



# **COLLEGE OF BIOMEDICAL AND TRANSLATIONAL SCIENCES**

## **Visual Sciences Discipline Handbook 2025-2026**

Regardless of the discipline, each CBTS student (MS or PhD) will receive the degree of Biomedical Sciences. The discipline is listed on the transcript as the Major.

The information provided in this document serves to supplement the requirements of the College of Biomedical and Translational Sciences detailed in the UNT Health Fort Worth Catalog with requirements specific to the discipline of Visual Sciences.

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## Visual Sciences Discipline

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**Graduate Faculty:** Acharya, Clark, Inman, Karamichos, Krishnamoorthy, Millar, Stankowska, Wu, Kim.

### **Description of the Visual Sciences Discipline:**

Vision is one of the most important senses of the human body. Although our knowledge of eye diseases has greatly advanced over the last 50 years, the leading causes of vision loss and blindness, for example: age-related macular degeneration, glaucoma, cataract, and diabetic retinopathy continue to affect hundreds of millions of people worldwide. Therefore, there still exists a very great need to prevent and treat these, and other eye diseases. The continued success of this mission depends upon further elucidation of disease mechanisms.

Vision science is the study of the physiology and pathology of the visual system, which includes the eye, its appendages, and several regions of the brain, especially the thalamus, superior colliculus, and visual cortex. This delicate system is extremely sensitive to aging, genetic disorders, infection, and injuries. Vision scientists combine neuroscience, cell biology, molecular biology, biochemistry, and electrophysiology techniques with ocular cell, tissue and animal models to study the visual system under normal or disease conditions.

The research of our current faculty focuses on eye diseases including glaucoma, retinal degeneration, corneal diseases, cataract, and diabetic retinopathy. Their research areas cover trabecular meshwork pathology, aqueous humor dynamics, retinal ganglion cell protection and regeneration, ocular responses to steroids, ocular genetic diseases, corneal biology, retinal pigment cell protection, oxidative stress, lens biology, and gene therapy. Faculty research is funded by extramural sources including: The National Eye Institute (NEI, a subsidiary of the National Institutes of Health (NIH)), U.S. Department of Defense (DoD), The Bright Focus Foundation, Glaucoma Research Foundation, The Knights Templar Eye Foundation, Harrington Foundation, Fight for Sight, as well as a number of pharmaceutical companies.

Students may enter the discipline with a variety of academic backgrounds, providing that they have fulfilled prerequisite courses. The graduate training program involves basic courses in cell biology, immunology, molecular biology, biochemistry, physiology, immunology and pharmacology, as well as advanced courses in specific vision science topics. Besides lectures, students have the opportunity to participate in seminars, journal clubs and clinical shadowing in techniques of contemporary vision research as well as clinical diagnosis and treatment. Students perform original publishable research, and present their research findings at local, national, and/or international scientific conferences. In addition, students present their research at the annual UNT Health Fort Worth Research Appreciation Day (RAD) and during the bimonthly institutional Works in Progress (WIPs). About two years are required to complete the Master of Science degree. Approximately four to five years are required to complete the Doctor of Philosophy degree. However, the actual time required for graduation depends on students' academic performance, which is determined by the major professor and the advisory committee.

Graduates with advanced degrees find employment in higher education, the pharmaceutical and biotechnology industries, and government agencies.

## Graduate Faculty and their Research Programs

### Graduate Faculty Membership Categories:

Associate members of the Graduate Faculty are able to serve as members of thesis or dissertation advisory committees, as major professors or co-major professors on thesis advisory committees, and as co-major professor on dissertation advisory committees with a full member as the other co-major professor.

Full members of the Graduate Faculty are able to serve as members of thesis or dissertation advisory committees, and as major professors or co-major professors on thesis or dissertation advisory committees.

