

UHCO Graduate Program Handbook

November, 2018

Table of Contents

Welcome	3
The College of Optometry Buildings	3
General Information about the Graduate Program.....	6
Content Area of Physiological Optics and Vision Science	7
Graduate Programs Offered	7
Assistantships, Scholarships, & Fellowships.....	8
Curriculum.....	10
<i>Master of Science in Physiological Optics (PHOP) Course Requirements.....</i>	<i>10</i>
<i>Doctor of Philosophy in Physiological Optics Course Requirements</i>	<i>11</i>
The PhD Qualifying Exam in Physiological Optics and Vision Science.....	11
<i>The Written Qualifying Examination</i>	<i>12</i>
<i>The Oral Qualifying Examination.....</i>	<i>13</i>
Technical Skill/Foreign Language Requirement	16
Other PhD Requirements	16
Thesis (MS) & Dissertation (PhD)	17
<i>Initial Steps in Completing a Master's Thesis.....</i>	<i>17</i>
<i>Initial Steps in Completing a Doctoral Dissertation</i>	<i>19</i>
<i>Final Steps for Completing a Thesis or Dissertation.....</i>	<i>21</i>
<i>Thesis/Dissertation Document Preparation, Submission and Binding Information.....</i>	<i>22</i>
Graduation Information	23
OD/MS program	24
OD/PhD program	25
Research Supervisors and Their Interests	25
Grievance Procedures for Graduate Students.....	26

Welcome

Welcome to the University of Houston (UH) College of Optometry's Graduate Program in Physiological Optics and Vision Science. We hope this booklet will help you to become acquainted with the Graduate Program and the UH College of Optometry.

In addition to entering graduate students are assigned “mentors” to assist their smooth acclimation to the Graduate Program, the College, and the University. Entering graduate students may also wish to consult the 2018-2019 Graduate Catalog <http://publications.uh.edu/index.php?catoid=30> for information about UH policies for graduate students, and the section that describes the Graduate Program in Physiological Optics and Vision Science,

The College mailing address is:

College of Optometry, University of Houston, 4901 Calhoun Rd., JDA Rm 2195, Houston, TX 77204-2020

Questions and concerns about the Graduate Program may be referred to:

Renee Armacost, Graduate Program Manager, rrattelade@uh.edu, 713-743-1885, (Room JDA 2115).

The College of Optometry Buildings

The College is housed in two buildings that are connected on the 1st, 2nd, and 3rd floors. The original building, J Davis Armistead (JDA), was designed specifically to serve as an optometric education and research center. JDA was completed in 1976, and it contains more than 133,000 square feet in three floors. A new six story building, 167,000 sq ft, facility, the Health Building 1 (Health1) opened for classes in 2013. Health 1 houses an ambulatory and laser surgery center on the 1st floor along with an auditorium, it serves as an optometric education and research center on the 2nd floor, and a center for research in other disciplines on the 3rd and 4th floors. The University Animal Care Operations animal vivarium is on the 5th floor and 6th floors. The 1st, 2nd and 3rd floors of Health 1 are continuous with Health 2 which opened in 2017. Health2 is the new home of the College of Pharmacy, and several UH Health programs and facilities. A new Health Sciences Library which includes the Optometry Vision Science Library is located at the meeting point of the two Health buildings and JDA on the second floor.

J Davis Armistead Building (JDA)

1st Floor

The 1st floor of JDA includes a large reception area, an optical dispensary (Essilor Optical Services), and several clinical services: Family Practice, Cornea and Contact Lens, Pediatric & Binocular Vision, Ocular Diagnostic & Medical Eye, Brain Injury & Vision Assessment & Rehabilitation, Center for Sight Enhancement (Low Vision), and the Multiple Sclerosis Eye Center for Analysis, Research and Education (MS EYE CARE).

The teaching clinics extend over about 50,000 square feet and are equipped with the latest ophthalmic instruments and diagnostic systems, including, for example: visual field analyzers, spectral domain optical coherence tomographers (OCTs), fundus cameras, corneal topographers and confocal microscope, and a combined A scan/B scan instrument.

2nd Floor

The 2nd floor of JDA includes business offices, faculty and staff offices, graduate student offices, and several faculty research labs for studies of human subjects (including: The Visual Optics Institute (VOI) which houses a lathe for wavefront guided production of contact lenses, the lab conducting the multicenter Bifocal Lenses in Nearsighted Kids (BLINK) study and other labs for ocular imaging, testing or recording of cortical visual evoked potentials (VEPs), electroretinograms (ERGs), refractive error, and accommodation. The photography and audio-visual service is also on the 2nd floor. There are two conference rooms, a classroom and five teaching laboratories for the optometry students, all of which have projection facilities. JDA 2nd floor also houses the Graduate office for graduate student support (JDA 2115), the Office of Optometry Relations for Optometry admissions, support of professional students, and for administration of continuing education. In addition there is a suite of graduate student offices, and two student lounges with microwave ovens in both, and refrigerators in one.

3rd Floor

The 3rd floor of JDA contains faculty research laboratories and some additional graduate student offices. Graduate students have access to network computers, with internet and email access to provide state of the art hardware and software tools for research. The 3rd floor also houses NEI Center Core Grant for Vision Research supported services, which are also listed under Technical Services. The NEI Biological Imaging Core on the third floor includes a histology lab, two electron microscopes for ultrastructural studies, one with 3-D reconstruction capabilities, a confocal microscope for immuno-histochemical studies, and a deconvolution microscope that allows live imaging. The Instrument Design services include machine and electronics shops. Particular areas of ongoing research include: visual physiology and psychophysics, myopia, eye-movements, wavefront aberrations, visual development and plasticity, retinal and cortical processes, structural and functional changes in glaucoma in animal models and human patients, cellular and molecular biology of vision, ocular surface anatomy, cell biology, wound healing as well as immune response, and mechanisms of Meibomian gland disorder and dry eye disease,

Health Building 1 (Heath 1)

1st and 2nd Floors

The 1st and 2nd floors of Heath 1 house the UH College of Optometry Vision Institute. On the 1st floor there is an ambulatory surgical eye center, a laser eye center, and an auditorium with projection capabilities. The 2nd floor has two classrooms for UHCO (The Brien Holden Vision Institute Classrooms) that provide amphitheater seating and excellent audio and projection services with a resident PC as well as accommodations for laptops. There are numerous small student study rooms, and the Smith Wensveen conference room. The Ocular Surface Institute (TOSI), with associated offices and labs, and the Dry Eye Center, are also on the 2nd floor of Health 1.

