

HANDBOOK FOR GRADUATE STUDENTS AND GRADUATE FACULTY

**Policies and Procedures for the
Ph.D. Program in Exercise Physiology
WVU School of Medicine**



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Health Sciences Center
West Virginia University

For Students Admitted Fall 2007 and later



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A. PROGRAM OVERVIEW

The Division of Exercise Physiology offers a program leading to the Doctor of Philosophy degree (Ph.D.) in the School of Medicine. Admission to our graduate program is through the WVU Health Sciences Biomedical Sciences Ph.D. program. The program in Exercise Physiology is intended to give exceptional students knowledge in basic medical and scientific areas to prepare them for careers as effective and knowledgeable researchers and teachers in the broad field of Exercise Physiology. These goals are achieved by several means. Formal course work in the major discipline of Exercise Physiology is supplemented with courses from the sub-disciplines of Physiology, Biochemistry, Molecular Biology, Pharmacology and Neuroscience. The student's knowledge base will be further strengthened by participation in additional courses offered by other departments within the School of Medicine and by departments in other colleges of West Virginia University. These formal courses provide the student with the opportunity to develop a solid foundation in sciences that can be applied to interpret and study aspects of exercise and disease.

The faculty in the Exercise Physiology graduate program views the Ph.D. primarily as a research degree. Research training and experience are provided under the guidance and supervision of the graduate faculty. The aim of this effort is to promote attitudes, habits, skills and abilities that will enable graduate students to develop into an independent scientist.

The graduate program is designed to foster the student's ability for independent thought and research. For the first year, all graduate students enrolled in the school of medicine will participate in the "undifferentiated curriculum" which provides a strong background in basic cellular function and whole organism dynamics. At the end of the first year of enrollment, graduate students choose their department/division or program in which they will conduct their dissertation and specialize. Students who choose to specialize in Exercise Physiology will therefore enter our graduate program at the end of the first year by choosing an advisor from our faculty. The students will work with that advisor and learn techniques, collect pilot data etc. leading towards the dissertation research.

Graduate work involves a program of study and research individually designed to utilize the abilities and strengths of the faculty and accommodate the needs of the student within an area of specific interest. Although there are common goals, expectations, and courses that will be universal for all graduate students, the exact content of a program of study within Exercise Physiology will often differ from one student to another.

The content of this handbook represent the current policies and procedures that have been approved by the graduate faculty of the Division of Exercise Physiology. Nevertheless, this handbook is to be viewed as a "living document" so that after appropriate debate and approval by the graduate faculty, the content of this handbook may be periodically revised.

B. POLICIES AND PROCEDURES FOR ADMISSION

B.1. Admission to the Ph.D.

The general application procedures to the Ph.D. Program in Exercise Physiology is via follows the published guidelines of the Graduate Catalogue, West Virginia University. These can be obtained online at: <http://www.hsc.wvu.edu/ResOff/Education/ProspectiveStudents/AppInfoCriteria.aspx#applicationmethods>

Applicants must have a bachelor's degree and excellent GPA and GRE scores. On average, applicants have a GPA of 3.4 and GRE scores of 1140 (combined V+Q) and a 4.5 for the analytical essay. Three letters of recommendation and a personal statement are required. We recommend that you apply in December and January to receive maximum admissions consideration. Following pre-selection of students with excellent credentials and a perceived passion for research, you will be invited in groups of ~10 for paid, two-day visit/interviews from January through March.

The Admissions Committee, comprised of the seven graduate directors in the Biomedical Sciences and a senior graduate, makes the decision on acceptance, which are offered on a rolling basis.

You are admitted as a common undifferentiated class by a graduate admissions committee comprised of the graduate directors of each of our seven Ph.D.-degree granting programs, a senior Ph.D. student, and the Assistant Dean for Graduate Studies.

B.2. Admission into the Exercise Physiology Program.

By the end of the first year of graduate education, graduate students will select the graduate program in Exercise Physiology by choosing to do their dissertation research with a faculty member affiliated with this program. The graduate program in Exercise Physiology is able to accommodate students with diverse backgrounds and wide ranges of interests in physiological pathologies and impacts of exercise on these pathologies. Any student admitted to the undifferentiated first year curriculum is eligible to join the graduate program. Students with MS degrees desiring direct entry into the program must apply through the school-wide admissions committee and may need to complete portions of the first year curriculum.

C . TYPICAL PROGRAM OF GRADUATE STUDY IN EXERCISE PHYSIOLOGY

C.1 Summary of time line for graduation

- C.1.1.** After admission to the graduate program in Exercise Physiology, the student should work with their advisor/Dissertation Chair to identify and assemble members of the Dissertation Committee. The committee members should be selected according to his/her abilities to assist the students with critical aspects of his/her doctoral work. The committee will consist of at least five faculty, the majority of who hold regular graduate faculty status. A minimum of three members of the committee (including the chair of the committee) must be members of the Exercise Physiology graduate faculty. The Graduate Director will have final approval of dissertation committee chairs.
- C.1.2** The members of the Dissertation Committee will develop a “plan of study” for the student that will include the remainder of the required course work for the program. The plan of study should be completed and approved by the Dissertation Committee and filed with the Graduate Studies office (with a copy of the plan of study submitted to the Director of Graduate Studies) on or before the end of the first semester of year 2. This plan of study serves as a contract between the student and the members of his/her dissertation committee.
- C.1.3** Normally students are expected to complete all formal course work within the first two (2) academic years of enrollment; however, some students may be required to complete additional work to provide sufficient background from which to conduct independent dissertation research activities.
- Students should meet with their full dissertation committee twice each year and provide evidence of research progress towards graduation during these meetings.
- C.1.4** The student must complete his/her qualifying examination including submission of a NIH style fellowship grant to the advisory committee as part of the comprehensive examination. This will include a written component and an oral presentation and defense of the proposal.
- C.1.5** The student is strongly encouraged to submit a grant (i.e., the written comprehensive examination document) to an appropriate national and/or state-funding agency normally before the beginning of the third year of graduate study.
- C.1.6** The student should present research data (e.g. pilot data) at one national meeting by the end of the end of the second year of study. All students should strive to present his/her research data at

a minimum of one national meeting/year thereafter.

- C.1.7** Students should submit/publish several manuscripts (e.g., 1-3) to appropriate peer-reviewed journals from work conducted as part of the dissertation program. The student should discuss the order of authorship with his/her dissertation advisor and the appropriate dissertation committee members prior to submission of the manuscript for peer review. Students must obtain permission from all co-authors (e.g., faculty, postdoctoral fellows or other graduate students who have made substantial contributions to the research design, data collection, data interpretation and/or funding of the project), and the dissertation chairperson prior to submission of research data for presentation or publication. Co-authors should all be extremely familiar with the data and be able to discuss any part of the study fully. Normally students or faculty who have made minor contributions to the project should not expect to be listed as co-authors on the papers. Technical support should be acknowledged, but it is not normally recognized via co-authorship. Grant support or other funding means should be acknowledged in the publications. The institute where the work was conducted should be acknowledged.
- C.1.8** Although the student's primary focus after completing the comprehensive/qualifying examination should be dissertation research, occasionally there may be opportunities for involvement in research that is unrelated to/not part of the student's dissertation. The student should first obtain approval from his/her dissertation chair prior to involvement in any non-dissertation research. Significant contributions to projects in which a student provides significant, direct, creative and research input to non-dissertation research may result in co-authorship on other manuscripts. The best policy is for authorship to be discussed and decided prior to initiating the project.
- C.1.9** The student' must consult with his/her Advisor to decide which presentations to make and manuscripts to write. Advisor approval must be met before the student submits any grant proposals, abstracts or manuscripts for review or presentation. It is the student's responsibility to report his/her progress, presentations and publications to the Director of Graduate Studies.

C.2 Courses and Requirements in Exercise Physiology

The graduate faculty in Exercise Physiology have developed a core curriculum for students in the graduate program in Exercise Physiology. The following courses constitute the Exercise Physiology core curriculum and are required for all Exercise Physiology graduate students. Enrolling in all graduate courses before completion of the qualifying examination requires the written approval of the Initial Advisor or Dissertation Chair (See **Appendix 1**). Enrollment in courses as a doctoral candidate (successful completion of the qualifying examination) requires approval of the Dissertation Advisor and Dissertation Committee (i.e., as stipulated in the official plan of study).

It is the policy of the Division of Exercise Physiology that graduate students:

Will formally enroll in all courses in the appropriate semester that the course is offered (i.e., grades other than a change from an "incomplete" cannot be given retroactively for coursework including research conducted in some other semester other than when the work was done.)

C2.1. Course Requirements

The Exercise Physiology faculty has developed a core curriculum for students in the graduate program in Exercise Physiology. The following courses constitute the Exercise Physiology core curriculum and are required for all Exercise Physiology graduate students. The required courses are relatively few, and the majority of the training will be obtained by engaging in research.

Completion of Master's thesis is highly desirable. Failure to complete a master's research thesis will not disqualify students from admission; however, this will usually result in the need for the student to acquire additional course work including laboratory research and laboratory techniques

Basic Science Course Prerequisites

Evidence of course work in Biology (4-8 semester hrs) and Chemistry (4-8 semester hrs; Organic or General Chemistry) are normally required for admission to the Ph.D. program. Additional course work in physiology, anatomy, biochemistry or other sciences is beneficial but not required.

** Students may be required to take additional specific courses as determined by the student's doctoral committee. These courses will address the specific needs and interests of the student and reflect the overall objectives of the graduate program. Student's dissertation committee or advisory committee in consultation with the student determines all elective courses. Partial or full tuition waivers will only be considered for graduate level courses that are approved by the respective student graduate committee (advisory/dissertation committee).*

REQUIRED DOCTORAL COURSE WORK (or equivalent) HRS.		
COURSE	COURSE TITLE	HOURS
	1st year core curriculum see: http://www.hsc.wvu.edu/som/resoff/gradprograms/1stycurriculum-main.asp or admission to Year 2 of the curriculum (e.g., similar courses that transfer in for graduate credit)	
EXPH 791A	Advanced Study Exercise Physiology I: Cardiovascular function	3
EXPH 791B	Advanced Study Exercise Physiology II: Muscle structure and function	3
EXPH 797	Research	~ 12
EXPH 799	Graduate Colloquium	Each Semester
	Statistics	6
EXPH 796	Dissertation (years 3-5)	~ 40+

Typical Course Curriculum and Sequence – YEARS 2-5+

YEAR 2 EXERCISE PHYSIOLOGY CURRICULUM: FALL SEMESTER		
COURSE	COURSE TITLE	HOURS
EXPH 791	Advanced Study of Exercise Physiology - I	3
EXPH 797	Research	6
EXPH 799	Graduate Colloquium/Journal Club	1
	Statistics	3
	TOTAL	13
YEAR 2 EXERCISE PHYSIOLOGY CURRICULUM: SPRING SEMESTER		
COURSE	COURSE TITLE	HOURS
EXPH 791	Advanced study in Exercise Physiology – II	3
EXPH 797	Research	6
EXPH 799	Graduate Colloquium/Journal Club	1
	Statistics	3
	TOTAL	13
YEAR 2 EXERCISE PHYSIOLOGY CURRICULUM: SUMMER SEMESTER		
COURSE	COURSE TITLE	HOURS
EXPH 797	Research	9
	Comprehensive Examination (Dissertation proposal in grant form)	N/A
	TOTAL	9
YEAR 3-5 EXERCISE PHYSIOLOGY CURRICULUM		
COURSE	COURSE TITLE	HOURS
EXPH 798	Dissertation Research	8
EXPH 799	Graduate Colloquium/Journal Club	1
	TOTAL	9

* Doctoral committees may require additional course work or research credits depending on the student's research or professional goals or the prior level of student preparation.