### **Suchismita Acharya, Ph.D.**

Assistant Professor, Pharmacology and Neuroscience  
Full Member

The Acharya laboratory's research is focused on expanding the chemical toolbox for neural signaling and anti-inflammation/anti-oxidant pathways to understand the mechanism of action of the disease pathology associated with glaucomatous optic neuropathy, Alzheimer Diseases, and ischemic stroke, as well as angiogenesis. The lab integrates medicinal chemistry, chemical biology, bio-engineering, and drug delivery via nanotechnology. We employ synthetic organic and organometallic chemistry to generate small molecule libraries for low throughput as well as high throughput screening (target based as well as phenotypic). Projects involve traditional medicinal chemistry SAR for property optimization to identify hit-to-lead candidates and their structure, fragments or ligand-based drug design using structural biology, and computational chemistry tools. Fluorescent and ESR active probe design for signaling study as well chemiluminescence assays are used. Pro-drug design to achieve chemical and metabolic stability, use of nanomeric materials and polymeric particles for drug delivery study is another core interest of Acharya lab. [Dr. Acharya's Profile](#)

### **Abe Clark, Ph.D.**

Regent's Professor, Pharmacology and Neuroscience  
Full Member

The Clark laboratory works to discover the cellular and molecular pathogenic pathways in ocular diseases, particularly glaucoma, in order to develop new disease modifying therapies to better treat and prevent ocular diseases. Ongoing projects include developing and characterizing cellular, organ culture, and mouse models of glaucoma (including trabecular meshwork, optic nerve head, optic nerve, and visual centers of the brain); determining the role of glucocorticoids in ocular hypertension and glaucoma; ocular gene therapy and genome editing; discovering the molecular pathways involved in glaucoma related genes Myocilin, TGF $\beta$ 2, SFRP1, and Gremlin, leading to the development of novel disease modifying therapies; and discovering retinal neurodegeneration pathways and new neuroprotection therapeutic strategies. [Dr. Clark's Profile](#)

**Denise Inman, Ph.D., Graduate Advisor**

Associate Professor, Pharmaceutical Sciences

Full Member

The Inman laboratory investigates the mechanisms of glaucoma, with an emphasis on how neurons and glial cells interact during the process of degeneration in the retina and optic nerve. Our research has implicated metabolism in the pathogenesis of glaucoma, finding that transfer of energy substrate is compromised and mitochondria are dysfunctional prior to axon loss. We investigate how expanding the options for energy substrate acquisition for retinal ganglion cells can ensure their survival. These observations offer new targets for therapeutic development. [Dr. Inman's Profile](#)

**Dimitrios Karamichos, Ph.D.**

Professor, Pharmaceutical Sciences and Pharmacology and Neuroscience

Full Member

The Karamichos laboratory investigates novel therapies for the treatment of corneal trauma and diseases. More specifically, we are working on the following research topics: 1) Keratoconus: A corneal disorder affecting 1:400 people worldwide characterized by progressive thinning and steepening of the cornea. The pathobiology and treatment of this disorder remains elusive. The lab is working with clinicians, on pre-clinical studies, as well as in vitro models in order to delineate the mechanisms that drive Keratoconus. 2) Diabetic Keratopathy: Corneal complications due to diabetes include corneal erosions, corneal scarring, endothelium shape abnormalities, and decreased epithelial barrier function. The lab is utilizing both in vitro and in vivo models in order to develop novel, non-invasive treatments for the disease. 3) Corneal trauma: Physical, chemical, or any injury to the human cornea can be a serious threat to vision. The gold standard treatment, to-date, is corneal transplantation. While corneal transplantation is a safe procedure, it comes with numerous limitations and side effects including bleeding, infections, swelling, clouding of lens and/or cataracts, glaucoma, and a lifetime of treatment with steroids. The lab, using both in vivo and in vitro models, and novel molecules, seeks to develop novel drugs and/or therapeutic modalities for the treatment of corneal trauma. 4) 3D bioprinting: The lab, in collaboration with industry partners, are developing novel fabrication methods of a living cornea. [Dr. Karamichos' Profile](#)