3rd and 4th Floors

The 3rd and 4th floors of Health 1 provide facilities for members of other Colleges. Occupants include neuroscientists, computer scientists, psychologists, and the Texas Institute for Measurement, Evaluation, and Statistics (TIMES) that provides statistical support and data management services for many projects, including NEI core grant supported statistical services.

5th and 6th Floors

The 5th and 6th floors are University of Houston AAALAC and OLAW approved rodent and nonhuman primate (NHP) vivariums respectively. NHPs research labs are also on the Health1 6th floor.

Technical Services

The Technical Services facilities of the College of Optometry provide technical support for the faculty, students, postdoctoral fellows, residents and staff of the College. The group offers the following support services: Photography and Audio Visual, IT, Biological Imaging (Histology and Microscopy), Instrument Design (Construction and Repair), and Electronics Design (Construction and Repair).

Graduate students are encouraged to consult with Technical Services personnel to determine the most efficient way to accomplish a particular technical job such as design and fabrication of research apparatus. Using the various tools and skills available in Technical Services will increase graduate students' awareness of the breadth and depth of instrument development available to them as investigators.

Within the AV service, on the second floor of JDA, there are qualified personnel available to support the College with AV production capabilities for research presentations and publications, such as: figures, technical illustrations and posters. Computer generated graphics, photographic services including video production and editing, are also available. Another service of the AV Department is setting up and maintaining the classroom projection facilities, audio equipment, Skype and lecture capture.

Computer software and hardware support for offices, labs and clinics is provided by the computer support, IT team (JDA 3357). Software development Pascal; and MATLAB for graduate students are offered at the college or may be taken elsewhere in the University. In addition, the NEI Core Grant provides application development expertise to assist laboratories in developing customized software for their research needs.

The machine shop has two band saws, two drill presses, milling machine, lathe, shaper, disc/belt sander, a 3-D printer and a Maximat lathe/mill combination. Custom electronic equipment as well as replacement hardware may be obtained from the electronics shop. Access to some of the equipment in each of the areas is limited to the individual responsible for that area: for example, the lathe and the milling machine in the shop are used only by the College's chief laboratory machinist. The personnel of Technical Services welcome the

opportunity to train graduate students in the safe and efficient use of the other devices in the various working areas.

General Information about the Graduate Program

This handbook is intended to serve as a guide to the graduate students in the College of Optometry Graduate Program in Physiological Optics and Vision Science. It provides a basic roadmap for progression toward a graduate degree and should be consulted frequently in planning a program of study. It is a supplement, not a substitute, for the *Graduate Catalog* (<http://publications.uh.edu/index.php?catoid=30>) of the University of Houston. In the *Graduate Catalog*, the Graduate School and the Graduate and Professional Studies Committee have provided University wide policies and regulations and descriptions of programs offered at UH.

This handbook covers the basic steps toward completion of the graduate degrees offered in Physiological Optics and Vision Science at the UH: the Master of Science (MS), the Doctor of Philosophy (PhD) and the OD/MS degree. The OD/PhD is briefly described as well. The handbook attempts to answer frequently asked questions and provide necessary information for successful completion of the graduate degrees. For a grievance procedure explicitly, see the section on "Grievance Procedures for Graduate Students" at the end of this document.

In seeking information more generally on academic policies, consider doing the following:

- (1) Consult the University's *Graduate Catalog* on the University website to determine the University's Graduate policy.
- (2) Consult this handbook to determine specific application of the UH Graduate policy for the Graduate Program in Physiological Optics and Vision Science.
- (3) Discuss any issues with your research mentor and/or the Director (Associate Dean) of Graduate Studies.
- (4) If a judgment on the problem which concerns you cannot be achieved otherwise, your mentor will refer the question to the Graduate Faculty. On such matters, please do not bypass your mentor, who should act as your agent, unless the problem involves the mentor. Official interpretations of policy of the University graduate programs are made by the University (Faculty Senate) Graduate and Professional Committee, but it is appropriate that matters requiring special rulings or requiring action be handled through the Thesis or Dissertation Committee Chair (your research mentor), Director (Associate Dean) of the Graduate Program, and Dean of the College of Optometry.

The basic responsibility for planning and completing a program of graduate study rests with the student. The research mentor, generally selected in the 2nd year if not sooner, serves as the Chair of the student's research committee, and has the role of advisor and counselor. It is also important that the Director (Associate Dean) of Graduate Studies be consulted about each student's plans during individual advisory meetings that are held each term. The purposes of these meetings are to plan distribution of credit hours for the upcoming

semester(s) and to discuss the student's progress in the program. The official administrative records for each student are kept by Renee Armacost in the graduate program office.

Content Area of Physiological Optics and Vision Science

The Graduate program in Physiological Optics and Vision Science is oriented toward the study of basic and applied visual processes, including the physical, physiological, pathophysiological and psychological aspects of vision. It is designed to prepare graduates of the Optometric curriculum, or those with a Bachelor's degree in a science related to vision, for a career in teaching and research in optometry and/or vision science. Principal career opportunities exist in educational institutions, research institutions, industry, military and government laboratories, and specialized optometric practice. The Graduate Program in Physiological Optics and Vision Science is under the administration of the College of Optometry.

The faculty biographical sketches, and their research interests that are posted on the College website (<https://www.opt.uh.edu/research/research-faculty/>) indicate the range of research interests and expertise within the College of Optometry. In addition, students interested in other disciplines, e.g. biology, biomedical or electrical engineering, computer science, pharmacology, psychology, and advanced statistics can enroll in courses in those areas. For graduate students interested in children with developmental disabilities and special needs, an excellent selection of courses is available from the Department of Special Education, College of Education, and the Developmental Cognitive Neuroscience Program in the Department of Psychology. It is also possible to take courses at other institutions in the Texas Medical Center, e.g. biostatistics in the University of Texas (UT) Health School of Public Health.