C3. Required Research Participation

C.3.1 Overview of Research in Exercise Physiology

- Because the Ph.D. is primarily a research degree, students will be expected to be involved in research from the beginning of his/her graduate programs. When each doctoral student enters the program, the ongoing research projects in the division will be explained by the principal investigator(s) during the student's interview and during the first few weeks of the fall semester of year 1. Students will select up to three faculty with whom they will complete research rotations during year 1 (typically 1 rotation in the fall and two in the spring of year 2).
- Each student will be required to collaborate with a faculty mentor, postdoctoral fellows and/or senior doctoral students on ongoing research projects during the first semester of doctoral work. The students will concurrently be reviewing the literature in an area of interest as part of his/her research efforts during the research rotations and subsequent research
- Students will learn to analyze and interpret data, and they will be encouraged to submit abstracts based on his/her projects for presentation at appropriate national meetings.

- Students will select a Dissertation Chair by the beginning of the summer semester of year 1. During the summer semester students should work on research projects with his/her Dissertation Chair. The preliminary research projects with his/her Dissertation Chair are designed to provide students with the skills necessary to become independent investigators. The research experience will be instrumental in collecting pilot data that will support Part II of the Comprehensive examination culminate and eventually will lead to the completion of the doctoral dissertation. Finally, the preliminary data will provide students the opportunity to obtain data for presentation at national and international meetings.
- Students will be expected to be heavily involved in research throughout the doctoral program with a goal of having at least one manuscript published or in preparation **prior** to beginning his/her dissertation research. As part of the qualifying examination, the students will be required to write a major grant proposal. The students will use the data from his/her pilot studies as part of his/her grant applications.

C.4 Directed Research

Once the Major (Dissertation) Advisor is identified and even before the Dissertation Committee is in place (year 2), the student can begin preliminary research projects and pilot studies in the area of the dissertation topic. All preliminary research must be collected under the supervision and approval of the Dissertation Chair.

Therefore, the student is expected to engage in directed research under the supervision of the Dissertation Chair to learn techniques and collect pilot data that will be the basis of a future dissertation project. The student does not require approval of his/her dissertation topic and research questions by his/her dissertation committee prior to beginning pilot data collection; but approval of the Dissertation Chair is required.

Studies to obtain pilot data should be presented to the dissertation committee to demonstrate the student's competency in research skills, and, that his/her research ideas and hypotheses are appropriate and justified. This process facilitates progression through the program in a timely and efficient manner. Nevertheless, the Dissertation Committee may require the student to obtain additional pilot data or research skills prior to approving the research proposal as a dissertation topic.

The student's directed research efforts should be progressing towards approval of a dissertation topic from the members of the Dissertation Committee, once they have been identified (before the end of semester 1, year 2). This research training will provide the student background data /information from which to base grant proposal and dissertation topic as part of the requirements for completing Part II of the Comprehensive Examination.

C.5 Comprehensive/Qualifying examination.

C.5.1 Purpose

The comprehensive (qualifying/candidacy) examination will evaluate a student's readiness for advancement to doctoral candidacy. Advancement to candidacy means that in the judgment of the faculty, the doctoral student has an adequate knowledge of Exercise Physiology, has an in-depth knowledge of a specialized area in Exercise Physiology, has acquired adequate research skills to conduct research experiments, knows how to use academic resources, and has potential to do original research. In other words, the student is qualified to complete the doctoral dissertation and conduct independent research.

C.5.2 Requirements of the Qualifying/Candidacy Examination

The qualifying examination should typically be taken before the beginning of the third academic year, preferably in the summer semester of the second year. Some students may require additional didactic course work if his/her

research/science preparation during his/her master's degree was considered to be insufficient to prepare the student for work at the doctoral level. When a student has passed the Qualifying Examination, he/she will be admitted to candidacy for the Ph.D.

C.5.3 The following are prerequisites for advancement to the qualifying examination:

C.5.3.1 The student must have an approved Dissertation Advisor and a Dissertation Committee.

C.5.3.2 The student must be in good academic standing (GPA of "B" or better) as defined in the Doctoral Program and this hand book, and have satisfactorily completed the first two years of course requirements (including those specified by the student's dissertation committee in the program of study). A MINIMUM of 12 credit hours (or equivalent) of research experience is expected, but more is desirable.

C.5.3.3 The oral and written components are evaluated exclusively by the Dissertation Committee, and there can be no more than one dissenting vote from this committee for a student to pass. Normally unanimous decision of the dissertation committee is sought before the student will pass the qualifying examination and advance to candidacy.

C.5.4 Format for candiacy/qualifying examination

C.5.4.1 Overview

Graduate students will be admitted to Ph.D. candidacy after successfully completing all course work and passing a candidacy examination. The purpose of the candidacy examination is to evaluate a student's readiness for advancement to doctoral candidacy. The candidacy examination will consist of writing and orally defending a dissertation proposal. Advancement to candidacy means that in the judgment of the faculty, the doctoral student has an adequate knowledge of Exercise Physiology, knows how to use academic resources, and has potential to do original research autonomously. No student with a grade point average of less than 3.0 will be eligible to take this examination.

The qualifying examination should be taken after completion of the formal course work as defined by the student's dissertation committee and chair/advisor of the dissertation committee in conjunction with the Director for Graduate Studies. When a student has passed the Candidacy/Qualifying Examination, he/she will be admitted to candidacy for the Ph.D.

The following are prerequisites for advancement to the qualifying examination:

- The student must have a dissertation advisor and a dissertation committee.
- The student must have demonstrated competent research skills.
- The student must have a suitable dissertation topic that is approved by the dissertation committee.
- The student must be in good academic standing as defined in the Doctoral Program and have satisfactorily completed the first two years of course requirements (including those specified by the student's advisory committee) with at least six credit hours (or equivalent) of laboratory research experience.

C.5.4.2 The student must demonstrate the following qualifications are required for advancement to Ph.D. candidacy:

- A wide base of knowledge in Exercise Physiology

- An in depth knowledge in a specific area related to Exercise Physiology (which will be the basis of the dissertation)
- An ability to think independently
- Integration of existing knowledge
- Critical evaluation of literature
- Problem-solving skills
- Acceptable written and oral communication skills as demonstrated by writing a grant proposal in a modified NIH/AHA format

C.5.4.3 Scheduling of candidacy examination:

- The examination will be scheduled by the Chair of the student's dissertation in consultant with the Director of the Graduate Studies and the Graduate Faculty, and will be held as soon as convenient after completion of all required course work. (Typically, the end of year two and normally before the end of semester 1, year 3.

C.5.4 Members of the Examination Committee

- Members of the students' Dissertation Committee will serve as voting members of the Examination Committee. Typically, the members of the dissertation committee will represent expertise over several areas of exercise physiology, as well as the minor area of concentration.
- Only the members of the student's dissertation committee will function as voting members.
- The majority of the faculty including the Director of Graduate Studies must agree that the quality and scope of the student's performance in the qualifying examination is adequate before the student is permitted to take the examination.
- The student should have the opportunity to discuss his/her performance against the faculty's expectation at an appropriate time after completion of the oral defense of the comprehensive examination.
- If the student fails to meet pass the candidacy/qualifying examination, the dissertation committee may opt to allow the student to revise and redo the examination. If a student fails to pass a second attempt, the student will normally be dismissed from the graduate program. The student may appeal the dismissal to the Dean of Graduate Studies.

C.5.5.1 Details for Written Research Proposal (the written component of the qualifying/candidacy exam).

- The comprehensive/qualifying examination is submission of a **NIH or AHA style grant proposal** that depicts exactly the dissertation project that the graduate student proposes to complete.
- It is expected that the student will develop the contents of this proposal by consulting individually with the members of his/her dissertation committee throughout year 2. Furthermore, the student should meet at least once with his/her dissertation committee prior to the comprehensive examination to establish a dialogue with his/her committee members and to address concerns regarding the general research directions. The student should consult regularly with his/her major (Dissertation) advisor throughout year 2 as they develop and mold his/her proposal.
- The written research proposal will become part of the evaluative tools for the dissertation committee's assessment of the student's preparation to candidacy. It will also be the means by which the Dissertation Committee evaluates the merit of the proposed research dissertation project.

The written exam will be normally be composed of the components of an NIH style, modified PHS 398 Research Plan containing the following sections:

I. Specific Aims

A concise description of what the proposed research project will accomplish, including the hypothesis.

II. Background and Significance

A discussion of the scientific literature relevant to the proposed project that illustrates the current level of understanding in this area and identifies specific gaps in knowledge that the proposed project is intended to fill.

III. Preliminary data and Pilot Studies

The figures, charts, photographs, gels, raw data signals etc. will provide evidence of the student having acquired the needed research skills, the accuracy to which the research methods have been used and interpreted, and this should be the basis for proceeding with the larger study (i.e., the pilot data demonstrates the likelihood for success).

IV. Research Design and Methods

This section requires a thorough description of the research design and experimental procedures that will be used to accomplish the specific aims of the project. This section should clearly present the rationale for the chosen experimental design and procedures, and it should also include information on how the experimental data will be analyzed. Anticipated results and his/her interpretation should also be discussed relative to the proposed hypothesis. One or more figures showing a flow chart of the research design and also the time line of experiments for the study are helpful and encouraged.

V. References

The references do not have to be exhaustive but they should be thorough and include the most recent manuscripts as well as the classical manuscripts from which the more recent data are based. The length of the written proposal should not exceed 20 single-spaced pages (excluding budget, references and pages prior to "Specific Aims"), with a minimum font size of 11 pt.

VI. Budget

A sample budget should also be constructed according to the PHS guidelines for an RO1 proposal (not the modular budget form). This will help the dissertation committee evaluate the student's grasp of the resources necessary to complete a dissertation research project.

Appropriate lengths for each section (single spaced) are:

- Specific Aims: 1 page
- Background and Significance: 2-3 pages
- Preliminary studies and Pilot Data: 3-5 pages
- Research Design and Methods: 6-7 pages
- Budget and Justification (2-4 pages including justification pages)
- References: (3-4 pages)

NOTE: This grant will also form the backbone of the Ph.D. dissertation.