**Raghu Krishnamoorthy, Ph.D.**

Professor, Pharmacology and Neuroscience

Full Member

My laboratory works on the development of endothelin receptor antagonists as neuroprotective agents for the treatment of glaucoma. Glaucoma is often referred to as the “sneak thief of sight” since the disease generally produces minimal pain or discomfort. Glaucoma is an optic neuropathy, commonly associated with an elevation of intraocular pressure, resulting in the degeneration of the optic nerve and loss of retinal ganglion cells, which leads to progressive loss of vision. Currently, the mainstay of glaucoma treatment is reduction in intraocular pressure, however, neurodegenerative effects persist in some patients. Hence, there is an unmet need for neuroprotective treatments for glaucoma. Our prior studies have shown that endothelin receptors are increased in a rodent model of glaucoma and contribute to damage to the optic nerve and death of

retinal ganglion cells. We are currently testing endothelin receptor antagonists for their ability to promote neuroprotection, following elevation of intraocular pressure in rats. The long-term goal is to understand mechanisms by which a blockade of the endothelin receptor could promote neuroprotection and develop neuroprotective treatments for glaucoma patients. [Dr. Krishnamoorthy's Profile](#)

**J. Cameron Millar, Ph.D.**

Research Assistant Professor, Pharmacology and Neuroscience  
Associate Member

In recent years I have focused on the mouse as a model for the study of Primary Open-Angle Glaucoma (POAG). My current interests include (in the mouse): measurement of intraocular pressure (IOP); the study of aqueous humor dynamics, and creation of induced models of POAG via over-expression of POAG-associated transgenes using viral vectors; creation of induced models of POAG via weekly periocular injection treatment with dexamethasone; creation of transgenic (Tg) models of POAG; models of retinal ganglion cell (RGC) degeneration achieved via retinal ischemia/reperfusion (I/R) and optic nerve crush (ONC); imaging of retinal tissues via Spectral Domain-Ocular Coherence Tomography (SD-OCT); assessment of visual acuity via assessment of the optomotor response, and assessment of the electroretinogram (ERG); and ocular examination (slit lamp examination, direct ophthalmoscopy, gonioscopy). [Dr. Millar's Profile](#)

**Dorota Stankowska, Ph.D.**

Associate Professor, Pharmacology and Neuroscience  
Full Member

Glaucoma is an eye disease commonly associated with an increase in intraocular pressure, afflicting nearly 3 million Americans and 70 million people world-wide. Current therapies are aimed at lowering intraocular pressure, however, damage to the optic nerve continues to occur despite these treatments. There is a pressing need for adjunct therapies aimed at protecting the optic nerve from further damage.

Stankowska's laboratory research focuses on the development of strategies for neuroprotection in glaucoma. Specifically, we are testing various small molecules, and adeno-associated viral gene therapies for their ability to attenuate neurodegeneration in animal models of glaucoma. We also aim to unravel cellular and molecular mechanisms underlying the pathophysiology of glaucoma. Concepts/techniques: We carry out these studies using in vitro rat primary retinal ganglion cell cultures, ex vivo adult rat retinal explants as well as various in vivo rodent models of glaucoma. We use visual function tests including pattern ERG, and optomotor test to determine the efficacy of clinically relevant experimental pharmacotherapies. Our ongoing studies have the potential to develop novel therapeutic agents for neuroprotection in glaucoma. [Dr. Stankowska's Profile](#)

**Hongli Wu, Ph.D.**

Associate Professor, Pharmaceutical Sciences  
Full Member

The central theme of my research is to understand the role of oxidative stress defense agents/enzymes and their functional targets and potential therapies in eye diseases. Of primary interest is age-related macular degeneration (AMD), the most common retinal disorder that affects 25 million people worldwide, yet its pathogenesis remains poorly understood. My lab uses gene knockout and transgenic animals as models to elucidate how altered redox signaling and disrupted redox homeostasis contribute to the pathogenesis of AMD. My research emphasizes the effects of oxidative damage and its repair on retinal proteins, in particular the thiol (SH)-containing proteins/enzymes. We also identify natural product-derived antioxidants for AMD treatment. [Dr. Wu's Profile](#)

**Jayoung Kim, Ph.D.**

Assistant Professor, Pharmaceutical Sciences  
Associate Member

Dr. Kim's research focus is the engineering of new formulation/technology for enhanced gene therapy against a number of disease indications, including: ocular disease, cancer, and other immunological disorders. Dr. Kim's research laboratory aims to achieve precision and personalization of nucleic acid delivery vectors through innovative and rational optimization. [Dr. Kim's Profile](#)

## Requirements

The requirements below are in addition to the CBTS requirements listed in the [Academic Procedures](#) chapter of the [UNTHSC Catalog](#).