Graduate Programs Offered

The College of Optometry offers graduate courses leading to the degrees of Master of Science (MS) and Doctor of Philosophy (PhD). In addition, a dual OD/MS program is offered that OD students enter in the Spring of their second year in the OD program. The OD/MS program, which includes elements of the MS program, is described separately after the full time MS and PhD programs are described. The OD/PhD program is briefly described as well. The Master of Science program curriculum and requirements are planned to serve the needs of students who expect to continue to the doctorate as well as those who may desire only a Master's degree. It is the intention that the Master's program should provide a fundamental background in the field of Physiological Optics and Vision Science. Students seeking a Master's degree may plan their programs to allow the degree of specialization in certain applied skills that they may desire, some training in teaching, and the completion of a research project.

The Doctor of Philosophy (doctoral) program is based on recognition that individuals must, in addition to mastering the content area, prepare themselves for successful careers as educators and researchers. Students need not complete the MS program prior to entering the PhD program. The programs distinguish, sometimes arbitrarily, the academic content of physiological optics as a discipline from the skills, techniques, and methodologies required for work in specific career areas. It is the intention of the PhD program that its doctoral graduates, regardless of their area of specialization, should first be well-rounded and informed teachers and vision scientists. Special attention is given to a fundamental background in physiological optics and vision science. In their academic work, students must demonstrate reasonable mastery of physiological optics and vision science as a whole, and outstanding mastery of specialized, related, areas of research.

Assistantships, Scholarships, & Fellowships

Attempts are made to provide financial support or aid to all full-time graduate students in the Graduate Program in Physiological Optics and Vision Science. Graduate students must enroll in at least 9 hours to be considered full-time.

Several forms of financial aid are available to full time students in the Graduate Program. Full time doctoral students in good standing will receive University Graduate Tuition Fellowships (GTF) for tuition and most fees to the extent that funds are available. Teaching and research fellowships provide stipends for students. Certain fellowships may not provide stipends to the limit allowable by the University of Houston. In these cases, additional college funds will supplement the fellowship awards to the limit allowable by the University. A concise description of various graduate student support programs follows:

- (1) UH Graduate Teaching Fellowship: Graduate students who have student contact in an instructional setting and who have primary responsibility for teaching a course for credit or as an attending clinician in the clinic. They must have completed a minimum of 18 semester hours of doctoral credit in their teaching field, be in good standing in the graduate program and make satisfactory progress toward the degree each term. They may be listed as the instructor of record in some cases.
- (2) Graduate Teaching or Instructional Assistantships: Graduate students who have student contact in an instructional setting as part of their assigned job duties and who perform under a faculty member's direct supervision. They must be in good standing in the graduate program and must make satisfactory progress toward the degree each term.
- (3) Graduate Research Assistantships: Members of the faculty who hold research grants or contracts may employ one or more Graduate Research Assistants at the standard stipend levels agreed upon by the College, University, granting agency, and the principal investigator. Appointments to these positions are made via the graduate program and the business office by the principal investigator of a particular grant or contract research program.

- (4) Graduate Program Assistantships: Graduate students who do not have student contact in an instructional setting but who assist with academic programs or projects under a faculty member's direct supervision.
- (5) NEI (or NIH or NSF) Fellowships, and Grants: Pre- and post-doctoral fellowships in various forms are available. As announcements are received, they are distributed to the graduate faculty and graduate students for information and subsequent application.

All of the options for financial assistance described above are available **only to full-time** students admitted to degree programs, and in good standing. Additional sources of financial assistance may become available to graduate students. Inquiry should be directed to the Associate Dean for Graduate Studies. Graduate students are encouraged to apply for these fellowships when they are announced by the college or externally. Evidence of support from peer reviewed grants/awards can assist in further grant support for the student as well as the College and may provide additional funds for travel, supplies and small items of equipment.

Graduate Student Travel: The Graduate Program Office generally has funds to support graduate student travel to scientific meetings. The dollar amount of support is determined by the number of students requiring support and the amount of money budgeted each year. Those presenting a paper or poster as the first author generally receive greater funding than those who do not present. Students are also encouraged to apply for travel funds from the Graduate School (Cullen Travel Fellowship), or the organizations that are arranging the professional meetings, such as the Association for Research in Vision and Ophthalmology (ARVO) and the American Academy of Optometry (AAO) and its affiliated research foundation, the American Academy Optometric Foundation (AAOF).

Curriculum

Master of Science in Physiological Optics (PHOP) Course Requirements

Courses taken must total minimum of **30 semester credit hours**, including a written thesis. Master of Science Degree students are expected to complete an independent research project under the supervision of a faculty mentor and at least two additional research committee members and to write and defend a thesis for the degree.

ALL of the following basic vision core courses in Physiological Optics) and Vision Science (PO/VS):

(The second digit in the course number is the number of credit hours)

- PHOP 6241 - Basic PO/VS Part 1
- 6242 - Basic PO/VS Part 2
- 6243 - Basic PO/VS Part 3
- 6152 - Basic PO/VS Lab (This may be included in 6243)

TWO of the following Advanced Module courses

- PHOP 7241 - Pathophysiology of the Anterior and Posterior Segments
- 7242 - Visual Neuroscience
- 7243 - Optics and the eye

ALL of the following Basic Research Skills:

- PHOP 6275 – Professional Development in the Visual Sciences
- 6371 - Experimental Design in Visual Sciences
- 6372 - Experimental Quantification in Visual Sciences

18 hours total

Each Semester:

- PHOP 6160 - General Seminar in PO/VS

Electives: As needed to strengthen student's education in a particular area related to his/her research

Research hours (practicum), and **independent study** (tutorial) are offered on an "as needed" basis to meet the individual needs of students (X indicates credit hours ranging from 1 to 9):

- PHOP 6X57 - Research Practicum B
- PHOP 6X67 - Research Practicum A
- PHOP 6X98 - Spec Problems in Physiological Optics and Vision Science
- PHOP 7X57 - Advanced Research Practicum B
- PHOP 7X67 - Advanced Research Practicum A

Master's Thesis hours: 3 hours are required, and students may register for up to 6 hours

- PHOP 6399 - Master's Thesis
- PHOP 7399 - Master's Thesis

Doctor of Philosophy in Physiological Optics Course Requirements

Courses taken must total a minimum of 60 semester hours, including the written dissertation. This track includes a technical skill or foreign language, written and oral qualifying examinations, original research, writing and defense of a doctoral dissertation.