C.5.5.2 Comprehensive Examination– The Oral Exam

- The oral examination will ONLY be scheduled if the members of the Dissertation committee judge the written submission of the exam (in the grant format) to be acceptable (or acceptable pending minor revisions).
- The following guidelines given below should be reviewed by the student and his/ her Dissertation Committee before scheduling the Oral Examination.
- The Dissertation Chair will notify the student whether the oral defense can be scheduled. If the written exam (e.g., NIH grant) is adequate (pending revisions/suggestions made by the Dissertation Committee etc.) that student will be instructed to secure an adequate room for the Oral Defense, and also to arrange for notification/advertisement of this oral examination. Notification and scheduling of the oral examination will be made by the student after consulting with the **Dissertation Chair** no less than 14 days before the examination. The student should arrange for the announcement to be posted in the Division/Department and sent to other departments, the Health Sciences Graduate Office and/or distributed by email. The announcement should contain:
 - The date, location and time of the oral presentation and defense.
 - The name of the student and each of the members of the student's dissertation committee (identify the Chair of the dissertation committee in the advertisement).
 - The title of the student's research proposal that will be presented and defended
 - All graduate faculty and graduate students will be invited to participate in the student's oral examination. (See M. **Appendix 4, pp.44** for an example of this notification).
 - A "doctoral qualifying examination form" (see: http://www.hsc.wvu.edu/ResOff/Education/Forms/doctoral_qualifying_exam_form_preliminary-fillable.pdf must be completed and signed by the members of the dissertation committee and submitted to the Graduate Office prior to the oral examination.
 - In the oral examination the student will make a professional formal presentation (using slides or power point computer slides or similar media, but not overhead acetates) that clearly identifies the research area, hypotheses and questions that they wish to pursue as part of his/her Ph.D. dissertation and pilot data that they have obtained (~40-45 minutes). The Chair of the Dissertation Committee will also Chair Part II of the examination. The Chair will permit members of the audience (faculty, graduate students etc.) to ask questions of the graduate presenter for approximately 10-15 minutes. Thereafter the guests will be dismissed and the meeting will be closed except for the members of the student's dissertation committee and other invited (i.e., non-voting) members of the graduate faculty that have been approved by the Chair of the Dissertation Committee.
- At the completion of the comprehensive examination, the Dissertaion Chair must complete the "Doctoral Research Proposal Defense" form and submit this to the graduate office (See: http://www.hsc.wvu.edu/ResOff/Education/Forms/doctoral_research_proposal_defense-fillable.pdf).

C.5.5.3 Grading of qualifying examination

- To pass, students must receive not more than one "no" (fail) vote by a member of the Examination Committee on either the oral defense or the written examination.
- The Dissertation Committee will grade the student's performance on the combined written and oral defense components as a satisfactory (pass), satisfactory pending satisfactory revisions (conditional pass), or unsatisfactory (no-pass). Outstanding efforts may obtain a "pass with distinction" notation from the Dissertation Committee; however, this requires a unanimous vote of all committee members.
- To successfully pass the qualifying examination, the student must have adequate pilot data and have demonstrated evidence of acquiring the necessary research skills, and have responded to the satisfaction of the faculty.

C.5.5.3 Stopping the Oral Component of qualifying examination

- If it becomes apparent that the student is incapable of answering the questions in a satisfactory manner (e.g., unfamiliarity with specific research methods, insufficient pilot data to provide a sound rationale for the proposal, etc.) the committee may stop the exam without failing the student; however, stopping the examination for reasons other than insufficient pilot data is rare.
- If the Dissertation Committee determines that all areas of the students' performance are adequate other than providing sufficient evidence of acquiring research skills and pilot data, the oral component of the Part II exam may be terminated (but not graded as a failure) until the student is able to obtain additional/sufficient pilot data. At the point of termination, the Dissertation Committee will establish a new time line and set a new oral defense date, and this new time line will be given to the student.
- The Dissertation Committee will be assembled at the newly established date and Part II will begin as if for the first time (including advertisement/notification) once the student had obtained these skills or new data.
- If the student fails to obtain the research skills/data etc. within the time determined by the Dissertation Committee, the student may be given an overall failing grade

C.5.5.6 Course of action in the event of failure

- If the oral exam is judged by the committee to be acceptable (i.e., "passed"), the committee will ask the student to revise the written proposal after providing the student with constructive criticism during the oral examination.
- Usually a verbal "conditional" approval, will be granted to the student on the day of completion of the oral defense contingent upon submission of a revised written proposal that carries the approval of all members of the dissertation committee (including editorial and scientific changes). The examining committee members will not sign the "approval" sections of the graduate school documents until the student has satisfactorily implemented all corrections. A "satisfactory" grade of Pass will not be submitted for the student's performance on the Comprehensive examination until the student has satisfactorily met all of the requirements of the Dissertation Committee concerning this examination and revisions as needed.
- Failure of either portion the written research proposal or the oral examination for a second time is ground for dismissal from the program. Students will be permitted due process and the Division Chair will convene the Graduate Faculty as a whole, who will consider written appeals from any student who has been dismissed by virtue of failing the qualifying/candidacy examination¹.

C.5.5.7 Temporary committee substitutions

- Membership on a doctoral dissertation committee signifies the highest level of commitment to all phases of the student's doctoral training. All committee members must therefore be present for the oral research design exam. If all the members of the committee are not present at the beginning of the oral defense for Part II, the oral examination cannot continue. Absence of a committee member from the exam is only acceptable in the event of illness or some other serious unforeseen problem.
- If a committee member is unexpectedly unable to participate in a scheduled oral examination, the examination should be rescheduled for another time within the next two weeks when all members can be present. The student may request that the examination not be rescheduled, provided that a substitute committee member can be found (if one is needed to meet minimal dissertation committee

¹Students will have access to due process for appeals from academic dismissal as defined by university procedures.

requirements). Requests for member substitution will be granted in only very rare and exceptional circumstances. The Division Chair must approve any temporary substitutions.

- The substitute must have adequate time to read the written proposal and prepare for the examination. The substitute must be a suitable graduate faculty with established expertise in an area previously represented by the absent committee member. It is not appropriate to substitute one faculty with another if a different research expertise would be represented by the substitution. Any substitute must be acceptable to both the student and the Dissertation Advisor, and the substitute must meet the requirements for dissertation committee membership. The substitute member will be considered a full-voting member of the Dissertation Committee for the purpose of administering and grading the examination. The final examining committee may contain no more than one (1) substitute member, and the students' advisor (normally Dissertation Committee Chair) may not be substituted for.

C.5.5.8 Submission of the Written Research Proposal to a Funding Agency

- The written examination also serves an additional purpose. Graduate students are expected to submit at least one grant proposal to an external granting agency by the end of his/her second year of enrollment. Constructing the proposal is a part of the requirements for graduation. The written component of the candidacy examination provides the graduate student the opportunity to complete these requirements for submitting the grant proposal, while also preparing for the qualifying examination and assembling the ideas for the dissertation project.
- The submission of the grant proposal to a funding agency should be used to: (a) seek a graduate student stipend and other research supplies as allowed by the external source; (b) seek funding for travel to national/international meetings if it is permitted by the funding agency; (c) obtain independent external review of the student's research proposal/dissertation project; (d) obtain experience in writing grants for external funding. The student should also notify the Director of Graduate Studies of the grant submission. This will be accomplished by submitting a copy of the front page of the grant proposal (with the title, signatures etc.), the budget page of the grant to the Director of Graduate Studies.

C.6 General Dissertation Requirements

- The purpose of the dissertation is to provide experiences that will assist the student in becoming an independent investigator and including the ability to construct manuscripts from the data collected in the research process. Typical dissertation projects will be ~ three (3) years in length.
- The student must complete a dissertation in which they have obtained original data that makes a novel and important contribution to knowledge in the broad field of exercise physiology. Students must pass an oral examination based upon his/her dissertation.
- The dissertation must be constructed in a format suitable to the Graduate School and the advisor. Preferable formats will include writing the chapters as if they were to be submitted to peer-reviewed journals. However, this "manuscript" format is not a requirement. Nevertheless, the typical doctoral dissertation will typically yield 3-5 peer reviewed manuscripts. To optimize feedback from the co-authors and to ensure timely publication, the manuscripts originating from dissertation work should be submitted for peer review prior to graduation, and some manuscripts may be published before the student graduates. Proper acknowledgement for funding of the research should be noted in both the dissertation and the manuscripts obtained from dissertation work.

C.6.1 Experiences associated with completing the dissertation should include:

- C.6.1.1** Reviewing the literature and identifying and defining an appropriate problem.

- C.6.1.2** Formulating research hypotheses, identifying specific research aims and goals that will provide novel scientifically important data.
- C.6.1.3** Deducing consequences from experimental manipulations, testing hypothesis, and defining basic terms and variables from the data outcomes.
- C.6.1.4** Constructing an experimental plan that considers all of the elements, conditions, and relations of the consequences including:
- Identifying all extraneous variables that might contaminate the experiment and determining how to control them
 - Selecting a research design
 - Selecting appropriate subjects to represent a given population, assigning subjects and treatments to groups;
 - Selecting or constructing instruments or assays and validating them in order to measure outcomes
 - Writing protocols to the Institutional Review Board for the Protection of Human Subjects or the Animal Use Committee;
 - Outlining procedures for data collection
 - Understanding and discussion the limitations of each research method used in the study.
 - Conducting pilot studies to perfect the instruments, assays, and research designs.
- C.6.1.5 Conducting experiments.
- C.6.1.6 Preparing raw data for analysis.
- C.6.1 .7 Applying appropriate statistical methods to determine significance.
- C.6.1.8 Interpreting and discussing the results.
- C.6.1.9 Preparing manuscripts and figures for submission to peer-reviewed journals.

After successful completion of the oral examination and submission of the final copy of the dissertation and the requirements as stipulated in the plan of study and the university's graduate handbook, the candidate will be recommended for the Ph.D. degree.

C.6.2 Recommended format for Dissertation

The precise format of the Dissertation should be determined by the Dissertation Chair in consultation with the student and members of the Dissertation Committee. The dissertation format below is recommended for the Exercise Physiology graduate program, but it is not mandatory.

Title Page (Page i) This lists the title of the dissertation, the author (give full name and degrees) and the institution and year of the oral defense of the dissertation.

Page ii The Degree, Title, Institution and Division, Author, Author's degrees and institutions where the degrees were earned, The major Dissertation Chair/Supervisor, the number of pages in the dissertation

Page iii-iv, Abstract A concise description of the dissertation projects. The aims of the research, hypothesis testing, methods (briefly), results and conclusions should be summarized in two pages or less (double spaced)

Table of Contents (pp. vi) List the chapter titles and reference the major subtitles in each chapter.

List of Tables This follows the Table of Contents

List of Figures This follows the List of Tables. This includes any photo reproductions of data, instrumentation etc.

Chapter 1. Introduction.

This begins as page 1 . Part of Chapter I can be taken directly from the appropriate categories from Part II of the Comprehensive Examination. The budget and references from Part II will not be included in Chapter I. The subtitles in this chapter are as follows:

- Purpose and Specific Aims: ~1 page
- Hypothesis: ~1/2 Page
- Background and Significance: ~3-5 pages
- Limitations of the study: ~1 page
- Terms: define terms used in the proposal

Chapter 2. Review of Literature

This chapter will be largely taken from the Background of Part II of the Comprehensive examination. However, it should be expanded to become more inclusive of references (recent and past important literature) and it should involve an integrative critical review of the literature, and not simply a restating of what various investigators found in those studies. This chapter however, must be focused on addressing the hypothesis and specific aims of the study. Topics that are not directly related to the hypothesis, specific aims or are not part of the background information from which the current hypothesis were derived should not be included. This is to be a focused in-depth review not a broad based verbose review of topics not directly related to the dissertation topic. Chapter 2 should typically be between 10-20 pages in length. Only in extremely rare conditions should Chapter 2 exceed 20 pages.