**GPA requirements:**

For graduate core courses:

All students are required to maintain a GPA of 3.0 (equivalent to "B") or higher in every graduate course. 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 Visual Sciences Discipline and enroll in PHRM 6401, PHRM 6402, and PHRM 6440. For these courses, the student is required to earn an "A" or "B" grade. A student who receives a single "C" in one of these courses will be required to retake the course and must then achieve an "A" or a "B" grade before being allowed to proceed to candidature for the Oral Qualifying Examination (OQE). The student's major professor is expected to work with the students to improve their knowledge in related areas during the student's graduate study.

### I. REQUIRED COURSES

Visual Sciences I (PHRM 6401) – 4 SCH  
Visual Sciences II (PHRM 6402) – 4 SCH



## Methods in Molecular Biology (PHRM 6440) – 4 SCH

An MS or PhD student who receives a “C” in one of these required courses (PHRM 6401, PHRM 6402 or PHRM 6440) will be allowed to self-remediate the course and the PhD student will still be allowed to take the oral qualifying exam in the summer of year 1 or the fall of year 2. An MS or PhD student who receives two or more “C’s” in the discipline-specific required courses must retake those courses in their entirety the following year. If the PhD student receives “A’s” and/or “B’s” upon retaking the courses, they will be allowed to take the oral qualifying exam.

## II. SEMINAR COURSES, JOURNAL CLUB COURSES, AND WIPs

Journal Club in Visual Sciences (PHRM 5220) – 1 SCH

Seminars in Visual Sciences (PHRM 5120) – 1 SCH

All Visual Sciences students are required to register for a journal club course (PHRM 5220) during every long semester beginning in the spring of year 1. Once MS students register for Thesis (BMSC 5395) or PhD students submit their Intent to Graduate form, they are encouraged to, but no longer required to register for the PHRM 5220 journal club course. All MS and PhD students are required to present their research in Seminar in Visual Sciences (PHRM 5120), also known as “Works in Progress” meetings, or WIPs, twice per year, beginning in their second year.

## Important Catalog Links

For information on: Academic Misconduct, Academic Standing, Annual Performance Review, Appeal Processes, Auditing, Change of Discipline, Class Attendance, Concurrent Enrollment, Course of Instruction, Course Syllabus, Enrollment Requirements, Final Examinations, Graduate Advisor, Graduation, Grade Requirements, Leave of Absence, Make-Up Examinations, Course Duplications, Quality of Work Required, Remediation of First-Year Courses, and Probation and Suspension; see [Academic Procedures](#)

## General Ph.D. Core Course Requirements

BMSC 5108	Transferable Skills	1 SCH
BMSC 6150	Lab Rotations	2 SCH
BMSC 5160	Biomedical Ethics	1 SCH
BMSC 5215	Principles of Scientific Communication	2 SCH
BMSC 6101	Responsible Conduct of Research	1 SCH
BMSC 6102	Grant Writing	1 SCH
BMSC 6200	Experimental Design and Biostatistics	2 SCH
BMSC 6201	Fundamentals of Biomedical Sciences I	2 SCH
BMSC 6202	Fundamentals of Biomedical Sciences II	2 SCH
BMSC 6203	Fundamentals of Biomedical Sciences III	2 SCH
BMSC 6204	Fundamentals of Biomedical Sciences IV	2 SCH
BMSC 6395	Doctoral Dissertation	6- 30 SCH
BMSC 6998	Individual Research	6 - 20 SCH

## Sample Degree Plans

The following are typical degree plans for students in the M.S. or Ph.D. programs in the Visual Sciences discipline. Also, students are expected to complete the core curriculum required by CBTS.