ALL of the following basic vision core courses:

- PHOP 6241 - Basic PO/VS Part 1
- 6242 - Basic PO/VS Part 2
- 6243 - Basic PO/VS Part 3
- 6152 - Basic PO/VS Lab (This may be included in 6243)

TWO of the following Advanced Module courses

- PHOP 7241 - Pathophysiology of the Anterior and Posterior Segments
- 7242 - Visual Neuroscience
- 7243 - Optics and the eye

ALL of the following Basic Research Skills:

- PHOP 6275 - Professional Development in the Visual Sciences
- 6372 - Experimental Quantification in Visual Sciences
- 6371 - Experimental Design in Visual Sciences

- IDNS 6391 - Ethics in Science

21 hours total

Each Semester:

- PHOP 6160 - General Seminar in PO/VS

Electives (minimum 5 hours required): As needed to strengthen student's education and/or skill in a particular research area, e.g. PHOP 7276 - MATLAB Programming for Vision Science

Research hours (practicum) and independent study (tutorial) are offered on an "as needed" basis to meet the individual needs of students. (X indicates credit hours ranging from 1 to 9):

- PHOP 6X57 - Research Practicum B
- PHOP 6X67 - Research Practicum A
- PHOP 6X98 - Spec Prob- Physiological Optics and Vision Science
- PHOP 7X57 - Advanced Research Practicum B
- PHOP 7X67 - Advanced Research Practicum A

Doctoral research hours (for students who have passed the PhD candidacy exam)

- PHOP 8X98 - Doctoral Research

Doctoral Dissertation hours (grades on a maximum of 9 hours can be included in the GPA)

- PHOP 8X99 - Doctoral Research

The PhD Qualifying Exam in Physiological Optics and Vision Science

Purpose of the Exam

The purpose of the qualifying examination is to evaluate whether a student in the PhD program should be advanced to candidacy and permitted to proceed with doctoral research. This decision should be made as early as possible in the graduate student's career. The examination should evaluate the following, which are taken to be necessary prerequisites for the conduct of doctoral research:

- (1) Factual knowledge in the broad area of physiological optics
- (2) Depth and breadth of topical knowledge,
- (3) Integration of knowledge from diverse areas to solve problems,
- (4) The ability to think and respond effectively on one's feet.

To meet these requirements, the qualifying examination consists of separate written and oral portions. The written examination taken in August of the summer following the first year courses is intended primarily to evaluate basic understanding of experimental design and statistical analysis as covered in required courses, as well factual knowledge of material in the core curriculum. Because questions cover the whole of the core curriculum including the Advanced Modules and are generated by a cross section of the graduate faculty, an important part of the examination is to determine whether the student can discern which factual information is needed to answer a particular question. When constructed properly, the written qualifying examination can also examine how well the student can integrate material presented separately in different core courses and in different sections of the same course.

The subsequent oral examination taken in the 5th to 8th semester focuses on depth of understanding of the student's chosen area of research, the student's ability to generate a research proposal in that area, and the student's capacity to think analytically and to respond to questions on his/her feet. The student will be evaluated on success in acquiring in-depth knowledge and the integration and application of this knowledge. The focus of the oral examination should be whether the student, if advanced to candidacy, is likely to generate and complete experiments that will lead to significant advancement of knowledge.

The Written Qualifying Examination

The written part of the qualifying examination should be taken after completion of the first year in the graduate program, typically in August before the beginning of the next academic year. By this time the graduate student should have completed all of the didactic material in the core curriculum (i.e., the basic PO/VS courses). The courses covering this material are therefore offered to graduate students on a yearly basis.

Written examinations will be scheduled as needed. Ordinarily, students who enter in the Fall and will take the written examination in the following Summer. If a sufficient number of students indicate readiness or if an appropriate contingency arises, an additional written examination may be scheduled.

The Chair of the Written Qualifying Examination Committee will solicit from the graduate faculty a number of questions to examine basic factual knowledge in each of the several topical areas of the areas covered in the basic PO/VS core courses, basic research skills courses, and advanced modules given in the first year of graduate studies. Since part of the rationale for the written qualifying examination is to foster integration of material within and between areas of vision science, questions will be written collaboratively by the qualifying exam committee.

The written examination will be constructed by the examination committee according to the following guidelines:

- (1). 50% of the questions on each written exam should cover material from the Fall comprehensive courses (Basic POVS), Fall and Spring, in PO.

- (2) 17% of the questions, on material from Experimental Design, and Statistics.

- (3) 33% of the questions on material from the Advanced Modules

It is expected that at least 2 half days of 4 hours each will be allocated for students to complete the written examination. After the examination, each question will be graded promptly (pass, not pass). Each question is graded by two faculty members with knowledge in the fields associated with the particular question. A failed question is one in which both graders give a non-passing grade. A contingently passing grade is obtained when basic knowledge is demonstrated in some but not all areas covered by the question, but the deficiencies are not so severe as to lead to a failure. Contingent passes may be corrected by meeting with the graders and correcting the answer appropriately as determined in the meeting. Students are required to pass all portions (questions undertaken on the first attempt) of the examination on either the first or second attempt. If a second attempt is necessary, it should generally be taken within the subsequent Fall term, and will include only the areas not passed on the first attempt except when the initial failure is of more than 50% of the questions. This will result in a full reexamination. Two failures of one or more questions is cause for dismissal from the PhD degree program.

Students are encouraged to seek the help of faculty members who teach and do research in areas covered by the exam. After the written examination has been graded, the student's performance will be communicated to the student by the Associate Dean for Graduate Studies. The student will be notified of his/her areas of strength and weakness, and any parts of the examination that must be re-taken will be identified.

The Oral Qualifying Examination

Students in the PhD program should plan to take the oral qualifying exam between the 5th and 8th semester in the graduate program. The chair of the oral qualifying committee is generally the mentor/advisor of the student. The student, the chair and the Associate Dean will confer to appoint the remainder of the committee, which will consist of at least 3 members (including the chair) who are experts in specific areas of physiological optics and vision science, or related fields, in which the student intends to obtain in-depth knowledge. The three areas of knowledge to be assessed in the exam, which are related to the committee's expertise, will be listed on the appointment form. The form may be obtained from the graduate office. One or more of the committee members may be appointed from outside the College, particularly if the student is seeking knowledge in a (minor) area for

which expertise is not available within the College. However, at least the chair and one other member of the committee (excluding the Associate Dean, who may choose to be an ad hoc member of any qualifying committee) must be a College of Optometry graduate faculty member. It is often the case that the student has done special problems and/or a research practicum with committee members. When the committee is appointed, a timeline for completion of the exam should be determined.