Chapters 3-8. Papers 1-5

Typically, a graduate student as part of his/her dissertation will write 3-5 manuscripts. The most convenient way to identify these manuscripts is to use each specific aim as a single paper. This might require the dissertation to have 3-5 specific aims, with 2-3 hypotheses tested in each specific aim. These chapters will look exactly like a submission to a peer-reviewed journal. The Dissertation Chair/research Advisor should decide the journal submission and format and the chapter should be formatted accordingly. This includes in typical fashion (taken from American Physiological Society formats as an example:)

- Title page
- Abstract
- Introduction
- Materials and Methods
- Results
- Discussion
- References
- Tables
- Figures
- Figure legends
- Acknowledgements

It is expected that several of these manuscripts that will be included in the dissertation will have been published before graduation (the HSC minimum requires one peer-reviewed first authored publication from dissertation work prior to graduation). It is further expected that ALL of the manuscripts will be

submitted to a peer-reviewed journal for consideration for publication before graduation. The process of writing the chapters as journal manuscripts will facilitate this process.

Final Chapters ~6. (Typically this may be ~Chapter 6-9). This chapter should provide a summary and discussion of the conclusions and the significance of the findings. All of the preceding papers will be brought together in this chapter to support the hypothesis proposed in Chapter 1, or, perhaps to forge a new set of hypothesis and a new model to explain the findings. This chapter should also include discussion under separate subheadings for future studies that could be conducted based on the data contained in this dissertation. Finally, the limitations of the data and the conclusions should be discussed.

C.7 Desired Outcomes of the Graduate Program in Exercise Physiology

C.7.1 Expected Outcomes

1. **Doctoral students should be familiar with the process of writing and submitting grant proposals prior to graduation.**

Assessment:

Graduate students will be expected to write and submit an ACSM/NIH/AHA-fellowship type grant proposal to their advisory committee as part of the departmental requirements for the qualifying examination. This grant proposal should detail the intended research dissertation project. The graduate student will be expected to submit this grant (after suggestions and revisions as provided by the advisor/dissertation committee) for the purposes of obtaining a graduate fellowship.

2. Graduate students should strive to **submit at least one grant proposal** to an external granting agency by the end of their second year of enrollment. The grant proposal should be used to: (a) seek a graduate student stipend and other research supplies as allowed by the external source; (b) obtain independent external review of the student's research proposal/dissertation project; (c) obtain experience in writing grants for external funding.
3. **Doctoral students should be able to conduct independent research, analyze and interpret the data and defend the findings and conclusions prior to graduation.**

Assessment:

Both the qualifying examination and dissertation project is designed to provide an avenue of training and assessment of graduate student's competency in these areas. Successful competency in general knowledge and preparation will be achieved when the full qualifying examination is passed (including approval of the dissertation project). Completing the dissertation project to the satisfaction of the dissertation committee will be evidence of successfully completing this outcome objective. Normally the dissertation project will demonstrate competency in some aspect of basic elements of molecular, cell, tissue, and/or organ physiology that is/are relevant to the Discipline of Exercise Physiology.

4. **Doctoral students should be able to clearly and professionally present and discuss their research findings at national and international scientific meetings.**

Assessments:

Graduate students in the Division of Exercise Physiology should become "well-rounded" scientists who have a breadth of knowledge that allows them to interact with persons who are not conducting research in their field. Furthermore, all graduate students can benefit from preparing, giving presentations and responding to questions (even if the topic area is not in their research field). To facilitate this process, students who are in their second year of enrollment through graduation will make a minimum of two Divisional presentations/year. Students in their second year of graduate enrollment are expected to give one departmental research seminar (providing hypothesis, literature background, evidence of data they have collected etc.) and one other seminar

each academic year. Doctoral candidates are expected to present their research findings at national/international scientific meetings. ¹⁷

All graduate students will benefit from presenting their data at national and international meetings and interacting with faculty and graduate students from other institutions who are doing the same. All graduate students who are in their second year of enrollment are expected to have conducted sufficient research in preparation for shaping their dissertation topic that they can present some of these at a minimum of one national/international meeting each academic year. Students should be made aware that they are representing their laboratory, Department, College and University at these research meetings, so they should be well prepared, and their professional behavior and conduct should be appropriate.

5. **Students should show teaching competency prior to graduation. Students should be required to teach at least on course (or section of a course) to improve their teaching abilities, provide teaching experience at a university (graduate/ undergraduate level) and provide the opportunity to begin honing their skills in communication as an instructor.**

C7.2 Student Evaluations

C.7.2.1 Annual Student Evaluations

- Students will receive annual evaluations by the Director of Graduate Studies. These evaluations will be based upon the compilation of the student's reports which are submitted to the Director of Graduate Studies each semester, input from the student's Dissertation Chair (or the Initial Advisor), and input from other faculty who have worked with the student.
- Faculty will have an opportunity to discuss and evaluate each student during a graduate faculty meeting that will be convened by the Director of Graduate Studies. Part of this evaluation will include the faculty's subjective assessments of the student's professional attitudes and conduct during participation in departmental and programmatic activities including but not limited to: participation in: course work, research efforts, graduate assistantship assignments, teaching assignments, research, working with peers and working with faculty and ethical and professional conduct when working with human patients/clients/subjects or animals.
- The Director of Graduate Studies will meet with each student and provide him/her a written assessment of his or her progress for the past year. The Director will also identify weaknesses that should be addressed throughout the following year. This feedback to the student is intended to improve the likelihood of the student moving steadily towards a timely graduation.

C.7.2.2 Regular Evaluations of Student Activity by the Dissertation Committee

- The Dissertation Chair should meet with the student to help the student identify strategies for academic and research improvement and therefore to improve the chances of successfully progressing towards a timely and successful graduation.
- The student should meet with the Dissertation Committee members individually at least once each semester, and with the complete Dissertation Committee no less than twice each year. The Dissertation Chair is required to submit a yearly assessment of the student's accomplishments and progress to the graduate office. This report is signed by the student and each member of the Dissertation Committee.
- The Dissertation Committee Chair and graduate student should keep the Director of Graduate Studies informed of scheduled meetings between the entire Dissertation Committee and the student. Usually, the frequency and outcome of these Committee meetings can be reported through the student's semester activity reports that are submitted to the Director of Graduate Studies.

C.7.2.3 Publication requirement. The final evaluation of quality graduate dissertation research is approval for publication of the research in quality peer-reviewed journals. While it is not possible to set a definite number of publications for each dissertation, the dissertation should be comprehensive enough to typically support three or more

full manuscripts for peer-reviewed journals. Nevertheless, students must have no less than one first authored publication from their dissertation work before they are permitted to set the date for their oral examination. Normally in Exercise Physiology, students are expected to have no less than three first authored publications prior to graduation. Although students might author and co-author other manuscripts during their graduate preparation (via research rotations, etc.), the intent of this goal and outcome assessment is to encourage submission of manuscripts as the project is proceeding towards completion (i.e., not waiting until every experiment is completed before assembling and submitting the first manuscript. The students will learn how to prepare manuscripts, if they are required to begin early and not late in their career. Ideally, all manuscripts connected with the dissertation will be submitted from the dissertation work before the student graduates from the doctoral program. Attempting to do this after graduation is not a good policy and usually results in significant delays in submission. This does not benefit the student, involved faculty or the graduate program. Thus, students will have met this outcome when all manuscripts arising from the dissertation work have been submitted to a peer-reviewed journal, which is acceptable to the dissertation chair and other co-authors. This should be completed before approval for graduation is granted. It is recommended that students should strive to have at least one-manuscript accepted, in press or published prior to graduation (assuming that there will be ~3 or more manuscripts from the dissertation project). The involved faculty and source of grant funding should be acknowledged as appropriate on each manuscript. The dissertation chair should determine authorship well in advance of writing and submitting the manuscript for peer-review and publication.

C.8 Teaching in Exercise Physiology.

- Although not a requirement, doctoral students may gain experience in teaching/lecturing and directing undergraduate courses in Exercise Physiology throughout his/her academic training. This should be done at a point that will not be disruptive to the student's research and after agreement of the Dissertation Chair. The request for teaching will be made to the Chair of Exercise Physiology, and a suitable teaching assignment will be obtained for the student.
- Typically, teaching experience will include a doctoral student providing several lectures in a class, or teach ½ class during summer sessions to masters or undergraduate students. A faculty member will work with junior students to assist them in developing lectures, handouts and exam questions. Senior students may be given full responsibility for complete sections of some courses.
- It is imperative for the professional development of the student that the teaching experience be as realistic as possible. In that regard, the student will be required to prepare and deliver lectures, construct test/examination questions, grade and direct courses. Therefore, the student will engage, to a limited degree, in all activities that are a normal part of the teaching responsibilities of a faculty member.
- Research will take precedence over teaching assignments, especially in senior graduate students. Therefore, teaching assignments will be designed to minimize conflicts with research activities. The Division Chairperson will assign all teaching workloads to graduate students.

C. 9 Expectations for all graduate students in all years of study

Participation in Departmental Activities.

An important part of the educational processes is for the graduate student to learn about ideas and the scientific inquiry of departmental and college peers, faculty and scientific experts who are outside of the Division of Exercise Physiology. Departmental seminars and colloquia provide an opportunity for "cross-pollination, where, all of the faculty, research staff, and graduate students can come together, ask questions, learn from each other, and provide constructive criticisms to help a peer, colleague or future colleague. Therefore, graduate students must attend all symposia, seminars or other academic/research events held by the Division of Exercise Physiology (irrespective if the Divisional activity has a designated course number and regardless if the student has registered to take this as a formal course). Graduate students who are not presenting in a departmental seminar or who are not enrolled to take this activity as a formal course are still expected to prepare for these meetings in advance by reading and identifying pertinent published manuscripts and subsequently attend and participate in these activities by asking questions and contributing to the discussion. Senior graduate students are expected to take the lead and therefore act as role models for more junior graduate students in these activities.

D. GRADES AND ACADEMIC STANDARDS

D.1. Achieving less than a grade of "B" in Any Core Course

It is the policy of the doctoral program in Exercise Physiology that:

D.1.1 Graduate students who fail to achieve an overall Grade Point Average (GPA) of "B" (i.e., a GPA of 3.0 or better) thereby indicating a failure to obtain academic good standing, will be placed on academic probation and permitted a maximum of one additional semester to achieve good academic standing. Students who do not meet these requirements will be dismissed from the graduate program.

D.1.2 Graduate students must obtain a grade of 3.0 ("B") or better in all Exercise Physiology courses. Any student who fails to achieve a "B" in any one of these courses must repeat that course even if his/her cumulative GPA is 3.0 or better. Students who fail to achieve a "B" grade or better in any of the three Advanced Exercise Physiology core courses that they have repeated will be prevented from enrolling in future graduate courses and dismissed from the graduate program. Achieving less than a grade of B in a second "core" Exercise Physiology course will result in the student's dismissal without opportunity for retaking the course¹.

D.2. Achieving less than a grade of "B" in Required Courses

It is the policy of the Division of Exercise Physiology that:

D.2.1 Graduate students who achieve less than a "B" grade in any elective or required course (i.e., not an Exercise Physiology "core" course) but they have otherwise maintained academic good standing of B or better, will have his/her academic records reviewed by the Director of Graduate Studies, Initial Advisor/Dissertation Chair, and the members of the student's advisory/dissertation committee.

¹ Students will have access to due process as defined by university procedures for academic appeals.

D.2.2 The **Advisor/Dissertation Chair** and Director of Graduate Studies will consult with the director of the course in which the student performed unsatisfactorily and will recommend to the Division Chair and Dissertation Committee that the student will either remediate or retake the course.

D.2.3 Graduate students, who are required to remediate any course, must formally enroll in that course. The remediated grade will appear on the student's transcript along with the original grade.

D.2.4 Graduate students can remediate a maximum of one required course. Students who take a total of two or more required courses will not be allowed to remediate the second failed course and they will be dismissed from the graduate program².

