Vision Science Graduate Program Handbook

Version 2.2
Approved by Research and Graduate Studies 7/20/18

The Ohio State University
College of Optometry

Contents

1. Purpose of the Handbook

The purpose of this handbook is to describe the policies, rules, and procedures of the Graduate Program in Vision Science, and particularly to define distinctions between the information relating to this program and the general information already described in the *Graduate School Handbook.* This version applies to students who are scheduled to graduate autumn 2016 and beyond.

2. Goals of the Program

The goals of the Graduate Program in Vision Science are:

a) To train researchers in the latest and most effective approaches for solving vision science problems;

b) To train educators for programs that train eye care providers; and

c) To produce scientists for the conduct of vision science in academia, military, government, industrial and other professional settings.

3. Relationship between the Graduate School and the Research and Graduate Studies Committee

The Graduate School of The Ohio State University includes faculty members authorized to provide graduate instruction, the graduate faculty, the Graduate Council, and the administration. The Graduate Council is the principal legislative body of the Graduate School and initiates policies and rules governing Graduate Programs. The policies, rules, procedures and general information concerning graduate education and research at The Ohio State University are embodied in the *Graduate School Handbook.*

The Research and Graduate Studies Committee administers the Graduate Program in Vision Science. This committee oversees and administers the Graduate Program and serves as the liaison between the Graduate School and the graduate faculty members. The responsibilities of the Research and Graduate Studies Committee are described in detail in the G*raduate School Handbook.* They include but are not limited to monitoring courses proposed for graduate credit; establishing procedures for assigning advisors; appointing graduate faculty; reviewing graduate faculty membership; making recommendations on student admissions; monitoring student progress; and establishing rules and procedures for the conduct of Master's Examinations, Candidacy Examinations, and Final Oral Examinations. The Research and Graduate Studies Committee is appointed by the College of Optometry Dean from the Category P, tenured graduate faculty in Vision Science.

The Committee publishes this *Graduate Program Handbook* embodying the policies, rules, and procedures of the program.

4. Admission

The admission criteria that are outlined in the *Graduate School Handbook* apply to the Graduate Program in Vision Science. The Research and Graduate Studies Committee evaluates the applicant’s credentials and admits graduate students to the Graduate Program in Vision Science by a simple majority vote of the Committee.

The admission procedure is a competitive process that examines the applicant's overall undergraduate and/or professional grade point average (GPA), Graduate Record Examination (GRE) results (required of all applicants), letters of reference, a personal statement, and other qualifications such as publications, scores on the National Board of Examiners in Optometry examinations, and professional and research experience.

The Research and Graduate Studies Committee may elect to conduct an interview with the applicant.

Applicants are normally expected to have completed an appropriate baccalaureate or more advanced degree or a Doctor of Optometry degree at an institution accredited by the Association of Schools and Colleges of Optometry to be considered for the program. Other potential applicants should make inquiry directly to the chair of the Research and Graduate Studies Committee to determine their eligibility.

5. Funding

A limited number of Graduate Teaching Associate (GTA) positions are available in the College of Optometry. Students will be notified at the time of the offer of admission whether he/she will receive a GTA position, the amount of the stipend, and the duration of the GTA award. The conditions of the GTA position are more thoroughly described in Section 14 of this manual.

Likewise, Graduate Research Associate (GRA) positions are sometimes available in the College of Optometry, typically funded through the college and/or an individual faculty members' extramural funding. Students will be notified at the time of the offer of admission whether they will receive a GRA position, the amount of the stipend, and the duration of the GRA award. The conditions of the GRA position are more thoroughly described in Section 14 of this manual.

6. Advisors

Advisors are selected by the graduate student with consent of the selected advisor. An advisor for a PhD student must have been granted 'P-level' status by the Graduate School. An advisor for an MS student can have either 'M-level' or 'P-level' status. The Research and Graduate Studies Committee Chair serves as the interim advisor for all graduate students prior to selection of a regular advisor. The advisor must be selected prior to beginning thesis/dissertation research.

The student and advisor are responsible for constructing the student's schedule. The advisor is responsible for proposing the composition of examination committees and chairs all such committees.

A student is expected to participate actively in the ongoing research program of the laboratory of his or her selected advisor.

The student is expected to monitor his or her own progress and adherence with all Graduate School and Graduate Program in Vision Science requirements and timelines for admission, course enrollment, course requirements, credit hour requirements, examinations, and graduation.

A student enrolled in any degree-seeking capacity in the Graduate Program in Vision Science may, without prejudice, request a change of advisor by writing to the Research and Graduate Studies Committee. The Research and Graduate Studies Committee and the student must concur on the particular choice of the new advisor. A change of advisor does not reset time limits defining adequate "academic progress" except at the discretion of the Research and Graduate Studies Committee.

7. Registration

To maintain full-time status, students must be enrolled in at least eight credits. Optometry credits count toward those eight credits for Combined OD/MS students. Advanced Practice Fellowship students and PhD students with Clinical Instructor appointments may not take more than 10 credits, which is the limit placed by the university for the faculty and staff Tuition Assistance Program. During the semester of graduation, all students must register for at least three graduate credits.

8. Graduate Student Travel Support

Travel funds for meetings are not guaranteed, but associations, student organizations, the university, and the college all provide means for students to apply for travel funds. Below is a list of possible sources, but it should not be considered comprehensive.