Prior to the exam, the student will study to acquire the knowledge in the areas listed on the committee appointment form. The student also will prepare a short grant proposal, NIH style, on the topic of the student's ongoing research. The grant proposal will (at the very minimum) follow the modified 7-page format for Student Vision Research Support Grant (sVRSG) available from the graduate office, but any advisor who wishes to use a longer format such as the RO1 format (12 page research plan + 1 page specific aims) may do so, with the consent of the appointed oral qualifying committee. This decision will be recorded on the same form used to appoint the committee. The student will distribute this qualifying exam grant proposal to the faculty members two weeks prior to the set time of the examination.

Evaluation of the oral qualifying exam has 2 parts:

1. Quality of the short grant proposal.
2. Oral defense of the proposal, the research that the student is doing, and a demonstration of knowledge in the three areas related to the committee's expertise, that were defined for the exam.

Every effort shall be made to hold the oral portion of the qualifying examination in the time frame agreed upon when the committee is appointed. Of course, the examination may be postponed as demanded by extenuating circumstances, but postponements are expected to be the exception rather than the rule. The rationale for setting a deadline at the outset of preparation and holding to it is to avoid extending the qualifying process over a protracted period of time.

The entire committee should be present at the oral examination, or a member may be present by Skype if necessary. The format of the examination is left to each committee to decide, but generally, the student presents the proposal and his or her progress on research (a planned ~30 min presentation) and the committee members ask questions during and following the presentation. The exam may last two or sometimes more hours. The acquisition of in-depth knowledge and the integration of this knowledge will be assessed during the oral qualifying examination. It should also be kept in mind that the purpose of the exam is to determine whether the student, if advanced to candidacy, is likely to generate and complete experiments that will lead to significant advancement of knowledge. Performance on the prior written examination may be taken into account.

Upon completion of the oral examination, the qualifying committee will decide and inform the student whether he/she has passed (or passed with distinction), not passed (requiring a single re-examination), or failed. Failure requires dismissal from the PhD program, as does a "not passed" outcome on the second attempt of the oral examination. An "in progress" decision is not permitted.

Because of the small size of the oral qualifying committee, the decision that it reaches must be unanimous. The Associate Dean, at his/her discretion, may or may not vote; it is expected that the Associate Dean will register a moderating vote if the examination committee is disposed to act with undue leniency or harshness. Reasonable effort to reach a unanimous decision is expected but, if a unanimous decision cannot be reached, the student will be advised and each committee member and the Associate Dean will prepare a written statement within 3 days indicating his/her vote and explaining the reasons. In case of a split vote, a decision will be made by a standing adjudication committee of at least 8 faculty members (drawn from the Qualifying Committee and the Graduate Review Committee), from which any faculty who participated in the examination in question shall be disqualified. The adjudication committee will receive and consider the written reports of the members of the qualifying committee and the Associate Dean. The committee may solicit other evidence or testimony regarding the qualifying examination itself (but not other aspects of the student's graduate career) as it deems necessary. A graduate student representative will be present to observe, but will not vote (primarily to protect the representative from unavoidable criticism). The outcome of the adjudication process need not be restricted to pass, not pass, or fail; each case must be heard on its merits and the action recommended must be as fair as possible to all concerned. As a last resort, a new committee may be appointed (from which original committee members and the Associate Dean may be excluded) and the examination repeated. Because of possible student anxiety, it is imperative that the adjudication process be carried out as quickly as reasonable conduct permits and within a period not to exceed 14 days.

Successful completion of the oral examination completes the qualifying process and the student is then advanced to candidacy for the PhD. At that time it is appropriate to begin the process for the dissertation committee to be appointed and for the student to plan his/her dissertation research. Research experience, and work that will contribute to the dissertation that occurs prior to completion of the qualifying process is strongly encouraged; however, this research should be aimed at learning particular research techniques, identifying an area of special interest, or evaluating the feasibility of an area of research. Failure to undertake the two parts of the qualifying in accordance with the times described above will cause the Graduate Student Review Committee to meet to determine whether the student is making satisfactory progress in the graduate program. It is the responsibility of the Associate Dean to encourage students to meet program requirements on schedule, monitor adherence, and call meetings of the Graduate Student Review Committee when necessary.

A schedule for meetings with the dissertation committee is outlined in the section entitled, "Steps in completing a doctoral dissertation." In a sense, the last meeting, the dissertation defense is an extension and the culmination of the qualifying examination process. This view of the defense implies it is substantially more than a vehicle for the student to inform faculty and peers about the dissertation project. At the defense, the student should present his/her dissertation research and receive questions from the audience in a public setting. Then in a closed meeting, the candidate be examined and challenged by the appointed research committee on in-depth understanding of the completed research and on how this work fits into the broad fabric of vision science.

Technical Skill/Foreign Language Requirement

All PhD candidates must demonstrate competence in one of the following Technical Skill/Foreign Language areas, or a new area that is timely and approved by the Mentor and Associate Dean:

- (1) Computer programming
- (2) Electronics
- (3) Statistics
- (4) Biological Imaging
- (5) Foreign Language
- (6) Other (with the permission of the Mentor, the Associate Dean for Graduate Studies and appropriate persons with expertise to evaluate competency in the particular skill)

The specific requirements will be determined for a skill/language by the Associate Dean for Graduate Studies and faculty or staff member(s) with expertise in the area. The expert(s) will outline requirements and will stipulate if the student has fulfilled the requirements. For example for the computer programming skill, the instructors for programming courses, and the Core Grant Principal for the Research Computing Module will evaluate a MATLAB (or Pascal) program that the student has written for his or her research.

Other PhD Requirements

Teaching: The activities of an individual with a PhD usually require the organization and presentation of research, teaching, and/or clinical materials before different groups. Therefore, candidates for the PhD are encouraged to experience laboratory and classroom teaching.

Research: Research constitutes an integral component of the graduate program. Graduate students are expected to be engaged in research under the supervision of the graduate faculty during all phases of the program. All PhD candidates must engage in independent research that is approved by the student's dissertation committee and write a dissertation for the award of the degree.