D.3. Academic Probation

It is the policy of doctoral graduate program in Exercise Physiology that:

D.3.1 Satisfactory progress and academic good standing for doctoral students will be indicated by a minimal grade of 3.0 (B) in each course, and a minimal cumulative grade point average (GPA) of 3.0. Students who fail to achieve academic good standing in all courses at the end of a semester will be placed on academic probation.

D.3.2 The student must reestablish academic good standing by the end of the following semester. The student must take a sufficient number of credits in courses approved by Director of Graduate Studies and Advisory Committee or Dissertation Committee to assure that it will be possible for the student to reestablish academic good standing.

D.3.3 If the student is unable to reestablish academic **good standing the following semester**, the Director of Graduate Studies will recommend to the Chair of the Division of Exercise Physiology that the student be dismissed from the graduate program.

D.3.4 The Director of Graduate Studies may consider and recommend to the Chair of the Division of Exercise Physiology a one-semester extension of the probationary period if the student can provide satisfactory written evidence of extenuating circumstances for failure to obtain academic good standing by the end of the original probationary period. The student may also be required to present his/her case orally to the graduate faculty as a whole.

D.3.5 After reviewing the written evidence for petition of extension of the probationary period, the Director of Graduate Studies will recommend one of two courses of action to the Division Chair: a) dismissal from the graduate program; b) extension of the probationary status by one final semester.

D.3.6 Students who are dismissed from the graduate program may appeal in writing to the Division Chair who will convene the graduate faculty in the Division of Exercise Physiology. Students will be given opportunity to appeal his/her case in person before the graduate faculty at large. The graduate faculty will recommend dismissal, reinstatement, or provisional reinstatement to the Chair of the Division of Exercise Physiology. The student may follow normal due process for appeals as established for university academic appeal procedures³.

² Students will have access to due process as defined by university procedures for academic appeals.

³ Students will have access to due process as defined by university procedures for academic appeals.

D.4 Appealing Dismissal from the Ph.D. program

D.4.1 The student may appeal a decision for dismissal by writing an appeal to the Chair of the Division of Exercise Physiology. The Division Chair will convene a meeting of the Exercise Physiology graduate faculty and the student's doctoral committee members if a doctoral committee had been formed prior to the student's dismissal. The student may appear at the meeting to make his/her appeal. The graduate faculty and doctoral committee members will review the appeal and render a decision by majority vote⁴.

E. SELECTION OF ADVISOR/DISSERTATION CHAIR AND THE DISSERTATION RESEARCH FOCUS

E.1 Selection of a Dissertation Chair (Year 1)

Before the end of the second semester of enrollment (but after completion of the research rotations) the graduate student should select a permanent major advisor (Dissertation Chair). The student should select a Dissertation Chair who has expertise in the area of the intended dissertation research, and with whom the student believes that he/she can work very closely for several years. In addition, because the Dissertation Chair will have the primary responsibility for mentoring the graduate student during the remainder of his/her academic career as a doctoral student, this faculty member must be willing to act as the student's Dissertation Chair. The Division Chair must approve appointment of the Dissertation Chair.

E.2 Selection of Major Dissertation Advisor/Chair and Dissertation Committee (Year 2)

The Dissertation Chair, and the student should work together to identify and obtain the agreements of other graduate faculty who have expertise in a research area pertinent to the student's dissertation. 'Courtesy' appointments to the Dissertation Committee will not be approved. Each member of the committee must have a clearly defined role and expertise that is pertinent to the student's dissertation success. This graduate faculty will become part of the student's examination and dissertation committee. All of the Committee members should agree to participate in the student's dissertation committee before the beginning of the second year of study. The Director of Graduate Studies must approve all committees. Ideally the dissertation committee will have its first meeting and review the student's progress and general research ideas/directions before the beginning of the second year of study. The Dissertation Committee will establish a plan of study for the student before the end of semester 1, year 2.

F. GENERAL GRADUATE STUDENT TRAINING AND PARTICIPATION AS A GOOD CITIZEN IN EXERCISE PHYSIOLOGY

F.1 Oversight of graduate work

- F.1.1** The Graduate Advisor will approve all course selections up to the time that the Dissertation Committee is appointed. The Dissertation Committee will maintain the responsibility of evaluating all academic student progress including research activities. The Director of Graduate Studies will receive yearly reports of the students progress towards graduation.
- F.1.2** Students will take courses as outlined in this Handbook. Students must enroll in required courses and appropriate graduate level courses as identified by his/her dissertation committee. The courses are designed to prepare the student for independent research and other contemporary Ph.D. pathways.
- F.1.3** Prior to beginning year 2, each student should have submitted the “preliminary” plan of study for year 2 to the Director of Graduate Studies. This preliminary plan of study must be approved by the student’s Dissertation Chair and indicate the courses that the student will take during the next 12 months, when the qualifying examination will be taken, identification of the faculty who has agreed to act as his/her Dissertation Chair, and the potential composition of his/her Dissertation Committee.
- F.2.1** It is the students' responsibility to meet regularly with his/her Dissertation Chair, because this person is his/her Major Advisor through the remainder of his/her graduate training. However, it is expected that the Dissertation Chair will require the student to meet regularly with him/her. The Initial and later, the Major Dissertation Advisor (Chair) should regularly review the student's progress, research problems/obstacles, writing, data etc. Usually students should arrange to meet with his/her major advisor at least weekly.
- F.2.2** Students should submit any written material in which they expect to receive feedback/constructive criticism initially to his/her Major Dissertation Advisor (e.g., dissertation, grant proposal, abstracts etc.). Students should expect a timely return of his/her materials, and this will normally be within two weeks from the point of submitting the material to his/her advisor for reviews of papers, data, reviews etc. but this should be discussed with his/her advisor/Dissertation Chair. It is unprofessional for a graduate student to expect or demand a faculty make special accommodations for returning materials in a time period that is shorter than two weeks from the point of submission to the advisor or any committee member. Unless instructed otherwise, a student should submit all written material and discuss any data/concerns etc. to his/her Dissertation Chair prior to discussion/submission to other members of the dissertation committee. Because the dissertation committee members were selected on the basis of his/her expertise and ability to assist the student’s progress in the research project, the student should next consult the members of his/her dissertation committee to resolve problems, interpretation questions, research assistance etc, prior to consulting non-committee members.
- F.2.3** In consultation with his/her Major Advisor, students should arrange to meet with his/her complete dissertation committee a minimum of twice annually. More frequent meetings between the Dissertation Committee and graduate student should be encouraged.
- F.2.4** Students will typically complete his/her qualifying examination and any other work that is recommended by the Dissertation Committee prior to the end of the second academic year of study and prior to beginning dissertation data collection. Although students may collect pilot data before this point, and the dissertation committee may allow the pilot data to be included as part of the dissertation project, it is in the student's best interest to have an approved project prior to considering the data collection to be part of the dissertation project.
- F.2.5** Students should provide data, drafts of any written work, etc. well in advance of any meeting with his/her dissertation committee. Although most members of the dissertation committee will require

delivery of chapters or data to be discussed at least two weeks prior to any meeting, it is the student's responsibility to inquire if the faculty member requires more time than this. Because a dissertation encompasses a large body of information graduate faculty (including the Dissertation Chair) will usually require four or more weeks to thoroughly review a dissertation in draft or final form. Therefore student should ask each of the committee members the amount of time that the faculty member will require to review the student's material. This will help the student determine the time needed to prepare materials prior to dissertation committee meetings or meeting with the faculty member individually. Therefore the student must plan accordingly and must not make assumptions about faculty time and availability.

F.3 Participation in Departmental Seminars

- F.3.1** Graduate students in the Exercise Physiology should become "well-rounded" scientists who have a breadth of knowledge that allows them to interact with persons who are not conducting research in his/her field. Furthermore, all graduate students can benefit from preparing, giving presentations and responding to questions (even if the topic area is not in his/her research field). Graduate students must normally enroll in two semesters of the departmental graduate seminar. Normally graduate students will make a minimum of one research presentation per academic year in the departmental or graduate seminar. It is the student's responsibility to make sure that they meet this obligation by scheduling this research presentation with the faculty responsible for organizing the seminars. A dissertation committee may require some graduate students to present more than one research seminar in a single academic year.
- F.3.2** Students who are in his/her second year of enrollment through graduation should make a minimum of two presentations/year. Students in his/her second year of graduate enrollment are expected to give one departmental research seminar (providing hypothesis, literature background, evidence of data they have collected etc.). Doctoral candidates (students who have passed the qualifying comprehensive examination) are expected to present his/her research findings. It is helpful for the student if a Division/Departmental seminar is scheduled before his/her committee meetings, so that students can better prepare to present his/her data and respond to questions during the scheduled dissertation committee meeting.
- F.3.3** All graduate students are required to attend all research symposiums, and seminars or other academic/research events held in the primary Dept. of their Dissertation Advisor (e.g., Division of Exercise Physiology; Dept. Physiology & Pharmacology etc.) simply as good citizens of the department (graduate students will attend even if the seminar is not in his/her area of research interest). They are also expected to attend any HSC Center seminars that are hosted by the Center of the affiliation of their Dissertation Advisor (e.g., CCRS etc.). Graduate students are expected to read the papers made available to them in advance of any seminar/presentation and furthermore, they should come prepared to ask questions of the speaker and contribute to the discussion. Senior graduate students are expected to take the lead in this area of inquiry. Faculty should meet with his/her advisees to constructively evaluate the student performance in these activities and suggest ways for improving if warranted.
- F.3.5** In rare cases research activities or presenting at a national/international research meeting may prevent a graduate student from participating in the scheduled graduate seminar. Permission for absences must be provided in writing to the seminar director and co-signed/approved by the student's Initial Advisor. Students must enrolled in EXPH 799 each semester and failure to attend two (2) graduate seminars in this course in a single semester will result in a grade of no-pass for that semester, (because the student has not provided evidence of participation or preparation for seminars) and this unacceptable grade in seminar will be recorded on the student's transcript. The student's Dissertation Advisor may also add additional consequences for failure.

F.4. Research, presentation of data in national meetings and writing manuscripts ²⁴

- F.4.1** Students are expected to conduct independent research under the advice and supervision of his/her Major Advisor. Students should familiarize themselves with resources, and obtain proper training on all research equipment. Students should seek the additional advice of the expertise represented by the faculty who have agreed to participate in his/her dissertation committee after consulting with his/her Dissertation Chair. It is expected that the graduate student will take the advice offered by the Dissertation Chair and other members of the Dissertation Committee.
- F.4.2** Graduate students will benefit from presenting his/her data at national and international meetings and interacting with faculty and graduate students from other institutions who are doing the same. All graduate students who are in his/her second year of enrollment are expected to present the data they have collected as part of his/her dissertation at a minimum of one national / international meeting each academic year. Students should remember that they are representing his/her laboratory, Division, School and University at these research meetings, so they should be well prepared, and his/her professional behavior and conduct should be appropriate.
- F.4.3** The Faculty in Exercise Physiology recognizes the educational importance of graduate students presenting his/her data at national/international meetings. Graduate students who have his/her data accepted for presentation at an international/national scientific meeting may be considered for Division funding to offset in part travel costs incurred to make this presentation. The graduate student must be the first author and presenter of the data. Priority will be given to graduate students who have passed his/her qualifying examination. Attendance at a national meeting without presentation will not be considered for departmental funding. Division funding is not guaranteed and it is dependent upon the availability of funding for this purpose. Although faculty are sensitive to the funding issues with travel for students, some funding agencies do not provide support for graduate student travel to meetings. Students should discuss with his/her Dissertation Chair whether funding is available for travel to scientific meetings to present dissertation data that is also funded by the Chairs' sources. Nevertheless, students are expected to attend appropriate scientific meetings (a minimum of one/year beginning in the third year of enrollment) and present his/her data at these meetings even if Divisional or Departmental funding is not available.
- F.4.4** Graduate students are reminded that all data and laboratory manuals used in his/her research are the property of the Principal Investigator/ Research Advisor. This is usually the Principal Investigator in whose laboratory the student worked and collected the data. Therefore, the graduate student must obtain the approval of the laboratory Principal Investigator/Primary Advisor prior to any data submission for purposes of presentation or publications including abstracts generated from the research.