American Academy of Optometry Travel Fellowship

- Must be a student member and presenting a paper or poster at the meeting
- http://www.aaopt.org/regsite/student-travel-fellowships-0

ARVO Travel Fellowship
- Must be presenting a paper or poster at the meeting
- http://arvo.org/Travel_Grants/

Optometric Educators Incorporated (OEI)
- Must have applied for and been denied other sources of support
- Contact OEI officers for more information

Ray Travel Awards from the Council of Graduate Students
- Presentation at the meeting not required
- Must apply the semester before travel
- Must be in good standing with the Graduate School
- http://cgs.osu.edu/funding/ray-travel-award/

Inter-Professional Council
- For current optometry students
- Apply for *reimbursement* of related expenses
- http://ipc.osu.edu/Funding/funding_options/for_students_pdf

Advisor
- Advisors receive $500 total (not per year) to spend on each graduate student
- These funds may be used for travel or other research-related expenses, such as human subjects payments or project supplies
- Students should ask their advisors if they have resources to reimburse expenses for travel

9. Description of Fields of Study

Vision Science is the science concerned with the study of all aspects of the eye or the visual system. Active research programs within The Ohio State University's Graduate Program in Vision Science include but are not limited to:

- **geometrical and physical optics:** improving methods of refractive error and visual acuity measurements;
- **ocular development:** etiology of refractive error, growth of the ocular components, and prenatal ocular development;
- **visual psychophysics:** color vision and monocular sensory processes;
- **infant vision:** development of visual acuity and stereopsis;
- **binocular vision and space perception**: correspondence, fixation disparity and spatial localization, vergence/accommodation therapy, vision therapy
- **ocular motility:** accommodative-convergence, sports vision, eye movements, and binocular rivalry;
- **ocular physiology:** metabolism of the ocular structures;
- **environmental vision:** vision standards and quality of life issues;
- **epidemiology of vision:** progression of keratoconus, natural history of eye growth;
- **pediatric vision:** amblyopia, vision screening, convergence insufficiency, refractive error;
- **contact lenses:** myopia control, wear and care, comfort;
- **neurobiology of vision**: neuroanatomy and neurophysiology of retina and ascending visual pathway;
- **adaptive optics**: imaging to detect early ocular disease and monitor progression;
- **pathology of vision:** assessment and prevention of eye disease; and
- **vision rehabilitation:** assessment and rehabilitation of individuals with impaired vision.

10. Vision Science Graduate Program Honor Code

The Vision Science Graduate Program abides by the Graduate School Honor Code:

Graduate students and Graduate Faculty aspire to professional behavior that is consistent with the highest ethical and moral standards. The Graduate School at The Ohio State University expects that graduate students will demonstrate responsibility and integrity in pursuing their creative and scholarly interests. The academic enterprise is dependent upon such behavior. Graduate students are responsible for learning about appropriate standards for ethical research and scholarly conduct and for following all university policies related to ethical research and scholarly conduct.

When graduate students join the Ohio State community, they become members of disciplinary, scholarly, and professional communities that extend beyond the university. Graduate students are expected to learn, respect, and abide by the professional codes of ethics and responsibilities that are commonly accepted in their field of study or area of research. These codes include but are not limited to the following: a responsibility to contribute an original body of work to one's chosen discipline and the recognition that one's work is based on the work of others which must be respected and properly acknowledged. Graduate students also have the responsibility to treat university faculty, staff, and other students respectfully and professionally.

Graduate Faculty, advisors, and graduate programs should actively encourage their students to participate as members of their chosen disciplinary, scholarly, and professional communities. Graduate students should be encouraged to seek and share knowledge wherever and whenever possible. Academic advisors and other faculty members should educate graduate students through example and discussion, addressing such issues as academic honesty, research, publication, recruitment, and hiring practices, and applicable fellowship and graduate associateship responsibilities. Disciplinary codes of ethics and norms should be discussed among graduate students and faculty. Such communication is a means of setting high standards of behavior in graduate study and beyond.

11. Master's Degree Programs

The Graduate Program in Vision Science offers three master's degrees: Combined OD/MS, Advanced Practice Fellowship, and traditional master's degree. The current policies of the Graduate School apply with regard to academic performance requirements, transfer of credit, residence, and time limits, except as specified in this document. The admission and completion requirements vary, depending on the course of study.

11.a. Combined OD/MS

11.a.1. Description

The Combined OD/MS program is only available to outstanding students enrolled in The Ohio State University College of Optometry who wish to simultaneously pursue the OD degree and the Master's in Vision Science. Only the Plan A (thesis) program is offered.

11.a.2. Eligibility

A minimum GPA of 3.00 in The Ohio State University College of Optometry program is required. Optometry students typically apply for this program during the summer between their first and second years in the optometry program; students cannot apply after the autumn semester of the second year. Admission of the applicant is based on the student's academic performance, the Research and Graduate Studies Committee's assessment of his or her motivation and ability to complete a program of independent research in combination with the regular optometry curriculum, and Graduate Record Examination results.

