting.

Requirements

The requirements below are in addition to the GSBS requirements listed in the GSBS Degree Programs chapter of the UNTHSC Catalog.

A student interested in the SARS discipline must maintain an overall GPA of 3.0 or better after the first semester to join SARS.

I. REQUIRED COURSES

BMSC core and required courses
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
BMSC 6200 – Experimental Design and Biostatistics
BMSC 5160 – Biomedical Ethics
BMSC 5150 – Lab Rotations [two are required]

Structural Anatomy and Rehabilitation Science Students must take at least one structural anatomy and one rehabilitation science course (see below).

A student who receives a "C" or "F" in one of the discipline-specific required courses (e.g., PHAN 5401) 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 they receive "A's" and/or "B's" upon retaking the courses, they will be allowed to take the oral qualifying exam.

II. TEACHING PRACTICA, SEMINAR COURSE, WIPS, AND JOURNAL CLUB

PHAN 6000 – Teaching Practicum
PHAN 6100 – Laboratory Teaching Practicum
PHAN 5140 – Seminar in Current Topics
PHAN 6150 – Structural Anatomy & Rehabilitation Sciences Journal Club

Students interest in education and teaching are encouraged to take PHAN 6000 and PHAN 6100. This is not requirement for all students, but we encourage all those interested in academic environments to participate in these courses.

Students are required to register for the Seminar in Current Topics course (PHAN 5140) in the spring of Year 1. Starting in Year 2, all MS and PhD students are expected to present their research in the Seminar in Current Topics course (PHAN 5140) a minimum of once per year as a "work in progress" (WIP).

All SARS students are required to register for a journal club course (PHAN 6150) during every long semester beginning in the spring of year 1. Once MS students register for Thesis

(BMSC 5395) or PhD students register for Doctoral Dissertation (BMSC 6395), they are no longer required to register for a journal club course; however, we encourage attendance.

III. **ELECTIVE (ADVANCED AND TECHNIQUE) COURSES** (Must include 4-6 SCH for MS Students and 8-10 for PhD students from the following (other courses can be substituted according to the research project of the student):

Structural Anatomy
Offered every fall semester:
PHAN 6340 – Structural Anatomy of the Musculoskeletal System [required course for all SARS students]
PHAN 5630 – Structural Neuroscience [required course for all SARS students]
PHAN 5332 – Structural Anatomy of the Cardiopulmonary System
PHAN 5334 – Structural Anatomy of the Human Digestive and Renal System
PHAN 5400 – Histology
PHAN 5390 – Head and Neck Anatomy

Offered every spring semester:
PHAN 5401 – Structural Anatomy
PHAN 5330 – Structural Anatomy of the Human Reproductive System

Offered alternating spring semesters:
PHAN 6204 – Embryology

Rehabilitation Sciences
Offered every fall semester:
PHAN 6301/DPHT 7320 – Integrated Control of Movement
DPHT 7501 – Clinical Med I

Offered every spring semester:
PHAN 6307 – Principles of Movement and Motor Control
PHAN 6308 – Applied Biomechanics [required course for all SARS students]
PHAN 6200/DPHT 7225 – Culture, Teaching and Learning
PHAN 6201/DPHT 7254 – Advanced Clinical Diagnostic and Imaging
PHAN 6202/DPHT 7256 – Health Promotion
PHAN 6300/DPHT 7305 – Applied Anatomy and Kinesiology
PHAN 6302/DPHT 7323 – Applied Exercise Physiology
PHAN 6303/DPHT 7324 – Development and Geriatrics
DPHT 7502 – Clinical Med II

Courses cross-listed with the DPHT curriculum require a one-semester advanced approval from the course instructor.

Other
Students may take courses from other programs as electives with consent from the major professor and the SARS graduate advisor. Students are encouraged to seek out Specials Problems (BMSC 5390/6390) courses to strengthen their knowledge and application of biomedical sciences.