F.5. Writing and submitting grant proposals

- F.5.1** Graduate students will be required to write and submit an NIH/AHA type grant proposal to his/her advisory committee as part of the departmental requirements for the qualifying examination. This grant proposal should detail the intended research dissertation project. The advisory committee may add other elements to the qualifying examination evaluation.
- F.5.2** Graduate students are expected to submit at least one grant proposal to an external granting agency by the end of his/her second year of enrollment. This will normally follow the comprehensive examination, since this grant is to be prepared as part of the requirements for the comprehensive examination. The grant proposal should be used to: (a) seek a graduate student stipend and other research supplies as allowed by the external source; (b) obtain independent

external review of the student's research proposal/dissertation project; (c) obtain experience in writing grants for external funding; (d) obtain funding for travel to scientific meetings. ²⁵

- F.5.3** Research data collected, work completed, manuscripts generated in part or in full from the data, abstracts of the data, all laboratory notebooks and new products developed by a graduate student in conjunction with a faculty advisor, remains the intellectual property of the student's faculty advisor. Normally this is not an issue because manuscripts originating from the dissertation work should be submitted prior to the student's graduation, so that the student is afforded due credit for the research efforts. Nevertheless, because granting agencies require the raw data record books be available in the principal investigators laboratory for grant review/inspection (e.g., a site visit), all original laboratory notebooks and compiled data (e.g., negatives from photographs, gels, electronically inputted data and images etc.) must remain in the possession of the faculty advisor in whose laboratory the student has worked (i.e., it is not the personal property of the graduate student). The principal investigator/Major Advisor may allow the student to make copies of data and research books for the student's own records.

G. FUNDING OF GRADUATE STUDENT RESEARCH AND STIPENDS FOR GRADUATE STUDENTS

- G.1** Graduate students will typically receive a stipend from a funding source that has been achieved by a graduate faculty Exercise Physiology. Students should be expected to be assigned duties for receiving a graduate stipend and fee waver. Some of these activities may be outside of the student's own dissertation/research responsibilities for graduation and may be up to 20 hours/week of non-dissertation work. In addition, during this time students will complete his/her course work, select a research laboratory/primary faculty advisor, pass his/her qualifying examination and obtain an approved dissertation topic.
- G.2** Students who are admitted to the doctoral program will be funded by a stipend throughout his/her training; however, renewal of this stipend is dependent upon maintaining academic good standing, making suitable progress towards graduation, and the availability of adequate funding.

H. GRADUATE WORK ENVIRONMENT: Professional conduct in a Professional School.

- H.1** Graduate training and receiving a stipend during that training is a privilege, not a right. The graduate student should strive to obtain a cohesive working arrangement with other graduate students, faculty and departmental staff. Unprofessional behavior and attitudes by a graduate student will not be tolerated in the Division, Department, School or University, and may, at the recommendation of the Dissertation Chair, Director of Graduate Studies and after review by the graduate faculty at large and if approved by the Division Chair, result in termination of the Division stipend funding and/or dismissal of the graduate student from the doctoral program in the Division of Exercise Physiology ⁴.

⁴ The student may appeal a dismissal from the graduate program for non-academic reasons according to approved channels of due process through the Graduate Office of the Health Science Center and West Virginia University.

H.2 The graduate student should recognize that he/she might have additional research tasks, research presentations, preparations and projects assigned to them as part of his/her graduate education process by the student's major advisor who is his/her Dissertation Chair (for example, assist in preparing an abstract/poster for presentation at a national meeting, etc.). Although the number and type of additional tasks may vary from student to student, all of the tasks are expected to be completed by the student in a timely manner. A graduate student, who believes that a task is inappropriate, can appeal an assignment in writing to the Division Chair who will review the assigned tasks⁵.

H.3 Graduate stipends are for 12 months and the graduate student is expected to be in the laboratory and conducting appropriate research/educational activities each day as part of his/her obligation to receiving the graduate stipend and being enrolled in the doctoral program. Divisional expectations for continued funding are described above.

H.4 Vacations, Sick Leave, and Work Schedules. Once in the second year of graduate study, the student no longer adheres to the vacation schedule of the undergraduate University calendar. If the student is sick for a journal club or seminar, they should inform the faculty member in charge of that activity of their absence. Please note any policies regarding absenteeism in the syllabi of courses. This can be by phone or email and should be done prior to the time of the class or meeting. Do not assume that informing your advisor or a single course director of your absence will result in that absence being communicated to all other faculty. Each faculty member with whom you have a class or other obligation must be informed individually each time an absence is going to happen.

The student should discuss vacation and sick policies with their advisor. There are no fixed holidays other than days that the university is officially closed as a holiday (Christmas, Thanksgiving etc.). The student is cautioned that the degree is granted based on completion of the dissertation research and not based on length of time in the program. The general University guideline for sick leave is 1 day per month.

The University does not have policy for maternity/paternity leave for graduate students. Students who need this leave should discuss expectations with their advisor. A general guideline would be 6 weeks maternity leave and 2 weeks paternity leave and University policy is that this time is deducted from sick and vacation leave. Many women and men find that they can return to some activity prior to this time. Remember, time spent away from the laboratory either due to illness or vacation will hamper the student's progress on their research.

The student should discuss the expectations for total hours of work as well as the days of service (weekends/holidays) with their dissertation advisor. These expectations are likely to vary between laboratories so it is important to establish what these are upon.

H.5 Student Code of Academic and Professional Integrity. Developing and practicing high standards for professional conduct are critical for the scientist. Both the University Graduate Council and the Graduate Faculty consider maintaining scientific integrity to be of utmost importance. All students are required to take a course in Scientific Ethics as part of the integrated first year curriculum. These standards are to adhere to throughout the student's graduate education and into his or her career. All students are directed to be familiar with the University's policy on this subject. This can be found at: <http://www.arc.wvu.edu/admissions/integrity.html>

Students should pay particular attention to the avoidance of plagiarism in all scientific writing. The University's definition and position on plagiarism is: "Plagiarism is defined in terms of proscribed

⁵ The normal due process for appeals is available to the student according to the procedures of operation for West Virginia University.

acts. Students are expected to understand that such practices constitute academic dishonesty²⁷ regardless of motive. Those who deny deceitful intent, claim not to have known that the act constituted plagiarism, or maintain that what they did was inadvertent are nevertheless subject to penalties when plagiarism has been confirmed. Plagiarism includes, but is not limited to: submitting, without appropriate acknowledgement, a report, notebook, speech, outline, theme, thesis, dissertation, or other written, visual, or oral material that has been copied in whole or in part from the work of others, whether such source is published or not, including (but not limited to) another individual's academic composition, compilation, or other product, or commercially prepared paper." (from: <http://www.arc.wvu.edu/admissions/integrity.html>). Students who have any questions regarding what constitutes plagiarism should request clarification from the faculty before embarking on any writing assignment. Failure to adhere to these standards of scientific integrity will result in disciplinary action by the graduate faculty and may jeopardize the student's status in the graduate program.

I. M.D./Ph.D. program in Exercise Physiology

- Two years of the medical school curriculum will satisfy the first year course requirements. The medical school curriculum includes an introduction to statistics as part of the Evidence Based Medicine course.
- Laboratory long rotations are chosen through the M.D./Ph.D. program and are completed prior to entry of the student into the Ph.D. portion of the curriculum.
- Passing the national boards are necessary for admission into the third year of the graduate program.
- The oral and written qualifying examination will be the same as above. This will consist of the proposal written in an NIH/AHA format and an oral defense and it will follow the guidelines for regular graduate students. It is recommended that this exam be taken during the first year of research but must be completed by the end of the fall semester of their third semester in the graduate program. Failure to pass the oral exam by the end of the third semester in the graduate program, unless prior approval is provided by the Graduate Studies Committee, will result in dismissal from the doctoral graduate program.
- Other course work and seminar requirements are two advanced courses in Exercise Physiology, journal clubs, and seminars, as required of other students in the Ph.D.
- The students will take the course in scientific ethics taught by the Office of Research and Graduate Studies.

APPENDIX

J. ETHICAL CONDUCT IN RESEARCH: THE NUREMBERG CODE AND THE WORLD MEDICAL ASSOCIATION DECLARATION OF HELSINKI^a

All students enrolled in the graduate program will conduct research with graduate faculty as part of the process towards becoming independent researchers. All research must be approached in an ethical and professional manner. Some research may be with humans and other research may be conducted using animal models for human problems or diseases. In addition, graduate students will work in the Human Performance Laboratory and occasionally in other clinical settings where professional and ethical conduct is paramount to the success of the student. Whether basic research, applied research, or clinical settings of research and/or clinical treatment of subjects or clients through exercise or other mediums all graduate students and faculty must follow the established and accepted procedures for ethical conduct. In addition to the Ethical conduct issues standard throughout West Virginia University School of Medicine, The Graduate Faculty in Exercise Physiology have adopted the Nuremberg Code of Ethical conduct in research and the World Medical Association Declaration of Helsinki. Both documents describe appropriate and ethical conduct when conducting human and animal research. Since both types of models are used in our Division, every student and faculty should become familiar with both of the following documents and conduct his/her actions according to these documents. Although especially the Helsinki Declaration frequently addresses physicians' responsibilities to patients and research on patients, the faculty and graduate students should direct his/her actions of ethical conduct so that it is indistinguishable from the physician's conduct with his/her patients as described below. All graduate students and faculty will obtain Human Institutional Review board (IRB) approval prior to collecting any data on human subjects. The rules and regulations outlined by the Institutional IRB committee will be followed in every detail. Furthermore, students or faculty cannot add items for testing on human subjects without filing the correct addendums or filing a new IRB, as determined by the policies and procedures of the IRB. Similarly, graduate students and faculty must not conduct research on animal models until proper review and approval from the Institutional Animal Use Committee (IACUC) has been granted. There are no exceptions to the rules as outlined by the IRB and IACUC. Failure of graduate students to conduct themselves in a professional and ethical manner and/or disregard for rules outlined by the IRB or IACUC or failing to follow established ethical practices when working with human subjects or animals will result in an inquiry from a committee established by the Chair of the Division of Exercise Physiology, and this committee may recommend dismissal from the graduate program if the student has been found guilty of failing to follow the codes of ethical conduct as described below. The infractions will be reported to the appropriate committees (e.g., IRB or IACUC) and will also be independently handled at the institutional level. The Division Chair will review and pursue the appropriate course of action for graduate faculty who choose to ignore the ethical codes for research conduct as described below. These codes for ethical conduct in research (which is described in both documents duplicated below) have been adopted by the National Institutes of Health and are considered a standard ethical code for research. It is expected that all graduate students and faculty in the Division of Exercise Physiology will follow the following research code of conduct as follows:

J.1 THE NUREMBERG CODE

J1.1 The voluntary consent of the human subject is absolutely essential. This means that the person involved should have legal capacity to give consent; should be so situated as to be able to exercise free power of choice, without the intervention of any element of force, fraud, deceit, duress, over-reaching, or other ulterior form of constraint or coercion; and should have sufficient knowledge and comprehension of the elements of the subject matter involved as to enable him to make an understanding and enlightened decision. This latter element requires that before the acceptance of an affirmative decision by the experimental subject there should be made known to him the nature, duration, and purpose of the experiment; the method and means by which it is to be conducted; all inconveniences and hazards reasonably to be expected; and the effects upon his health or person which may possibly come from his participation in the experiment. The duty

^a Taken from the National Institutes of Health Policies (Effective May, 2000)

and responsibility for ascertaining the quality of the consent rests upon each individual who initiates, directs or engages in the experiment. It is a personal duty and responsibility, which may not be delegated to another with impunity.