11.a.3. Course Requirements

- Must complete 30 graduate credit hours
- Up to 10 credits of VS 8999 (research credits) may be counted toward the 30 graduate credit hours required for the master's degree, but a student may take more than 10 credits total. For example, students are required to take at least three graduate credit hours during the semester they plan to graduate. If a graduating student already received 10 credits of VS 8999, s/he can take three credits of VS 8999 during the last semester to satisfy the need for three credit hours during the graduation semester, but they will not count toward the 30 graduate credit hours.
- Vision Science 6300, 6320, and 7620 taken in the optometry curriculum may contribute up to 10 of the 30 credit hours required for graduation
- Must complete Vision Science 7960 (Ethics in Biomedical Research)
- Must complete Vision Science 7980 (Statistics in Clinical Research)
- Must take VS 7950 (Vision Science Seminar) every semester through spring semester of the third year. Students *must make every attempt* to attend VS 7950 lectures during their fourth year of optometry school, but should not take the course for credit if extern rotations prohibit attendance.
- Must complete at least two of the following four courses: VS 8001, VS 8002, VS 8003, VS 8004
- Remaining coursework is selected according to the student's interests, as recommended by the student's advisor

11.a.4. Thesis and Master's Examination

Prior to commencing research, the student and the advisor must obtain the appropriate Institutional Review Board (IRB) or Institutional Animal Care and Use Committee (IACUC) approval.

The topic of the thesis work is determined by the student, in close consultation with his or her advisor. The thesis examination occurs in two steps: an oral examination followed by approval of the written thesis document. The thesis oral examination is a two-hour examination with emphasis on the thesis material. Students may not bring written materials to the oral examination. The oral examination lasts approximately two hours. A presentation of the research by the student should not last more than 45 minutes, and the remaining time must be allotted to discussion of the research and to questions of and answers by the student. The examination is scheduled by the student in close consultation with his or her advisor. The written thesis is approved by the Master's Examination Committee after successful completion of the oral examination.

11.a.5. Master's Examination Committee

- Chosen by the student and advisor
- Approval by Research and Graduate Studies Committee is not required, except for non-graduate faculty as noted below
- Three members required
  - Advisor and at least one other committee member must be Vision Science Graduate Faculty
  - A non-Graduate Faculty member may be appointed to the Master's Examination Committee by approval of the Research and Graduate Studies Committee and petition to the Graduate School

11.a.6. Progress in the Graduate Program

The master's degree should be completed by spring semester of the final year in optometry school for students enrolled in the Combined OD/MS program. A student may be considered lacking in academic progress after this period. To be considered in good standing, a student must maintain a graduate cumulative grade point average of 3.00 or better in all graduate credit courses. All Vision Science credit hours count toward this graduate cumulative grade point average, even those in excess of the 10 credit hours maximum from the professional optometric curriculum that also count toward the master's degree.

11.a.7. Progress in the Professional Program

In the case of an I/E grade in the professional program for a Combined OD/MS student, the student's advisor will be notified. The advisor will then help the student manage graduate work during remediation. One I/E grade in a clinic rotation in the professional program makes the student eligible for dismissal from the Combined OD/MS program. The advisor will be invited to Remediation Committee meetings, after which he or she will discuss the option of dismissal with the Research and Graduate Studies Committee. The Research and Graduate Studies Committee will ultimately decide whether to dismiss the student from the Combined OD/MS program.

11.b. Advanced Practice Fellowship

11.b.1. Description

The Advanced Practice Fellowship program is a two-year program involving work toward a master's degree in Vision Science combined with clinical experience. Its purpose is to provide advanced optometric and research training with particular emphasis on the chosen specialty:

1) Cornea and Contact Lenses;
2) Binocular Vision and Pediatrics;
3) Vision Rehabilitation; or
4) Community Eye Care.

During the first summer of the program, Fellows typically do not take any courses, but they provide direct patient care full-time in the clinical setting of their specialization and possibly other clinical settings, as follows:

Cornea and Contact Lenses:	Contact Lens Clinic
Binocular Vision and Pediatrics:	Binocular Vision and Pediatrics Clinic
Vision Rehabilitation:	Vision Rehabilitation, Advanced Ocular Care, and Primary Care
Community Eye Care:	Vision care settings in the community

The remaining five semesters are devoted to 50% FTE in clinical teaching, serving as a Graduate Teaching Associate in appropriate laboratories, and patient care from routine to the most complex phases of optometric practice. Individual sequences will be established by consultation among the fellow, his or her advisor, his or her clinical mentor, the Associate Dean for Clinical Services, and the individual Service Chief, and may be influenced by thesis project requirements. Fellows must also complete a research project and Master's thesis; only the Plan A (thesis) program is offered.

Any student with the option of conducting research instead of teaching for all or part of his or her 50% FTE will need to petition the Research and Graduate Studies Committee at least one semester prior to the change (i.e., such a petition for spring semester would have to be filed the previous autumn semester). The Research and Graduate Studies Committee, in conjunction with the Associate Dean for Clinical Services, would then make a decision based on simple majority vote on a case-by-case basis as to whether to approve the proposed research appointment. Any exceptions to the five-semester requirement are subject to the approval of the Research and Graduate Studies Committee.

11.b.2. Eligibility

A minimum GPA of 3.00 in The Ohio State University College of Optometry program and undergraduate work is required. Applicants to this program must be eligible for licensure to practice optometry in the state of Ohio. Admission of the applicant is based on the student's academic performance, the Research and Graduate Studies Committee's assessment of his or her motivation and ability to complete a program of independent research in combination with the regular optometry curriculum, and Graduate Record Examination results.