For both the MS and PhD degrees, students are required to take the Core Courses (Fundamentals of BMSCs) in the Fall semester, and Advanced Courses (Visual Science courses) in the Spring and Summer semester of their first year of study. By the end of the Fall semester of their first year of study, they should have identified their Major Professor and applied for change of discipline. They should have formed an advisory committee (Major professor, at least two (MS)/three (PhD) additional graduate faculty members, and a University member), and should have filed a degree plan with the graduate school by the end of the Spring semester of their first year of study. In general, M.S. students could complete their degree in 2 years, while Ph.D. students could graduate after four to five years, if they are able to satisfy the requirements on time.

Once a PhD student has advanced to candidacy (completed the oral qualifying exam and research proposal milestones) they are able to enroll in a total of 6 SCH per semester. A minimum of 2 SCH of BMSC 6395 (Doctoral Dissertation) must be included in the 6 SCH of coursework. Once a PhD candidate submits the “Declaration of Intent to Graduate” Form, they can enroll in a total of 3 SCH of Doctoral Dissertation in the semester in which they will defend their dissertation (the final semester of enrollment.)

## MS Degree Plan for Visual Sciences

### Year 1: Fall

BMSC 6201	Fundamentals of BMSC I	2 SCH
BMSC 6202	Fundamentals of BMSC II	2 SCH
BMSC 6203	Fundamentals of BMSC III	2 SCH
BMSC 6204	Fundamentals of BMSC IV	2 SCH
BMSC 5150	Lab rotations	1 SCH
BMSC 5150	Lab rotations	1 SCH
BMSC 6200	Experimental Design and Biostatistics	<u>2 SCH</u>
<i>Milestones to be completed: Selection of Major Professor, Change of Discipline</i>		12 SCH

### Year 1: Spring

BMSC 5160	Biomedical Ethics	1 SCH
PHRM 5220	Journal Club in Visual Sciences	1 SCH
PHRM 5120	Seminar in Visual Sciences	1 SCH
BMSC 5998	Individual Research	5 SCH

PHRM 6401	Visual Sciences I	<u>4 SCH</u>
	<i>Milestones to be completed: Selection of Advisory Committee, and Degree Plan,</i>	12 SCH
<b>Year 1: Summer</b>		
PHRM 6440	Methods in Molecular Biology	4 SCH
BMSC 5108	Transferable Skills	1 SCH
BMSC 5998	Individual Research	<u>1 SCH</u>
	<i>Milestones: Research Progress Summary, and Research Proposal</i>	6 SCH
<b>Year 2: Fall</b>		
PHRM 6402	Visual Sciences II	4 SCH
PHRM 5220	Journal Club in Visual Sciences	1 SCH
BMSC 5395	Thesis	3 SCH
PHRM 5120	Seminar in Visual Sciences	<u>1 SCH</u>
		9 SCH
<b>Year 2: Spring</b>		
BMSC 5395	Thesis	4 SCH
PHRM 5120	Seminar in Visual Sciences	1 SCH
BMSC 5250	Laboratory management	2 SCH
BMSC 5215	Principles of Scientific Communications	<u>2 SCH</u>
		9 SCH
<b>TOTAL</b>		<u><b>48 SCH</b></u>

## PhD Degree Plan for Visual Sciences

<b>Year 1: Fall</b>		
BMSC 6201	Fundamentals of BMSC I	2 SCH
BMSC 6202	Fundamentals of BMSC II	2 SCH
BMSC 6203	Fundamentals of BMSC III	2 SCH
BMSC 6204	Fundamentals of BMSC IV	2 SCH
BMSC 6150	Lab rotations	1 SCH
BMSC 6150	Lab rotations	1 SCH
BMSC 6200	Experimental Design and Biostatistics	<u>2 SCH</u>
	<i>Milestones: Selection of Major Professor, Change of Discipline</i>	12 SCH
<b>Year 1: Spring</b>		
BMSC 5160	Biomedical Ethics	1 SCH
PHRM 5220	Journal Club in Visual Sciences	1 SCH
PHRM 5120	Seminar in Visual Sciences	1 SCH