- J1.2** The experiment should be such as to yield fruitful results for the good of society, unprocurable by other methods or means of study, and not random and unnecessary in nature.
- J1.3** The experiment should be so designed and based on the results of animal experimentation and knowledge of the natural history of the disease or other problem under study that the anticipated results will justify the performance of the experiment.
- J1.4** The experiment should be so conducted as to avoid all unnecessary physical and mental suffering and injury.
- J1.5** No experiment should be conducted where there is an a priori reason to believe that death or disabling injury will occur; except, perhaps, in those experiments where the experimental physicians also serve as subjects.
- J1.6** The degree of risk to be taken should never exceed that determined by the humanitarian importance of the problem to be solved by the experiment.
- J1.7** Proper preparations should be made and adequate facilities provided to protect the experimental subject against even remote possibilities of injury, disability, or death.
- J1.8** The experiment should be conducted only by scientifically qualified persons.
- J1.9** The highest degree of skill and care should be required through all stages of the experiment of those who conduct or engage in the experiment.
- J1.10** During the course of the experiment the human subject should be at liberty to bring the experiment to an end if he/she has reached the physical or mental state where continuation of the experiment seemed to him/her to be impossible.
- J1.11** During the course of the experiment the scientist in charge must be prepared to terminate the experiment at any stage, if he has probably [sic] cause to believe, in the exercise of the good faith, superior skill and careful judgment required of him that a continuation of the experiment is likely to result in injury, disability, or death to the experimental subject.

J.2 WORLD MEDICAL ASSOCIATION DECLARATION OF HELSINKI

Adopted by the 18th World Medical Assembly
Helsinki, Finland, June 1964
and amended by the
29th World Medical Assembly
Tokyo, Japan, October 1975
35th World Medical Assembly
Venice, Italy, October 1983
and the
41st World Medical Assembly
Hong Kong, September 1989

J.2.1 Introduction

It is the mission of the physician and the clinical Exercise Physiologist to safeguard and if possible improve the health of the people. His or her knowledge and conscience are dedicated to the fulfillment of this mission.

The Declaration of Geneva of the World Medical Assembly binds the physician with the words, "The health of my patient will be my first consideration," and the International Code of Medical Ethics declares that, "A physician shall act only in the patient's interest when providing medical care which might have the effect of weakening the physical and mental condition of the patient." (We expect Clinical Exercise Physiologists to carry this same ethical concern for the patients we see daily).

- The purpose of biomedical research involving human subjects must be to improve diagnostic, therapeutic and prophylactic procedures and the understanding of the etiology and pathogenesis of disease. In current medical practice most diagnostic, therapeutic or prophylactic procedures involve hazards. This applies especially to biomedical research.
- Medical progress is based on research, which ultimately must rest in part on experimentation involving human subjects. In the field of biomedical research a fundamental distinction must be recognized between medical research in which the aim is essentially diagnostic or therapeutic for a patient, and medical research, the essential object of which is purely scientific and without implying direct diagnostic or therapeutic value to the person subjected to the research.
- Special caution must be exercised in the conduct of research, which may affect the environment, and the welfare of animals used for research must be respected.
- Because it is essential that the results of laboratory experiments be applied to human beings to further scientific knowledge and to help suffering humanity, the World Medical Association has prepared the following recommendations as a guide to every physician, and scientist in biomedical research involving human subjects. They should be kept under review in the future. It must be stressed that the standards as drafted are only a guide to physicians all over the world. Physicians are not relieved from criminal, civil and ethical responsibilities under the laws of his/her own countries. To this end, graduate students in Exercise Physiology should recognize that his/her misconduct especially when working with human subjects in clinical or research environments might not be limited to Divisional or Intuitional review. Ethical misconduct with humans or animals may be subject to review through means of civil and federal laws.

J.2.2 Basic principles for conducting research in human subjects

J.2.2.1 Biomedical research involving human subjects must conform to generally accepted scientific principles and should be based on adequately performed laboratory and animal experimentation

and on a thorough knowledge of the scientific literature.

- J.2.2.1 The design and performance of each experimental procedure involving human subjects should be clearly formulated in an experimental protocol, which should be transmitted for consideration, comment and guidance to a specially appointed committee independent of the investigator and the sponsor provided that this independent committee is in conformity with the laws and regulations of the country in which the research experiment is performed.
- J.2.2.3 Biomedical research involving human subjects should be conducted only by scientifically qualified persons and under the supervision of a clinically competent medical person. The responsibility for the human subject must always rest with a medically qualified person and never rest on the subject of the research, even though the subject has given his or her consent. Biomedical research involving human subjects cannot legitimately be carried out unless the importance of the objective is in proportion to the inherent risk to the subject.
- J.2.2.4 Every biomedical research project involving human subjects should be preceded by careful assessment of predictable risks in comparison with foreseeable benefits to the subject or to others. Concern for the interests of the subject must always prevail over the interests of science and society.
- J.2. 5 The right of the research subject to safeguard his or her integrity must always be respected. every precaution should be taken to respect the privacy of the subject and to minimize the impact of the study on the subject's physical and mental integrity and on the personality of the subject.
- J.2.2.6 Physicians should abstain from engaging in research projects involving human subjects unless they are satisfied that the hazards involved are believed to be predictable. Physicians should cease any investigation if the hazards are found to outweigh the potential benefits. In publication of the results of his or her research, the physician is obliged to preserve the accuracy of the results. Reports of experimentation not in accordance with the principles laid down in this Declaration should not be accepted for publication.
- J.2.2.7 In any research on human beings, each potential subject must be adequately informed of the aims, methods, anticipated benefits and potential hazards of the study and the discomfort it may entail. He or she should be informed that he or she is at liberty to abstain from participation in the study and that he or she is free to withdraw his or her consent to participation at any time. The physician should then obtain the subject's freely given informed consent, preferably in writing.
- J.2.2.8 When obtaining informed consent for the research project the physician or scientist should be particularly cautious if the subject is in a dependent relationship to him/her or her or may consent under duress. In that case the informed consent should be obtained by a physician or scientist who is not engaged in the investigation and who is completely independent of this official relationship.
- J.2.2.9 In case of legal incompetence, informed consent should be obtained from the legal guardian in accordance with national legislation. Where physical or mental incapacity makes it impossible to obtain informed consent, or when the subject is a minor, permission from the responsible relative replaces that of the subject in accordance with national legislation. Whenever the minor child is in fact able to give a consent, the minor's consent must be obtained in addition to the consent of the minor's legal guardian.
- J.2.2.10 The research protocol should always contain a statement of the ethical considerations involved and should indicate that the principles enunciated in the present Declaration are complied.

J.3. Medical research combined with clinical care (Clinical research)

- J.3.1 In the treatment of the sick person, the physician must be free to use a new diagnostic and therapeutic measure, if in his or her judgment it offers hope of saving life, reestablishing health or alleviating suffering.
- J.3.1 The potential benefits, hazards and discomfort of a new method should be weighed against the advantages of the best current diagnostic and therapeutic methods.
- J.3.2. In any medical study, every patient - including those of a control group, if any--should be assured of the best-proven diagnostic and therapeutic method.
- J.3.3 The refusal of the patient to participate in a study must never interfere with the physician patient relationship.
- J.3.4 If the physician considers it essential not to obtain informed consent, the specific reasons for this proposal should be stated in the experimental protocol for transmission to the independent committee.
- J.3.5 The physician can combine medical research with professional care, the objective being the acquisition of new medical knowledge, only to the extent that medical research is justified by its potential diagnostic or therapeutic value for the patient.

J.4. Non-therapeutic biomedical research involving human subjects (Non-clinical biomedical research)

- J.4.1 In the purely scientific application of medical research carried out on a human being, it is the duty of the physician to remain the protector of the life and health of that person on whom biomedical research is being carried out.
- J.4.2 The subjects should be volunteers--either healthy persons or patients for whom the experimental Design is not related to the patient's illness.
- J.4.3 The investigator or the investigating team should discontinue the research if in his/her or his/her judgment it may, if continued, be harmful to the individual.
- J.4.4 In research on man, the interest of science and society should never take precedence over Considerations related to the well being of the subject.

J.5. Applying the Ethical Principles in Research

On September 30, 1978, the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research submitted its report entitled "The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research." The Report, named after the Belmont Conference Center at the Smithsonian Institution where the discussions, which resulted in its formulation, were begun, sets forth the basic ethical principles underlying the acceptable conduct of research involving human subjects. Those principles, respect for persons, beneficence, and justice, are now accepted as the three quintessential requirements for the ethical conduct of research involving human subjects.

Respect for persons involves recognition of the personal dignity and autonomy of individuals, and special protection of those persons with diminished autonomy.

Beneficence entails an obligation to protect persons from harm by maximizing anticipated benefits and minimizing possible risks of harm.

Justice requires that the benefits and burdens of research be distributed fairly.

J.6 Respect for Persons

Required by the moral principle of respect for persons (see definition, above), informed consent contains three elements: information, comprehension, and voluntariness.

J.6.1 First, subjects must be given sufficient information on which to decide whether or not to participate, including the research procedure(s), his/her purposes, risks and anticipated benefits, alternative procedures (where therapy is involved), and a statement offering the subject the opportunity to ask questions and to withdraw at any time from the research.

- Responding to the question of what constitutes adequate information, the Report suggests that a "reasonable volunteer" standard be used: "the extent and nature of information should be such that persons, knowing that the procedure is neither necessary for his/her care nor perhaps fully understood, can decide whether they wish to participate in the furthering of knowledge. Even when some direct benefit to them is anticipated, the subjects should understand clearly the range of risk and the voluntary nature of participation." Incomplete disclosure is justified only if it is clear that: (1) the goals of the research cannot be accomplished if full disclosure is made; (2) the undisclosed risks are minimal; and (3) when appropriate, subjects will be debriefed and provided the research results.

J.6.2 Second, subjects must be able to comprehend the information that is given to them. The presentation of information must be adapted to the subject's capacity to understand it; testing to ensure that subjects have understood may be warranted.

- Where persons with limited ability to comprehend are involved, they should be given the opportunity to choose whether or not to participate (to the extent they are able to do so), and his/her objections should not be overridden, unless the research entails providing them a therapy unavailable outside of the context of research. [See discussions on this issue in other sections of the Guidebook, including Chapter 6, "Special Classes of Subjects."]
- Each such class of persons should be considered on its own terms (e.g., minors, persons with impaired mental capacities, the terminally ill, and the comatose). Respect for persons requires that the permission of third persons also be given in order to further protect them from harm.