11.b.3. Course Requirements

- Must complete 30 graduate credit hours
- Up to 10 credits of VS 8999 (research credits) may be counted toward the 30 graduate credit hours required for the master's degree, but a student may take more than 10 credits total. For example, students are required to take at least three graduate credit hours during the semester they plan to graduate. If a student already received 10 credits of VS 8999, s/he can take three credits of VS 8999 during the last semester to satisfy the need for three credit hours during the graduation semester, but they will not count toward the 30 graduate credit hours.
- Must complete Vision Science 7960 (Ethics in Biomedical Research)
- Must complete Vision Science 7980 (Statistics in Clinical Research)
- Must take VS 7950 (Vision Science Seminar) every semester
- Must complete at least two of the following four courses: VS 8001, VS 8002, VS 8003, VS 8004. Each of the areas of specialization has further requirements:

Cornea and Contact Lenses:	Must take VS 8001
Binocular Vision and Pediatrics:	Must take VS 8002
Vision Rehabilitation:	Must take VS 8004
Community Eye Care:	Must take *one* of the following:

VISSCI 5500	Special Topics in Vision Science: Global Issues in Eye Care (1 credit)
PUBHHBP 7544	Health Behavior & Health Promotion: Fundamental Determinants of Population Health and Implications for Public Health (3 credits)*
PUBHHMP 7617	Health Management & Policy: Leadership in Health Care (3 credits)*
PUBHHBP 7520	Health Behavior & Health Promotion: Community Health Assessment (3 credits)*
PUBHHBP 7542	Health Behavior & Health Promotion: Settings and Special Populations in Health Promotion (3 credits)*

*Students must show instructor permission either by submitting a course enrollment permission form with the instructor's signature to the Graduate School or by forwarding an email from the instructor to registration@cph.osu.edu, then staff will work to get the course added.

- Remaining coursework is selected according to the student's interests, as recommended by the student's advisor

11.b.4. Thesis and Master's Examination

Prior to commencing research, the student and the advisor must obtain the appropriate Institutional Review Board (IRB) or Institutional Animal Care and Use Committee (IACUC) approval.

The topic of the thesis work is determined by the student, in close consultation with his or her advisor. The thesis examination occurs in two steps: an oral examination followed by approval of the written thesis document. The thesis oral examination is a two-hour examination with emphasis on the thesis material. Students may not bring written materials to the oral examination. The oral examination lasts approximately two hours. A presentation of the research by the student should not last more than 45 minutes, and the remaining time must be allotted to discussion of the research and to questions of and answers by the student. The examination is scheduled by the student in close consultation with his or her advisor. The written thesis is approved by the Master's Examination Committee after successful completion of the oral examination.

11.b.5. Master's Examination Committee

- Chosen by the student and advisor
- Approval by Research and Graduate Studies Committee is not required, except for non-graduate faculty as noted below
- Three members required
  - Advisor and at least one other committee member must be Vision Science Graduate Faculty
  - A non-Graduate Faculty member may be appointed to the Master's Examination Committee by approval of the Research and Graduate Studies Committee and petition to the Graduate School

11.b.6. Progress in the Graduate Program

The master's degree normally is completed in two years for students enrolled in the Advanced Practice Fellowship. A student may be considered lacking in academic progress after this period. To be considered in good standing, a student must maintain a graduate cumulative grade point average of 3.0 or better in all graduate credit courses.

11.c. Traditional Master's Degree Program

11.c.1 Description

The College of Optometry offers a traditional Master's in Vision Science. This is a two-year program that provides vision science research training and experience. Only the Plan A (thesis) program is offered.

11.c.2. Eligibility

A minimum undergraduate GPA of 3.00 is required. Applicants to this program must have a Bachelor's degree or equivalent. Part-time students are permitted, but first priority is given to full-time students. If permitted, the time limit for part-time attendance is determined by the Research and Graduate Studies Committee prior to the admission of the student. If a full-time student wishes to change to part-time status, he or she must petition the Research and Graduate Studies Committee who will provide written terms for continuation on part-time status.

The minimum academic criteria for admission include:

- credentials documenting prerequisite academic work that gives evidence of ability to pursue a graduate program in your chosen area,
- a baccalaureate or higher degree from an accredited college or university prior to beginning graduate studies, and
- a cumulative grade point average equivalent to at least 3.0 on a 4.0 scale (B grade) in all prior undergraduate and graduate level work.

Applicants are required to submit Graduate Record Examination (GRE) scores that were completed within the past five years. International Applicants and those who have held the status of U.S. Permanent Resident for less than one year whose native language is not English, must submit an official Test of English as a Foreign Language (TOEFL) score, Michigan English Language Assessment Battery (MELAB) score, or an International English Language Testing Service (IELTS) that was completed within the past two years. Minimum English Proficiency Requirements are as follows:

- at least 550 on the paper-based TOEFL,
- at least 79 on the internet-based TOEFL,
- at least 82 on the MELAB, or
- at least a 7.0 on the IELTS.