BMSC 6998	Individual Research	5 SCH
PHRM 6401	Visual Sciences I	4 SCH
	<i>Milestones: Selection of Advisory Committee, Degree Plan</i>	<b>12 SCH</b>
<b>Year 1: Summer</b>		
PHRM 6440	Methods in Molecular Biology	4 SCH
BMSC 5108	Transferable Skills	1 SCH
BMSC 6998	Individual Research	1 SCH
	<i>Milestones: Oral Qualifying Exam, Research Progress Summary (annual committee meeting)</i>	<b>6 SCH</b>
<b>Year 2: Fall</b>		
PHRM 5120	Seminar in Visual Sciences	1 SCH
BMSC 6102	Grant Writing	1 SCH
BMSC 6998	Individual Research	5 SCH
PHRM 5220	Journal Club in Visual Sciences	1 SCH
PHRM 6402	Visual Sciences II	4 SCH
		<b>12 SCH</b>
<b>Year 2: Spring</b>		
BMSC 5165	Industry Practice and Lab Management	2 SCH
PHRM 5220	Journal Club in Vision Research	1 SCH
BMSC 6998	Individual Research	6 SCH
PHRM 5120	Seminar in Visual Sciences	1 SCH
BMSC 5215	Principles of Scientific Communications	2 SCH
		<b>12 SCH</b>
<b>Year 2: Summer</b>		
BMSC 6101	Responsible Conduct of Research	1 SCH
BMSC 6998	Individual Research	5 SCH
	<i>Milestones: Research Progress Summary (annual committee meeting), approved Research Proposal, and <u>Advancement to PhD candidacy.</u></i>	<b>6 SCH</b>
<b>Year 3: Fall</b>		
BMSC 6395	Doctoral Dissertation	4 SCH
PHRM 5220	Journal Club in Visual Sciences	1 SCH
PHRM 5120	Seminar in Visual Sciences	1 SCH
		<b>6 SCH</b>
<b>Year 3: Spring</b>		
PHRM 5220	Journal Club in Visual Sciences	1 SCH
BMSC 6395	Doctoral Dissertation	4 SCH
PHRM 5120	Seminar in Visual Sciences	1 SCH
		<b>6 SCH</b>

**Year 3: Summer**

BMSC 6395	Doctoral Dissertation	6 SCH
	<i>Milestones: Research Progress Summary (annual committee meeting)</i>	

**Year 4: Fall**

PHRM 5220	Journal Club in Visual Sciences	1 SCH
BMSC 6395	Doctoral Dissertation	4 SCH
PHRM 5120	Seminar in Visual Sciences	1 SCH
		<hr/> 6 SCH

**Year 4: Spring or Final Semester**

BMSC 6395	Doctoral Dissertation	5 SCH
PHRM 5120	Seminar in Visual Sciences	1 SCH
		<hr/> 6 SCH

<b>TOTAL</b>		<hr/> <b>90 SCH</b>
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For additional information regarding Academic Procedures, please refer to the College of Biomedical and Translational Sciences Catalog at: [Academic Procedures \(CBTS\)](#)

## Advancement to MS Candidacy

### Defense of Research Proposal

M.S. students are expected to successfully defend their research proposal by the end of the Fall semester of their second year of study. Students are required to develop their research proposal, and the topic will be based on their graduate study. The Advisory committee and mentor should participate in the development of the proposal.