SAMPLE DEGREE PLANS

I. ***Master of Science***

The typical degree plan leading to the M.S. degree is outlined below. The degree plan may vary depending on availability of course offerings in a given semester and each student's background and progress toward the thesis project. This is a template and should be modified accordingly.

MS Degree Plan for Structural Anatomy and Rehabilitation Sciences Track		
Year 1: Fall		
BMSC 6201	Fundamentals of Biomedical Science I	2
BMSC 6202	Fundamentals of Biomedical Science II	2
BMSC 6203	Fundamentals of Biomedical Science III	2
BMSC 6204	Fundamentals of Biomedical Science IV	2
BMSC 5150	Lab Rotations (1 SCH; each student will register for 2 rotations)	2
BMSC 6200	Experimental Design and Biostatistics	2
Milestones	*Change of Discipline; Designation of Major Professor*	0
		12 SCH
Year 1: Spring		
BMSC 5160	Biomedical Ethics	1
BMSC 5315	Principles of Scientific Communication	2
BMSC 5998	Individual Research	1-5
PHAN 5140	Seminar in Current Topics	1
PHAN 6150	SARS Journal Club	1
PHAN 6308	Applied Biomechanics	2
ELECTIVES	Recommended: PHAN 5401 (5 SCH)	0-5
Milestones	*Designation of Advisory Committee; Degree Plan*	0
		12 SCH
Year 1: Summer		
BMSC 5998	Individual Research	6
		6 SCH
Year 2: Fall		
BMSC 5998	Individual Research	1-5
PHAN 6150	SARS Journal Club	1
PHAN 6340	Structural Anatomy of the Musculoskeletal System	4
PHAN 5630	Structural Neuroscience	2
ELECTIVES	Recommended: PHAN 5332 (2 SCH), PHAN 5334 (3 SCH)	0-5
Milestones	*Research Proposal*	0
		12 SCH
Year 2: Spring		
PHAN 6000	Teaching Practicum	1
PHAN 6100	Laboratory Teaching Practicum	2
PHAN 6150	SARS Journal Club	1
BMSC 5998	Individual Research	1-4
ELECTIVES	Recommended: PHAN 5330 (3 SCH), PHAN 6307 (4 SCH)	0-7
		12 SCH
Year 2: Summer		
BMSC 5395	Thesis	6

		6 SCH

II. ***Doctor of Philosophy (Ph.D)***

The typical degree plan leading to the Ph.D. is outlined below. The degree plan may vary depending on availability of course offerings in a given semester and each student's background and progress toward the thesis project. This is a template and should be modified accordingly.

PhD Degree Plan for Structural Anatomy and Rehabilitation Sciences Track		
Year 1: Fall		
BMSC 6201	Fundamentals of Biomedical Science I	2
BMSC 6202	Fundamentals of Biomedical Science II	2
BMSC 6203	Fundamentals of Biomedical Science III	2
BMSC 6204	Fundamentals of Biomedical Science IV	2
BMSC 5150	Lab Rotations (each student will register for 2 rotations)	1 (2)
BMSC 6200	Experimental Design and Biostatistics	2
Milestones	*Change of Discipline; Designation of Major Professor*	0
		12 SCH
Year 1: Spring		
BMSC 5160	Biomedical Ethics	1
BMSC 5315	Principles of Scientific Communication	2
BMSC 5998	Individual Research	1-5
PHAN 5140	Seminar in Current Topics	1
PHAN 6150	SARS Journal Club	1
PHAN 6308	Applied Biomechanics	2
ELECTIVES	Recommended: PHAN 5401 (5 SCH)	0-5
Milestones	*Designation of Advisory Committee; Degree Plan*	0
		12 SCH
Year 1: Summer		
BMSC 6998	Individual Research	1-6
		6 SCH
Year 2: Fall		
BMSC 6998	Individual Research	1-5
PHAN 6150	SARS Journal Club	1
PHAN 6340	Structural Anatomy of the Musculoskeletal System	4
PHAN 5630	Structural Neuroscience	2
ELECTIVES	Recommended: PHAN 5332 (2 SCH), PHAN 5334 (3 SCH)	0-5
Milestones	*Qualifying Exam*	0
		12 SCH
Year 2: Spring		
PHAN 6150	SARS Journal Club	1
BMSC 6998	Individual Research	1-5
PHAN 6100	Laboratory Teaching Practicum	2
ELECTIVES	Recommended: PHAN 5330 (3 SCH), PHAN 6307 (4 SCH)	0-7
		12 SCH
Year 2: Summer		
BMSC 6998	Individual Research	4
PHAN 6000	Teaching Practicum	2
Milestones	*Research Proposal*	0