11.c.3. Course Requirements

- Must complete 30 graduate credit hours
- Up to 10 credits of VS 8999 (research credits) may be counted toward the 30 graduate credit hours required for the master's degree, but a student may take more than 10 credits total. For example, students are required to take at least three graduate credit hours during the semester they plan to graduate. If a graduating student already received 10 credits of VS 8999, s/he can take three credits of VS 8999 during the last semester to satisfy the need for three credit hours during the graduation semester, but they will not count toward the 30 graduate credit hours.
- Must complete Vision Science 7960 (Ethics in Biomedical Research)
- Must complete Vision Science 7980 (Statistics in Clinical Research)
- Must take VS 7950 (Vision Science Seminar) every semester
- Must complete at least two of the following four courses: VS 8001, VS 8002, VS 8003, VS 8004.
- Remaining coursework is selected according to the student's interests, as recommended by the student's advisor.

11.c.4. Thesis and Master's Examination

Prior to commencing research, the student and the advisor must obtain the appropriate Institutional Review Board (IRB) or Institutional Animal Care and Use Committee (IACUC) approval.

The topic of the thesis work is determined by the student, in close consultation with his or her advisor. The thesis examination occurs in two steps which include an oral examination and approval of the written thesis document. The thesis oral examination is a two-hour examination with emphasis on the thesis material. Students may not bring written materials to the oral examination. The oral examination lasts approximately two hours. A presentation of the research by the student should not last more than 45 minutes, and the remaining time must be allotted to discussion of the research and to questions of and answers by the student. The examination is scheduled by the student in close consultation with his or her advisor. The written thesis is approved by the Master's Examination Committee after successful completion of the oral examination.

11.c.5. Master's Examination Committee

- Chosen by the student and advisor
- Approval by Research and Graduate Studies Committee is not required, except for non-graduate faculty as noted below
- Three members required
  - Advisor and at least one other committee member must be Vision Science Graduate Faculty
  - A non-Graduate Faculty member may be appointed to the Master's Examination Committee by approval of the Research and Graduate Studies Committee and petition to the Graduate School

11.c.6. Progress in the Graduate Program

The master's degree normally is completed in two years for students enrolled in the Traditional Master's degree program. A student may be considered lacking in academic progress after this period. To be considered in good standing, a student must maintain a graduate cumulative grade point average of 3.00 or better in all graduate credit courses.

12. Doctoral Degree Program

12.a. Description

The College of Optometry offers a Doctoral (PhD) degree in Vision Science. This is typically a four-year program that provides vision science research training and experience. Only the Plan A (thesis) program is offered.

12.b. Eligibility

Applicants to this program must have a Bachelor's degree. Surplus MS hours may be transferred to the Doctoral program if approved by the Research and Graduate Studies Committee, subject to limits established by the Graduate School. If a student wishes to change academic advisors when switching from the Master's program to the Doctoral program, he or she may do so.

Part-time students are permitted, but first priority is given to full-time students. If permitted, the time limit for part-time attendance is determined by the Research and Graduate Studies Committee prior to the admission of the student. If a full-time student wishes to change to part-time status, he or she must petition the Research and Graduate Studies Committee who will provide written terms for continuation on part-time status.

The minimum academic criteria for admission include:

- credentials documenting prerequisite academic work that gives evidence of ability to pursue a graduate program in the chosen area,
- a baccalaureate or higher degree from an accredited college or university prior to beginning graduate studies, and
- a cumulative grade point average equivalent to at least 3.00 on a 4.00 scale (B grade) in all prior undergraduate and graduate level work.

Applicants are required to submit Graduate Record Examination (GRE) scores that were completed within the past five years. International Applicants and those who have held the status of U.S. Permanent Resident for less than one year whose native language is not English, must submit an official Test of English as a Foreign Language (TOEFL) score, Michigan English Language Assessment Battery (MELAB) score, or an International English Language Testing Service (IELTS) that was completed within the past two years. Minimum English Proficiency Requirements are as follows:

- at least 550 on the paper-based TOEFL,
- at least 79 on the internet-based TOEFL,
- at least 82 on the MELAB, or
- at least a 7.0 on the IELTS.

To apply to the PhD program, students currently enrolled in The Ohio State University Vision Science Graduate Program (Combined OD/MS, Advanced Practice Fellows, or Traditional Master's students) must submit a curriculum vitae, a one-page letter of intent, and a letter of recommendation from their advisor to the Associate Dean for Research. Acceptance in the PhD program will be determined by the Research and Graduate Studies Committee.

12.c. Program Requirements

- Must complete 80 graduate credit hours or 50 graduate credit hours beyond the master's degree
- Up to 40 credits of VS 8999 (research credits) may be counted toward the 80 graduate credit hours required for the Doctoral degree, but a student may take more than 40 credits total. For example, students are required to take at least 3 graduate credit hours during the semester they plan to graduate. If that student already received 40 credits of VS 8999, s/he can take 3 credits of VS 8999 during the last

semester to satisfy the need for 3 credit hours during the graduation semester, but they will not count toward the 80 graduate credit hours.