The student is required to (a) prepare a research proposal in a format approved by their committee (example formats include the NIH F31 or R21), (b) present the proposal in a public seminar, and (c) orally defend the proposal before the student's thesis advisory committee. The proposal should be based on an original hypothesis and should describe specific experimental approaches to address the hypothesis. The major professor will chair the process. The student will meet with the committee at least 2 times during the semester to review drafts of the proposal. The final written proposal must be prepared in the agreed-upon format and presented to the committee at least 14 days prior to the public seminar and oral defense. The grant proposal and the student's oral presentation and defense will be evaluated on the basis of originality and ability to synthesize and communicate the proposal content. The student's major professor may be present and may vote on the outcome. The student's university member must be present for the public seminar and oral defense of the proposal. Upon successful defense of the student's research proposal, the student is advanced to candidacy and can enroll in Thesis (BMSC 5395) in the first long semester immediately following their defense.

## Advancement to Doctoral Candidacy

## Qualifying Examination

Students are required to take the oral qualifying examination (OQE) by the end of the summer semester of the first year or fall semester of their second year of study. The main goal of the OQE is to ensure that each doctoral student has a broad knowledge base and has mastered the fundamental principles of biomedical sciences and visual sciences. The OQE will be directed mainly towards the didactic coursework of the student but understanding of general research techniques in biomedical research and visual sciences will be included. The student is expected to become knowledgeable in these areas via individual reading of textbooks and scientific literature, coursework, seminar attendance, and/or journal club discussions. During the first month of the semester in which the examination is to be taken, the student will submit a written request and meet with the graduate advisor for Visual Sciences to discuss the format of the examination. At least 2-3 months prior to the OQE, students will be provided a list of the topics to be covered by the OQE and the list of faculty members on the Examination Committee. The qualifying examination will be administered by an Examination Committee appointed by the graduate advisor. The graduate advisor will chair the OQE exam unless the graduate advisor is the major professor of the student. In the event the graduate advisor is the major professor, the Examination Committee will elect, from among their members, the chair of the OQE. The student may meet with members of Examination Committee prior to the examination to discuss the topics and the examination schedule. The student's major professor is not present during the oral examination. A university committee member must be in attendance for the oral examination. A student who fails the exam will be required to retake. Two attempts to pass the qualifying examination will be allowed. Failure to pass the qualifying examination after 2 attempts will result in dismissal from the doctoral program. In this case, a student may be allowed to complete the requirements for a Master of Science degree.

## Defense of Research Proposal

Ph.D. students are expected to successfully defend their research proposal by the end of the Summer semester of their second year of study. Students are required to develop their research proposal, and the topic will be based on their graduate study. The Advisory committee and mentor should participate in the development of the proposal.

The student is required to (a) prepare a research proposal in a format approved by their committee (example formats include the NIH F31 or R21), (b) present the proposal in a public seminar, and (c) orally defend the proposal before the student's doctoral advisory committee. The proposal should be based on an original hypothesis and should describe specific experimental approaches to address the hypothesis. The major professor will chair the process. The student will meet with the committee at least 2 times during the semester to review drafts of the proposal. The final written proposal must be prepared in the agreed-upon format and presented to the committee at least 14 days prior to the public seminar and oral defense. The grant proposal and the student's oral presentation and defense will be evaluated on the basis of originality and ability to synthesize and communicate the proposal content. The student's major professor may be present and may vote on the outcome. The student's university member must be present for the public seminar and oral defense of the proposal. Upon successful defense of the student's research proposal, the student is advanced to doctoral candidacy. Two attempts will be allowed. Failure in the defense of research proposal will result in dismissal from the

doctoral program in Visual Sciences. In this case, a student may be allowed to complete the requirements for a Master of Science degree.

Upon successful defense of their research proposal, the student is advanced to candidacy and must enroll in Doctoral Dissertation (BMSC 6395) in the first long semester immediately following their defense. The student can enroll in 6 SCH/semester after advancing to candidacy including at least 2 SCH of BMSC 6395.

### **Expectations**

Graduate students in the Visual Sciences Discipline are expected to meet frequently with their Major Professor to monitor research and academic progress. Students will also meet at least once per year with their thesis/dissertation graduate committee to update the committee on research progress. All students are required to attend the Visual Sciences journal club as well as attend all Visual Sciences Seminars. Students also will be required to attend and present at NTERI Works in Progress Seminars (WIPS).