		6 SCH
Year 3: Fall		
BMSC 6998	Individual Research	2-6
PHAN 6150	SARS Journal Club	2-4
PHAN 6100	Laboratory Teaching Practicum	2
ELECTIVE	Electives	1-5
		9 SCH
Year 3: Spring		
BMSC 6998	Individual Research	2-4
PHAN 6150	SARS Journal Club	1
PHAN 6100	Laboratory Teaching Practicum	2-4
		9 SCH
Year 3: Summer		
BMSC 6998	Individual Research	1-6
		6 SCH
Year 4: Fall		
BMSC 6998	Individual Research	2-4
PHAN 6100	Laboratory Teaching Practicum	2-4
BMSC 6395	Doctoral Dissertation	3
		9 SCH
Year 4: Spring		
BMSC 6395	Doctoral Dissertation	9
		9 SCH

D.O./Ph.D. and P.T./Ph.D. DEGREES

At least 60 hours of credits not included in the D.O. or DPT programs are required to obtain a Ph.D. in Structural Anatomy and Rehabilitation Sciences as a second terminal degree.

Advancement to Candidacy

I. Master of Science

Advancement to Master's Candidacy is achieved after successful completion of a research proposal.

The research proposal is a detailed outline of the thesis project. It must include a summary of the proposed project, the hypothesis and aims to be investigated, significance and innovation of the project, research design and methodology to be used, a 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, and to clearly define the project and the committee's expectations, it is imperative that the student meets with his/her advisory committee before preparing the research proposal. **The research proposal should be provided to the advisory committee no later than 14 days prior to the defense.** The formal presentation and defense of the research proposal will only be to the members of the student's advisory committee. The research proposal must be approved by the advisory committee and the Dean prior to registering for Thesis (BMSC 5395). It is expected that M.S. students will complete their Research Proposal in the Fall of year 2. Research Proposal Guidelines and the Research Proposal approval forms are available on the GSBS Forms and Guidelines website.

Research Proposal Guidelines and the Research Proposal approval forms are available on the GSBS Forms and Guidelines website.

Once a master's student has successfully advanced to candidacy, he/she may use "MS Candidate" as a title on any general business correspondence such as business cards, e-mail messages, etc.

II. Doctor of Philosophy

Advancement to Doctoral Candidacy is a two-step process. The first step of this process is successful completion of the Oral Qualifying Examination, a common rite of passage in most doctoral programs regardless of the field of study. The second step of this process is the preparation and defense of a research proposal. Below are details of the Structural Anatomy and Rehabilitation Sciences Discipline for advancing to candidacy.

A. Oral Qualifying Examination

The qualifying examination ensures that the doctoral student has mastered information needed to succeed as a Ph.D. in the fields associated with Structural Anatomy and Rehabilitation Sciences (e.g., biomechanics, evolutionary biology, experimental biology, physical therapy, engineering). The qualifying examination within the Structural Anatomy and Rehabilitation Sciences discipline should be successfully completed after completing the GSBS core and the required SARS advanced courses with a GPA of at least 3.0. The course requirement to take the exam will be slightly modified for dual degree students. The main goal of the examination is to ensure that each doctoral student has a broad knowledge base in the biomedical sciences and principles of structural anatomy and rehabilitation science. Students should also be able to discuss concepts associated with biochemistry, immunology, physiology, and cell biology. Students will receive a study guide from the SARS graduate advisor upon their matriculation into the discipline. The student is expected to become knowledgeable in the topics covered in the study guide through their course work, reading of textbooks and scientific literature, and discussion with faculty members.