- Must complete VS 8001, 8002, 8003, and 8004
- Must complete Vision Science 7960 (Ethics in Biomedical Research)
- Must complete Vision Science 7980 (Statistics in Clinical Research)
- Must complete Vision Science 7970 (Grantsmanship)
- Must complete Vision Science 7950 (Vision Science Seminar) every semester
- Must complete VS 7940 (Oral Presentation of Scientific Research) annually, beginning 12 months after matriculation into the PhD program and culminating with the open dissertation defense. Students present a research symposium talk in the VS 7950 series based on research interests. Failure to do so could provide evidence of insufficient academic progress.
- Remaining coursework is selected according to the student's interests, as recommended by the student's advisor.
- One year after matriculation, every PhD student must submit an American Optometric Foundation Ezell Fellowship and an Ohio Lions Eye Research Foundation (OLERF) Fellowship application annually, until receiving that award
- Each student must perform at least two semesters of teaching, although it can be on a part-time basis. At least one of these semesters must encompass teaching in a laboratory course. In the event that the student is funded through a source outside the college (e.g., a training grant) the student will not receive additional compensation for teaching. Teaching experience may include working with optometry students in providing care to patients examined in the professional program or instructing optometry students in selected laboratories.

12.d. Progress Committee

Within 12 months of matriculation, each PhD student must, in consultation with his/her advisor, select a Progress Committee. The Progress Committee will be expected to follow the student's progress throughout his or her training and to help mentor the student in his or her research. It is expected that the Progress Committee will meet with the student at least annually as a group.

- Chosen by the student and advisor
- The initial Progress Committee members and any changes to the Progress Committee must be approved by the Research and Graduate Studies Committee
- Three members required
  - Advisor serves as the Chair
  - At least two additional P-level graduate faculty must be on the committee
  - A student may, without prejudice, request a change in the Progress Committee, and a member of the Progress Committee may resign. A change in Progress Committee membership must be approved by the Research and Graduate Studies Committee.
  - A change of Progress Committee membership does not reset time limits defining adequate "academic progress" except at the discretion of the Research and Graduate Studies Committee.

12.e. Candidacy Examination

A Candidacy (General) Examination must be taken within two semesters of completing 40 credit hours (exclusive of Vision Science 8999) and all required coursework; failure to do so may be considered failing to make adequate academic progress. The Candidacy Examination has both written and oral portions. Candidacy Examinations are arranged by the graduate student's advisor.

Satisfactory completion of the Candidacy Examination is achieved by unanimous affirmative vote of the Candidacy Examination Committee. Satisfactory completion of the Candidacy Examination admits the student to Candidacy for the Doctoral degree.

If the examination is judged unsatisfactory, a second examination may be permitted on the recommendation of the Candidacy Examination Committee, according to the guidelines in the *Graduate School Handbook*. Students who fail their Candidacy Examinations and are permitted to retake the examination must retake the Candidacy Examinations within two semesters of their initial failure.

The Candidacy Examination Committee can unanimously designate an "Honors" (non-transcript) level for exceptional performance on the Candidacy Examination. It is expected that the Honors designation will be used rarely.

12.e.1. Candidacy Examination Committee

- Chosen by the advisor and candidate
- The initial Candidacy Examination Committee members and any changes to the Candidacy Examination Committee must be approved by the Research and Graduate Studies Committee
- At least four members are required
  - Advisor serves as Chair of the Candidacy Examination Committee
  - At least one member of the Progress Committee in addition to the Advisor must serve on the Candidacy Examination Committee
  - At least two additional members of the graduate faculty of the Graduate Program in Vision Science must serve on the Candidacy Examination Committee. The two additional members may include the third Progress Committee member and may include one M-level faculty member.
  - Non-Graduate Faculty members may be appointed to the candidacy examination committee by approval of the Research and Graduate Studies Committee and by petition to the Graduate School. Non-Graduate Faculty are in addition to the required four, current Ohio State Graduate Faculty members. Once approved, membership of the Candidacy Examination Committee cannot be changed without the approval of the Research and Graduate Studies Committee.

12.e.2. Written Candidacy Examination

The written portion of the Candidacy Examination consists of a 13-page NIH-R01 type application (one page specific aims plus 12-page application) plus a critical review article on the same topic (20 double-spaced pages, suitable for publication). These page limits do not include references. The written portion must be completed no fewer than two and no more than three months after the approval of the Candidacy Examination topic.

The topic of the Candidacy Examination proposal must be distinct from the candidate's proposed dissertation topic but may be in a related area. The grant proposal cannot be one that has been created for any other purpose previously. Writing on the grant proposal cannot begin until the topic has been approved by unanimous vote of the Candidacy Examination Committee. After the topic has been finalized and approved by the Candidacy Examination Committee, candidates are not permitted to seek advice regarding the proposal from anyone other than the Candidacy Examination Committee. The entire proposal will be evaluated by the Candidacy Examination Committee.

12.e.3. Oral Candidacy Examination

The oral examination must be scheduled within the next month but no sooner than two weeks after the completion of the written examination. Extensions must be approved by simple majority vote of the Research and Graduate Studies Committee.

The oral examination is two hours in length and consists solely of questions posed by the Candidacy Examination Committee; the candidate does not make a formal presentation. Each Candidacy Examination Committee member is expected to participate fully in the oral questioning of the student. Questions must relate to the written materials but can draw from related areas in vision science and other related disciplines. Students may not bring written materials to the oral examination. Questions at the oral examination will require the candidate to understand important and classic papers in vision science. The candidate should also be prepared to discuss strengths and limitations of various study designs and methods, potential threats to validity, and other pitfalls in the area of research interest.