Thesis (MS) & Dissertation (PhD)

With the conviction that research skills are vital to all fields of professional function in contemporary vision science, the Graduate Program in Physiological Optics and Vision Science requires the demonstration of such skills as an important aspect of each of its degree programs. The student must execute an independent research study under faculty supervision. The completed independent research studies fall into two categories: Master's Thesis and PhD Dissertation.

Initial Steps in Completing a Master's Thesis

Step 1: *The student selects a general research area of interest.* This usually takes place during the first two semesters of the first year. The student should decide in which areas he or she is interested; this is a good time for talking to other graduate students and faculty members.

Step 2: *The student discusses research interests with Associate Dean for Graduate Studies.* This should be about the time the student registers for the third semester. At this time the student is encouraged to register for at least one research practicum or special problems course with a faculty member in the area of the student's general interest, perhaps including a lab rotation in that faculty member's lab. This is a step toward identifying potential research advisors.

Step 3: *The student meets with potential advisors to discuss research questions in the area of interest.* This should be during the third semester (summer) if not sooner.

Step 4: A. Advisor: *The student contacts the Associate Dean to finalize the choice of research advisor, and the advisor confirms willingness to serve.* The advisor, must be a member of the graduate faculty with special interests closely related to the proposed thesis topic. This should be the result of meetings by the student with the potential advisors.

B. Committee: The advisor and student should *propose additional committee members* (sometimes with one faculty member from a department outside the College of Optometry). The proposed committee is entered on the proposal form (requested from the graduate office) and submitted to the Associate Dean. The Associate Dean officially appoints the Thesis Committee. The appointment form should be submitted by the fourth semester. Each committee member should be selected for some special contribution. If needs change (should be constantly monitored by student and mentor), then the committee membership should change. This is essentially an automatic change, at least until the formal proposal is submitted. To modify committee membership before the formal proposal is signed, the chair must notify the Associate Dean, who will reformulate the committee.

Step 5: *The statement of research direction is submitted to the Associate Dean. At the time of committee appointment at the earliest, and before the end of the 4th semester at the latest.* Before the end of the fourth semester, the student and the committee meet to identify:

- a. The general problem
- b. The specific experimental question
- c. The significance of answering the question
- d. The general methodology

These items form the statement of research direction. For some students the process will include pilot projects; for others, there will be more concentration on literature review. The Committee closely monitors the student's progress on all preliminary research activities to assure that the project neither languishes nor progresses beyond the pilot (preliminary) stage before the formal research proposal is prepared. The Committee monitors the student's progress and meets with the student on a regular basis. During these meetings the student briefs the Committee on the progress of the research.

Step 6: *The formal research proposal (7 to 10 pages) is submitted to the Research Committee and when approved, to the Associate Dean.* The student consults with his/her Committee in preparing a formal proposal that includes information such as:

- a. an explicit statement of the general problem
- b. the specific experimental question to be addressed
- c. significance of the research
- d. review of relevant literature (and bibliography)
- e. specification of the experimental subjects
- f. specification of methods and procedures
- g. modes of analysis
- h. anticipated results
- i. possible interpretations

The committee meets with the student to approve the formal proposal. A copy signed by all Committee members of the approved proposal is submitted to the Associate Dean to be placed in the student's file. This proposal should be submitted to the Associate Dean by the end of the 5th semester.

Students will be required to have progress meetings with their respective thesis committee at least once every six months. The student is responsible for arranging the meetings and for turning in to the Graduate Program Office a completed sign-off sheet, on which the committee will indicate progress, before the end of each six-month period.

Failure to provide the Associate Dean with the statement of research direction, thesis proposal, or the sign-off sheet according to the schedule specified above will cause the Graduate Student Review Committee to meet to determine whether the student is making satisfactory progress in the graduate program. It is the

responsibility of the Associate Dean to encourage students to meet program requirements on schedule, monitor adherence, and call meetings of the Graduate Student Review Committee when necessary.

The final steps for the Master's Thesis can be found in a later sections along with steps for the Doctoral Dissertation, These appear after the initial steps for the Doctoral Dissertation.

Initial Steps in Completing a Doctoral Dissertation

(Steps 1-5 below are specific to doctoral student)

Step 1: Student will complete oral qualifying examination during 5th to 8th semester as described in the section above on qualifying examinations.

Step 2: The Dissertation committee must be appointed by the end of the semester following that in which the Oral Qualifying exam was successfully completed. The Dissertation committee should consist of 4-5 members, three of whom (the chair and two others must be faculty of the College of Optometry and were likely already members of the Oral Qualifying Committee) and one of whom must be from outside the College.

Step 3: Dissertation Committee Meetings and Documentation

Around the time of formation of the dissertation committee, the student will provide the committee members with a 1-2 page document "Statement of Research Direction". This statement will include:

- a. The general problem
- b. The specific experimental question
- c. The significance of answering the question
- d. The general methodology
- e. The time line for proposed experiments for the following 6-12 months.

If the student has not met with a research (or qualifying) committee for a year, a meeting should be scheduled to discuss the project described in the Statement of Research Direction. Revisions can be made to this document after the meeting. If the student has had a recent committee meeting, only consent to serve on the committee, from each committee member, after reading the Statement is needed. If a meeting is held, the student must secure approval (signature or email) from each committee member and before filing the Statement in the Graduate program Office. Filing of the final version of the Statement must occur within 2 weeks of the committee meeting. This document then serves as a formal record of what the expectations are for the next few months.

Step 4: Within one year (ideally sooner rather than later) of the first dissertation committee meeting the student must provide the committee with a formal Dissertation Research Proposal. This documents the major body of work they intend to complete. The proposal should cover the following areas, and at the choice of the mentor and student, it can be in formal NIH R01 proposal format or in a less formal format that covers the necessary components

- a. an explicit statement of the general problem
- b. the specific experimental question or questions (aims) to be addressed
- c. significance and innovation of the research
- d. brief review of relevant literature (and bibliography) to provide rationale for the research
- e. experimental approach including
 - i. specification of the experimental subjects
 - ii. specification of methods and procedures
 - iii. modes of analysis
 - iv. anticipated results
 - v. possible interpretations

This proposal will be discussed with the student at a required meeting of the dissertation committee. Revisions can be made to this document after the meeting. The student must secure approval (signature or email) from each committee member and then the Proposal is filed with the Grad program Office. Filing of the final version of the Proposal must occur within 2 weeks of the committee meeting. This document then serves as a formal record of what the expectations are for the dissertation research.