A committee comprised of members of the Structural and Rehabilitation Sciences graduate faculty, other UNTHSC faculty members, and the student's university member administer the qualifying examination. The graduate advisor will serve a committee chair for the qualifying exam and is a voting member of the committee. The graduate advisor will also appoint 3-4 additional voting faculty members to the committee. The university member serving on the student's advisory committee is a non-voting member and must be present for the qualifying exam. The student's major professor is discouraged from attending the qualifying examination and may not participate in the exam or cast a vote.

The qualifying examination will be administered in the Fall of year 2. 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 (terminal Master's Degree). It is the responsibility of the student to obtain signatures from the examination committee, university member, graduate advisor, and department chairman upon completion of the exam. The appropriate form may be obtained from the GSBS Forms and Guidelines website.

All modification to the requirements must be discussed with the graduate advisor.

B. Research Proposal

The research proposal is an outline of the dissertation project. It must include a summary of the proposed project, the hypothesis and aims to be investigated, significance and innovation of the project, research design and methodology to be used, a 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, and to clearly define the project and the committee's expectations, it is imperative that the student meets with his/her advisory committee before preparing the research proposal. **The research proposal should be provided to the advisory committee no later than 14 days prior to the defense**. However, it is strongly recommended that the student provide their research proposal to their advisory committee earlier (ideally, 4 weeks in advance). This is a professional courtesy to the advisory committee and may assist the student in strengthening their proposal prior to the defense. Research Proposal Guidelines and the Research Proposal approval forms are available on the GSBS Forms and Guidelines website.

The student will set a meeting with his/her mentor and advisory committee including the university member to present and defend the proposal. The student's advisory committee will determine if the proposal is satisfactory.

For Ph.D. students, the proposal should be completed within a year of having passed their qualifying examination (ideally in the summer of year two). The proposal must be approved by the student's advisory committee and submitted to the GSBS, at the latest, during the semester prior to the student's final semester. The formal presentation of the research proposal will only be to the members of the student's advisory committee. The research proposal must be approved by the advisory committee and the Dean prior to registering for Dissertation (BMSC 6395). Research Proposal Guidelines and the Research Proposal approval forms are available on the GSBS Forms and Guidelines website.

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.

Once a doctoral student has successfully advanced to candidacy, he/she may use "PhD Candidate" or "Doctoral Candidate" as a title on any general business correspondence such as business cards, e-mail messages, etc. In addition, the minimum number of credit hours required for full-time enrollment drops from 12 SCH to 9 SCH in long semesters. Full-time enrollment remains 6 SCH in summer semesters.

Other

I. Yearly Progress Reports

The yearly progress report is a formal meeting where the student and advisory committee meet to evaluate your progress. This meeting is intended to help student focus on their personal academic goals within their selected academic field. Please see the GSBS Forms and Guidelines website for the rubric associated with this yearly milestone. This report will allow you to reflect on your academic year and your research progress. During this meeting, faculty may advise on how best to improve. Again, this meeting is to help teach you how to create and manage your research agenda.

Yearly progress reports are due no later than the last day of the summer semester as defined by the most current academic years calendar. However, it is strongly encouraged that students submit at least a month early.

II. Individual Development Plan

The individual development plan (IDP) is a tool to help a student focus on how to leverage their expertise into a satisfying and productive career. Student will be required to complete an IDP throughout their graduate careers at UNTHSC. The individual development plan (IDP) will help students explore career possibilities and set goals to follow the career path that fits them best.

Students will be prompted by the GSBS when an IDP requires submission, revision, or reevaluation.