12.f. Dissertation

12.f.1. Research Plan

The PhD student, in consultation with his or her advisor, selects the dissertation topic. Within one semester of successful completion of his or her Candidacy Examination, the student must prepare a comprehensive research plan for the Dissertation Committee. This plan should include proposed methodologies, analyses and expected outcomes and must be approved by each internal member of the Dissertation Committee.

Where human subjects, animals, or chemical or biological agents are involved in the dissertation research it is the responsibility of the student to assure that the appropriate institutional review is obtained.

12.f.2. Dissertation Committee

- Chosen by the advisor and candidate
- The initial Dissertation Committee members must be approved by the Research and Graduate Studies Committee, and any changes to the Dissertation Committee after the research plan is approved must be approved by the Research and Graduate Studies Committee
- At least three Vision Science graduate faculty members and a non-Vision Science graduate faculty member
  - Advisor (must be P-level) serves as Chair of the Dissertation Committee
  - In addition to the Advisor, two committee members must be P-level Ohio State graduate faculty members, at least one of whom is a member of the Progress Committee
  - One faculty member who is not a member of the Graduate Faculty in Vision Science, either from Ohio State or from another academic institution, is required. This member is typically assigned specifically for the Dissertation Examination only, but may be included earlier if desired. Any non-Ohio State graduate faculty must also be approved by the Ohio State University Graduate School. It is expected that this member will be chosen based on their expertise in the area of the dissertation research topic. If an expert is flown in from another institution, airline, hotel, and per diem will be provided. An outside committee member may be considered for giving a VS 7950 lecture.
  - Once the final oral examination is scheduled, the Dean of the Graduate School appoints the Graduate Faculty Representative. The Graduate Faculty Representative is a Category P Graduate Faculty member who is neither a Graduate Faculty member in the student's graduate program nor a member of the dissertation committee. The Graduate Faculty Representative is a full voting member of the final oral examination committee.

12.f.3. Dissertation Examination

The oral portion of the Dissertation Examination takes the form of verbal questioning by the Dissertation Committee and a graduate school representative. The final oral examination lasts approximately two hours. Students may not bring written materials to the oral examination. The oral examination begins with a public

presentation of the dissertation research by the student which should not last more than 45 minutes; the remaining time must be allotted to discussion of the research and questioning of the student by the Dissertation Committee. This portion of the Dissertation Examination is not open to the public. Questioning is focused on the dissertation material, although it also may be comprehensive of the major field. The examination is scheduled by the student and his or her advisor. The written dissertation is subsequently approved by the entire Dissertation Committee following successful completion of the oral portion of the Dissertation Examination.

12.g. Academic Progress

Graduate students who fail to make adequate academic progress may be dismissed from the Graduate Program in Vision Science by unanimous vote of the Research and Graduate Studies Committee. To be considered in good standing, a student must maintain a graduate cumulative grade point average of 3.0 or better in all graduate credit courses.

A doctoral student who fails to schedule and take his or her Candidacy Examination within two semesters of completing all required coursework and 40 credit hours (exclusive of Vision Science 8999) may be considered failing to make adequate academic progress.

Doctoral students who fail their Candidacy Examinations and are permitted to retake the examination may be considered failing to make adequate academic progress if they fail to retake the Candidacy Examinations within two semesters of their initial Candidacy Examination failure.

Doctoral candidates who do not complete their dissertation within two years of being admitted to candidacy may be considered to be failing to make adequate academic progress.

13. Departmental Research Facilities

In addition to providing access to clinical and basic facilities for research, the graduate faculty members in Vision Science maintain specialized laboratories that offer a varied research environment for graduate students in the Graduate Program in Vision Science. All applicable university and college policies should be reviewed and adhered to prior to commencing use of these facilities.

14. Departmental Graduate Associate Policies

The rules and procedures relating to Graduate Associate (GA: both Graduate Teaching Associates [GTA] and Graduate Research Associate [GRA]) responsibilities, appointments, and benefits, as described in the *Graduate School Handbook*, apply to the Graduate Program in Vision Science.

Graduate Associate positions are normally awarded by the Chair of the Research and Graduate Studies Committee on an annual or academic year basis and may be terminated by providing a one-semester notice. GA appointments may be terminated on the basis of unsatisfactory evaluations or failure to make adequate academic progress.

Graduate Teaching Associates are normally evaluated annually on the basis of their teaching performance; however, evaluations may be conducted each semester if deemed warranted by the Research and Graduate Studies Committee. Evaluations are conducted by the Chair of the Research and Graduate Studies Committee and are based on information provided by the instructors of the courses in which the GTA has had involvement, research job performance, faculty reviews, and/or teaching evaluations.

Graduate Associates should only undertake employment outside the College after consultation with their advisor.

Appendix A: Graduate Curriculum in Vision Science

Core Courses in Vision Science

Core courses present a comprehensive background in vision science and are not intended as introductory. Graduates of other institutions should have the graduate program evaluate the suitability of similar courses at their institution as substitutions. Open to graduate students only.