Step 5: Regular dissertation committee meetings must be held so that the committee can have input in to the student's progress. At the very least a committee meeting must be held once per year. However this can be at shorter intervals at the advisor's/student's discretion. After each meeting the advisor will complete a "Progress Form" and write a brief summary of the student's progress since the last meeting and the short term research goals (discussed at the meeting) for the next meeting. The student must secure approval of this "Progress Form" (signature or email) from each committee member and then the form is filed with the Grad program Office. Filing the final version of the form must occur within two weeks of the committee meeting. This document then serves as a formal record of what the expectations are until the next meeting. (Note "Progress Form" does not have to be completed for the very first committee meeting (the approved Statement of Research Direction will serve as documentation for that meeting) or for the meeting at which the Dissertation Proposal is discussed (the approved Dissertation Proposal will serve as documentation for that meeting unless the committee chooses to list expectations.).

This is the general sequence of events but as always exceptions can be made (with the permission of the Associate Dean for Graduate Studies) for extenuating circumstances (e.g. OD/PhD).

The Graduate Program Office will play an active role in ensuring students and their advisors stay on track. Each student entering the program and all graduate faculty will be reminded of time lines and expectations, thus no-one can claim they "did not know". Also the Grad Program Office will send out reminders of upcoming milestones and chasing up students (and advisors) by email or in person if the deadlines are not being met.

Thesis or Dissertation Preparation – General Comments

Responsibilities for Thesis/Dissertation:

The Committee gives guidance and constructive criticism on research procedures as well as in the preparation of the dissertation. The Committee is expected to:

- a. assist the student in formulating the research proposal
- b. approve the student's written proposal
- c. help the student overcome problems encountered in conducting the research
- d. provide guidance to the student in writing the dissertation
- e. conduct the student's defense of dissertation, and
- f. approve the dissertation.

Committee members should lead the student through the research process, by frequent interactions with all committee members and the student in such a way that the student is not given solutions but develops the tools needed to repeat the process on his or her own. The student should not be alone during the process, but develop the skills *with* his or her committee to be prepared to do independent research in the future.

The Chair should lead the student through the process of identifying a problem worthy of research - and developing logic on approaching that problem, and help the student to limit the scope of the project.

The Student is responsible for keeping all committee members informed of experiment results. This could be handled by individual meetings as well as by regular committee meetings.

Final Steps for Completing a Thesis or Dissertation

Step 7: *Execution and writing of the thesis/dissertation.* The actual execution of the research is carried out by the student independently, although presumably with frequent consultation with the advisor and the Thesis or Dissertation Committee. Procedural modifications within the general framework of the proposal may occur with Committee approval, although the student is expected not to depart drastically from his or her proposal.

The format of the thesis or dissertation follows acceptable standards of scientific and scholarly writing in the discipline. As an added guide, reference may be made to A Manual for Writers of Term Papers, Theses and Dissertations (K. L. Turabian) or to A Manual of Style (The University of Chicago Press). It is the primary responsibility of the candidate and, secondarily, the Thesis/Dissertation Committee that the thesis has the correct form and is grammatically correct.

Step 8: *Thesis/Dissertation defense.* The final oral defense of the MS thesis or the PhD dissertation is normally scheduled by the student and the Chair of the Thesis or Dissertation Committee at a time agreeable with all members of the Committee. The candidate **MUST** distribute complete, properly formatted, and

corrected per mentor's review, copies of the thesis or dissertation to all committee members **at least two weeks in advance of the date of the defense**. Students should request the thesis/dissertation abstract form from the graduate office who will distribute the announcement about the oral defense. The defense is open to the entire academic community and notification will also be made to the appropriate Colleges and Departments within the University.

Thesis/Dissertation Document Preparation, Submission and Binding Information

Each student is responsible for the cost of any electronic or hard (paper) copies of the draft for committee members prior to the defense, and for all but one of the copies of the final thesis or dissertation to be submitted for binding. The one copy that goes to the UH Vision Science library is paid for by the College.

The University requires that every student submit a final electronic thesis or dissertation in PDF format through the Vireo system (see details below). Before submitting the thesis/dissertation for binding and to Vireo, the student must include the following items in this order, as required by the University of Houston, and **verify with the Associate Dean for Graduate Studies** that the submission is acceptable:

1. Cover Sheet (one blank sheet of paper at the beginning of each copy)
2. Copyright Page (Copyright by . . . , month, and year of graduation) (optional)
3. Title/Signature Page 4. Dedication (optional)
5. Acknowledgment (preface or foreword) (optional)
6. Abstract Title Page (the month and year of graduation) (optional)
7. Abstract: may not be > 350 words for the MS thesis or 600 words for the PhD dissertation
8. Table of Contents
9. List of Figures
10. List of Tables
11. Text (introduction, methods, results, conclusions)
12. Bibliography (Standard format of a journal – choose one, e.g. Invest Ophthal Vis Sci if reference superscripts are used)
13. End Sheet (one blank sheet of paper at the end of each copy)

A Word document thesis/dissertation template is available from the Graduate Student Office, but generally, the document must follow these guidelines:

Font Size: Font size must be 12 point (Times Roman, or equivalent, e.g. Arial 11) and print should be black, with consistently clear and dense characters. Text should be double spaced.

Page Margins: Left: 1.5 inch Right, Top and Bottom: 1 inch

Copyright: Copyright is not an automatic process. If desired, the student may request that the thesis/dissertation be copyrighted by signing the appropriate section on the University Microfilms Agreement form.

Electronic Copy: An electronic version (PDF) of the Thesis/Dissertation must be submitted to the University archive (Vireo). Students should request instructions from the graduate office. Approval of graduation, which means that the degree is official, will not occur until the PDF is submitted and approved by the advisor and the graduate office. Currently the final date for submission in a given term is the last day that grades can be submitted.

Hard Copy (required by Health Sciences library only).

Paper: Use at least 20-pound, 8.5 X 11 white bond with at least 25% rag content for the original and one copy. (the Graduate Office has paper available for purchase by students for this copy; Neena Bond 02717).

Other copies for committee member review may be prepared on at least 13-pound paper. In general, xerox quality duplication is an acceptable means of duplication for the additional copies.