J.6.3 Finally, consent to participate must be voluntarily given. The conditions under which an agreement to participate is made must be free from coercion and undue influence. IRBs should be especially sensitive to these factors when particularly vulnerable subjects are involved.

J.7 Beneficence

J.7.1 Closely related to the principle of beneficence (see definition, above), risk/benefit assessments "are concerned with the probabilities and magnitudes of possible harms and anticipated benefits." The Report breaks consideration of these issues down into defining the nature and scope of the risks and benefits, and systematically assessing the risks and benefits. All possible harms, not just physical or psychological pain or injury, should be considered. The principle of beneficence requires both protecting individual subjects against risk of harm and consideration of not only the benefits for the individual, but also the societal benefits that might be gained from the research.

- J.7.2 In determining whether the balance of risks and benefits results in a favorable ratio, the decision should be based on thorough assessment of information with respect to all aspects of the research and systematic consideration of alternatives. The Report recommends close communication between the IRB and the investigator and IRB insistence upon precise answers to direct questions. The IRB should:
- J.7.2.1 Determine the "validity of the presuppositions of the research;"
 - J.7.2.2 Distinguish the "nature, probability and magnitude of risk...with as much clarity as possible;"
 - J.7.2.3 Determine whether the investigator's estimates of the probability of harm or benefits are reasonable, as judged by known facts or other available studies."

J.8 Five basic principles apply when making the risk/benefit assessment

- J.8.1 Brutal or inhumane treatment of human subjects is never morally justified.
- J.8.2 Risks should be minimized, including the avoidance of using human subjects if at all possible. Risk minimization extends to careful supervision of clients/patients during all Exercise programs and tests.
- J.8.3 Strict adherence to IRBs, which will be scrupulous in insisting upon sufficient justification for research involving "significant risk of serious impairment" (e.g., direct benefit to the subject or "manifest voluntariness of the participation").
- J.8.4 The appropriateness of involving vulnerable at risk populations must be demonstrated and carefully monitored.
- J.8.5 The informed consent process must thoroughly and completely disclose relevant risks and benefits.

J.9 Justice

The principle of justice mandates that the selection of research subjects must be the result of fair selection procedures and must also result in fair selection outcomes. The "justness" of subject selection relates both to the subject as an individual and to the subject as a member of social, racial, sexual, or ethnic groups.

- J.9.1 **With respect to his/her status as individuals**, subjects should not be selected either because the researcher favors them or because they are held in disdain (e.g., involving "undesirable" persons in risky research). Further, "social justice" indicates an "order of preference in the selection of classes of subjects (e.g., adults before children) and that some classes of potential subjects (e.g., the institutionalized mentally infirm or prisoners) may be involved as research subjects, if at all, only on certain conditions."
- J.9.2 **Investigators**, institutions, or IRBs may consider principles of distributive justice relevant to determining the appropriateness of proposed methods of selecting research subjects that may result in unjust distributions of the burdens and benefits of research. Such considerations may be appropriate to avoid the injustice that "arises from social, racial, sexual, and cultural biases institutionalized in society."
- J.9.3 **Subjects** should not be selected simply because they are readily available in settings where research is conducted, or because they are "easy to manipulate as a result of his/her illness or socioeconomic condition." Care should be taken to avoid overburdening

institutionalized persons who "are already burdened in many ways by his/her³⁶ infirmities and environments."

J.10 Non-therapeutic research

J.10.1 Much of the research that will be conducted in the Exercise Physiology environment on human subjects will have a therapeutic application (e.g., the data will benefit pulmonary or cardiac patients). However the Helsinki report recommends the following: Non-therapeutic research that involves risk should use other, less burdened populations, unless the research "directly relate[s] to the specific conditions of the class involved." Thus, it is imperative that research in humans especially humans at risk or vulnerable, and research that will not directly benefit the research subjects should first be conducted in healthy well young adults and/or animal models before justification can be made for using vulnerable and at risk populations for research that may not provide direct benefit to them.

J. II Suggestions for Additional reading on ethics in research

- Beauchamp, Tom L., and Childress, James F. Principles of Biomedical Ethics, 3d Ed. New York: Oxford University Press, 1989.
- Beecher, Henry K. "Ethics and Clinical Research." New England Journal of Medicine 274 (1966): 1354-1360.
- Curran, William J. "Government Regulation of the Use of Human Subjects in Medical Research: The Approaches of Two Federal Agencies." In Experimentation with Human Subjects, edited by Paul A. Freund, pp. 402-454. New York: George Braziller, 1970.
- Fried, Charles. Medical Experimentation: Personal Integrity and Social Policy. New York: American Elsevier Company, 1974.
- Levine, Robert J. Ethics and Regulation of Clinical Research. 2d ed. Baltimore: Urban and Schwarzenberg, 1986. See especially Chapter 14, "The Institutional Review Board."
- Maloney, Dennis M. Protection of Human Research Subjects: A Practical Guide to Federal Laws and Regulations. New York: Plenum Press, 1984.
- McCarthy, Charles R. "Experience with Boards and Commissions Concerned with Research Ethics in the United States. In Research Ethics, edited by Kare Berg and Knut Erik Tranoy, pp. 111-122. New York: Alan R. Liss, 1983.
- McCarthy, Charles R. "Current Regulations for the Protection of Human Subjects." In Alzheimer's Dementia: Dilemmas in Clinical Research, edited by Vijaya L. Melnick and Nancy N. Dubler, pp. 13-18. Clifton, NJ: Humana Press, 1985.
- Marshall, Ernest. "Does the Moral Philosophy of the Belmont Report Rest on a Mistake?" IRB 8 (No. 6, November/December 1986): 5-6.
- Rothman, David J. Strangers at the Bedside: A History of How Law and Bioethics Transformed Medical Decision Making. New York: Basic Books, 1991.
- Rothman, David J. "Ethics and Human Experimentation: Henry Beecher Revisited." New England Journal of Medicine 317 (No. 19, November 5, 1987): 1195-1199.
- Sieber, Joan E. Planning Ethically Responsible Research: A Guide for Students and Internal Review Boards. Applied Social Research Methods Series, vol. 31. Newbury Park, CA: Sage Publications, 1992.
- Twenty Years After: The Legacy of the Tuskegee Syphilis Study. The Hastings Center Report 22 (No. 6, November/December 1992): 29-40. Includes articles by Arthur L. Caplan, Harold Edgar, Patricia A. King, and James H. Jones. U.S. National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. A complete list of the National Commission's reports and recommendations is provided in Appendix 1.
- U.S. President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research.
- Veatch, Robert M. "Human Experimentation Committees: Professional or Representative?" Hastings Center Report 5 (No. 5, October 1975): 31-40.

K. Appendix 2: Student Responsibilities - Checklist:

Required Courses and Electives - YEARS 2-5+

1. Graduate seminar spring semester.
2. Dissertation hours
3. Supervised teaching in Exercise Physiology

Other responsibilities years 3-5

4. Establish a plan of study and goals for completion with the dissertation committee.
5. Meet with dissertation committee a minimum of 2/year.
6. Meet all responsibilities of graduate assistantship.
7. Teach assigned courses.
8. Present research data in departmental seminars ~ 1/year.
9. Present papers, journal articles etc. from current primary literature in seminars, journal clubs or other avenues within the Division of Exercise Physiology.
10. Present data in national/international meetings a minimum of 1/yr.
11. Continue to revise and submit fellowship grants if they have not been funded.
12. Prepare and submit 1-3 manuscripts (or the number that your advisor and dissertation committee indicates is appropriate from this work) to a peer-reviewed journal for consideration of publication.
13. Submit intent to graduate forms to HSC Graduate office

Research productivity: The dissertation committee chair will be required to provide documentation for research productivity (or lack of productivity once/year for each student). For example, your report should include documentation/references for papers presented at national/international meetings, presentation of data in scientific forums and seminars papers submitted/published, grants submitted/approved for funding and other evidence that the graduate student is making satisfactory research progress.

L. Appendix 3: Faculty Checklist:

ALL STUDENTS YEARS 2-5+

2 x Monthly

- Meet with graduate advisee at least twice each month. Review data, assign and discuss relevant research papers, discuss research, discuss research problems.
- Identify research questions and specific research skills, which the student should learn (to prepare him/her for independent research activities).

1 x Semester

- Student completes appropriate Appendices 1. Determine appropriate courses for the next semester, determine and review appropriate research objectives and goals. Review previous objectives to determine if the student has met them. Sign Appendix and submit to Director of Graduate Studies.

1 x Year

- Prepare annual evaluation of student's progress (Appendix 5A or 5B). This will be completed at the **end** of each academic year (July or the first of August) beginning in year 1.

YEAR 2-5+

- The student should be collecting pilot data and he/she will formulate research questions and hypothesis. Help student identify research focus and research questions (These meetings may be part of or in addition to the regular 2 x monthly meetings). The student's research goals and dissertation should be consistent with your expertise, funding and research goals. Identify appropriate graduate faculty to serve on the student's dissertation committee.
- Meet with and prepare student for qualifying examination.
- Review course work. Ensure that all of the graduate requirements have been met.
- Provide student with feedback re: writing and oral skills. Help the student prepare for departmental seminar presentation of data by providing constructive criticisms.
- Ensure student submits grant proposal to external agency from compressive/qualifying examination.
- Submit an annual report of student's progress and productivity to the graduate office.

Faculty Checklist (continued):

YEARS 3-5+

- Meet with the student at least monthly to review data collected.
- Help the student to set realistic goals for completing the work in a timely fashion.
- Organize dissertation committee meetings a minimum of 2-x/academic year. Have the student submit written material to each of the committee members at least 2 weeks before each dissertation meeting.
- Identify the weaknesses of the student (e.g., oral, written, organizational skills any research skill deficits) and provide constructive feedback to the student that will increase the likelihood for success.
- Require student preparation of manuscripts from his/her dissertation data. Provide data as a co-author and submit paper to an appropriate peer-reviewed journal. (The faculty should always be the corresponding author. The faculty should keep all original data books.
- Submit an annual report of student's progress and productivity to the graduate office.
- Assist student (e.g., in year 5) in timely review of the dissertation document; provide feedback of oral and written defense presentation.
- Assist student if possible, in obtaining contacts, suggestions etc. for postdoctoral or other training as part of the next step in the student's career.

M. APPENDIX 4**(Example of Announcement for The Oral Component of Part II of
the Comprehensive/Qualifying Examination)**

In Partial Completion of the Qualifying Examination

I.M. Exhausted, M.S. C.M.I.
Division of Exercise Physiology, School of Medicine

Will present his research proposal titled

**“The Effects of Overtraining on Mitochondrial
Biosynthesis and mRNA Expression During Skeletal
Muscle Adaptation to Overload in 80-year old Men with
Chronic Fatigue Syndrome”**

8105 HSC, 1:00 p.m. December 24, 2015

Dissertation Chair:

J.M. Taskmaster, Ph.D., Division of Exercise Physiology

Dissertation Committee Members:

I.M. Right, Ph.D., Division of Exercise Physiology

U.R. Wrong, Ph.D., Department of Physiology & Pharmacology

U.R. Nofat, Ph.D. Division of Exercise Physiology

I.A.M. Watching Yue, Ph.D. Dept. Biofeedback

ALL FACULTY AND STUDENTS ARE WELCOME TO ATTEND