VIS SCI 8001 Anatomy and Physiology of the Eye
- 2 credits
- ½ semester
- 2 hours per day, 2 days per week
- Advanced gross anatomy and vegetative physiology and molecular biology of the eye

VIS SCI 8002 Ocular Motility and Binocular Vision
- 2 credits
- ½ semester
- 2 hours per day, 2 days per week
- Advanced topics on eye movements, ocular motility, and sensorimotor aspects of visual perception and binocular vision

VIS SCI 8003 Visual Sensory Processes
- 2 credits
- ½ semester
- 2 hours per day, 2 days per week
- Neurophysiology of the retina, the ascending visual pathway, and the brain, and their functional significance

VIS SCI 8004 Optics of the eye and specification of the visual stimulus
- 2 credits
- ½ semester
- 2 hours per day, 2 days per week
- Contemporary issues in visual and clinical optics and imaging

Courses in Vision Science

VIS SCI 5500 Global Health
- 1 credit
- Spring semester, every year
- Provides an overview of the common causes of vision impairment and eye disease, including means to eliminate avoidable blindness

VIS SCI 5998 Credit for Non-Thesis or -Dissertation Research
- 1 to 5 credits
- Student receives course credit for conducting research not related to a thesis or dissertation
- Cannot be concurrently taken with VIS SCI 8999

VIS SCI 7101 Basics of Graduate Work
- 1 credit
- Designed for first-semester graduate students
- Autumn semester, every year
- Students will learn the basics of graduate work, from IRB Submissions to writing abstracts

VIS SCI 7940 Oral Presentation of Scientific Research
- 1 credit
- PhD students present in VS 7950 based on their research or scholarship to improve presentation skills

VIS SCI 7950 Seminar in Vision Science
- 1 credit
- Series of seminars dealing with new developments in various areas of vision science

VIS SCI 7960 Ethics in Biomedical Research
- 2 credits
- Provides a general understanding of the issues surrounding the ethical conduct of science including issues related to research involving human subjects, scientific misconduct, and authorship of scientific papers. Real-life case studies will be used

VIS SCI 7970 Grantsmanship
- 2 credits
- The structure of the National Institutes of Health, the principles of good grantsmanship, and description of the grant review process. Emphasis focused on Mentored Clinical Scientist Development Award (K08/K23) and Research Project Grant (R01)

VIS SCI 7980 Statistics for Clinical Research
- 3 credits
- Introduction to the basic concepts and methods of statistical analysis of clinical research data. Statistical software packages will be demonstrated along with interpretation of output

VIS SCI 7990 Assessing the Literature
- 1 credit
- Autumn and summer semesters only
- Provides a framework to develop skills to critically evaluate the literature, improve data presentation skills, summarize information efficiently, and improve statistical knowledge by critically reviewing published literature

VIS SCI 8101 Designing Clinical Studies
- 1 credit
- Summer semester, even years
- Teaches various aspects of designing clinical studies, from specific aims to data management

VIS SCI 8102 Scientific Writing
- 2 credits
- PhD students only or by permission of instructor
- Summer semester, odd years
- Develops effective scientific writing skills

VIS SCI 8103 Circadian Rhythms and the Eye
- 2 credits
- Autumn semester, even years
- Advanced topics in chronobiology with emphasis on the role of the eye in synchronizing circadian rhythms to the external environment

VIS SCI 8104 High Resolution Imaging of the Eye
- 2 credits
- Autumn semester, even years
- Design, construction, interpretation, and use of adaptive optics (AO) in normal and diseased eyes

VIS SCI 8105 Advanced Ocular Motility
- 1 credit
- Autumn semester, even years
- Methods to monitor eye movements including eyetracker selection, calibration, and data interpretation

VIS SCI 8106 Refractive Error Development
- 2 credits
- Spring semester, odd years
- Students learn about ocular changes that lead to the development of refractive error in children

VIS SCI 8107 Basic Science Experimental Design
- 2 credits
- Summer semester, odd years
- Teaches various aspects of designing basic science experiments, from choosing controls to data analysis

VIS SCI 8108 Quantitative and Computational Methods for Vision Science
- 2 credits
- Summer semester, odd years
- An introduction to Matlab and its applications in research

VIS SCI 8109 Psychophysics
- 2 credits
- Summer semester, odd years
- This course will cover visual psychophysical techniques commonly used in clinical research

VIS SCI 8111 Advanced Topics in Low Vision
- 1 credit
- Autumn semester, odd years
- Advanced topics in models for rehabilitation, patient-reported outcomes measurement, and psychophysical testing of people with permanent vision impairment

VIS SCI 8112 Advanced Binocular Vision and Visual Plasticity
- 1 credit
- ½ semester
- Spring semester, even years
- Structural, molecular and functional considerations of mechanisms underlying visual plasticity

VIS SCI 8113 Clinical Trials in Binocular Vision
- 0.5 credit
- Spring semester, even years
- Review of recent clinical trials in amblyopia and intermittent exotropia

VIS SCI 8114 Advanced Contact Lens Topics
- 2 credits
- Autumn semester, odd years
- Advanced topics related to contact lens materials and care, lens modalities, advanced fitting techniques, adverse events and regulations

VIS SCI 8115 Effective Scientific Presentation Skills
- 2 credits
- Summer semester, even years
- Develop skills to communicate scientific findings using a variety of presentation formats

VIS SCI 8999 Credit for Thesis or Dissertation Research
- 1 to 5 credits
- Student receives course credit for conducting research related to a thesis or dissertation
- Cannot be concurrently taken with VIS SCI 5998