Preparation for Binding: Bind each copy separately by using rubber bands, both horizontally and vertically, to secure pages. Stack the copies together and put an additional copy of the title/signature page on top of the stack. On this page, circle in red ink the title of the thesis/dissertation, author's name, and date of graduation (This information is printed on the covers of the bound copies). On the lower right-hand corner of the page, print the number of copies in the stack.

Fees: The Graduate Program will pay for binding of one copy, plus the pick-up and delivery charge. Copyright fees and binding of additional copies for the student and/or committee must be paid for by the student. Fees are to be paid to the Graduate Program Office and are listed as follows:

Binding:	\$45.00 - \$55.00 per copy
Copyright:	\$65.00 (not usually done)

Forms: There are a number of forms to be completed prior to graduation. Students should contact the Graduate Program Office to ensure all of the necessary paperwork is completed in a timely fashion.

Graduation Information

Applications: Applications for graduation should be filed during the semester in which the student intends to graduate. Student may apply for graduation through MyUH. Check with the Graduate Program Office for the current dates for submitting the application. A fee of \$25.00 will be billed to the student's university account.

Commencement: Commencement usually takes place in mid-May for those who completed their requirements for graduation the previous August or December or that May. Robes, hoods, etc. may be rented

or purchased from Barnes & Noble Bookstore. Student should notify the Graduate Program Office (as soon as possible if they will participate in the commencement exercises. The graduation rehearsal is usually the day before the actual commencement.

OD/MS program

A dual OD/MS program is available for enrolled optometry students wishing to pursue a Master's (MS) degree in Physiological Optics/Vision Science concurrently with the doctor of optometry (OD) degree.

Admission Requirements

OD students may apply for the OD/MS program in the Fall of the 2nd academic year for admission in the Spring of their second year. The applicant must have a history of research with a faculty mentor. The prior research generally was done during the Summer between the first and second year of the OD program, in a federally- or college-funded summer research training program for OD students.

Degree Requirements

The dual OD/MS program requires:

- The entire Optometry, OD program curriculum.
- The MS curriculum for OD/MS students, which includes a total of 30.0 Credit Hours of coursework and research hours.
 - 6 credit hours in basic research skills courses are required (PHOP 6371 and 6372).
 - 12 credit hours of OPTO 6000-level science courses may be shared for the MS portion of the dual degree.
- A written thesis based on original research (see sections describing the MS thesis above). The research generally is an extension of the research carried out in the summer research program. The student must write and defend a thesis proposal and the thesis.
- In the final term, the student must enroll once in PHOP 7399 - Thesis Writing Credit Hours: 3.0
- The student's thesis committee must consist of a minimum of 3 members, at least two of which are graduate faculty members. One may be external to the program, for example, from the clinical program or other departments, other universities or industry, subject to approval by the Associate Dean of the graduate program.
- Graduate program coursework and research hours with the prefix PHOP will be supported by UHCO
- Research hours (practicum) and independent study (tutorial called "Special Problems") are offered on an as needed "as needed" basis to meet the individual needs of students.

Basic Research Skills Courses

	Credit hours
PHOP 6371 - Experimental Design in Visual Sciences	3.0
PHOP 6372 - Experimental Quantification in Visual Sciences	3.0
PHOP 6275 - Professional Development for Vision Scientists	2.0 optional
PHOP 6160 - General Seminar Visual Sciences	1.0 <i>completed at least once</i>
PHOP 7399 - Thesis writing	3.0

Elective Courses

As needed to strengthen student's education and/or skill in a particular research area.

Example:

PHOP 7276 - MATLAB Programming for Vision Science Credit Hours: **2.0**

OD/PhD program

A dual OD/MS program is available for enrolled optometry students wishing to pursue a doctoral (PhD) degree in Physiological Optics and Vision Science. The program would begin concurrently with the doctor of optometry (OD) degree, and be completed after the OD is conferred. Students may enter the program as OD/MS students and then apply to transfer to the PhD program at some point. The decision to transfer would be made in consultation with the MS mentor and the Associate Dean for Graduate Studies. The PhD student would be required to take all required PHOP courses for the PHD at some point in the program. An individual schedule is possible, and sample schedules are available in the graduate office.

Research Supervisors and Their Interests

Please see the descriptions of faculty members' research on the College of Optometry website:

<https://www.opt.uh.edu/research/research-faculty/>

Grievance Procedures for Graduate Students

Step 1: Attempt at resolution of the grievance through informal efforts

Every effort shall be made by the graduate student and the faculty member(s) involved to settle their differences amiably and informally to redress the grievance. If appropriate or necessary, the Associate Dean for Graduate Studies shall participate in this informal effort to resolve this grievance. If appropriate, the aid of a disinterested mediator should be sought to aid resolution. A grievance involving the associate dean will begin with a similar process mediated by the vision sciences department chair or his/her designee.

Step 2: Submission of formal “complaint” within 10 days

In the event that an informal resolution is not possible, the graduate student may petition the associate dean by filing a document, the “Complaint”, within 10 days of the mutual decision that the grievance cannot be settled informally. The formal written “Complaint” must state (a) when he/she discovered the issue being grieved, (b) what issue is being grieved and the evidence to support the grievance, (c) the desired resolution, (d) the postal (not e-mail) address to which written communication may be sent. It is the responsibility of the grievant to notify the office handling the grievance of any change of address during the course of the grievance. After receipt of the “Complaint”, the associate dean must respond in writing to the grievant within 10 working days.

Step 3: Formal written “Petition”

In the event that a resolution is not possible at the graduate program level (Steps 1 and 2 above), the grievant may petition the Dean of the College of Optometry, against which the grievance is held, or the dean’s designee by submitting a formal written “Petition,” appended to the written “Complaint” and the associate dean’s written response, within 10 working days after the decision of the associate dean. The grievant may include in his/her notice of appeal copies of any documentation that he or she considers useful at this point, but shall retain possession of the originals. The dean of the college must respond in writing within 20 days, and the response must include an explanation for his/her decision.

Step 4: Appeal seeking university level review by the Graduate and Professional Studies Grievance Committee (GPSGC), which is under the purview of the Dean of Graduate and Professional Studies

Please read the Grievance Policy and Procedures for Graduate, Professional, and Post-baccalaureate Students that can be found in the graduate catalogue: http://www.uh.edu/grad_catalog/

