

**POLICIES AND ACADEMIC
GUIDELINES
FOR GRADUATE STUDENTS**

**FREE RADICAL AND
RADIATION BIOLOGY PROGRAM**

THE UNIVERSITY OF IOWA

Department of Radiation Oncology

The University of Iowa

Iowa City, Iowa 52242-1181

Tel: 319 335 8019

Fax: 319 335 8039

<http://www.uiowa.edu/~frrbp>

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I. INTRODUCTION

The Free Radical and Radiation Biology Graduate Program (FRRBP) is a Program in the Graduate College of The University of Iowa. The Free Radical and Radiation Biology Program is in the Department of Radiation Oncology in the College of Medicine. The FRRBP is a member of the Biosciences Program of the College of Medicine.

The Free Radical and Radiation Biology Graduate Program is interdisciplinary with the possibilities of a major emphasis in Radiation Biology or Free Radical Biology. Although students with diverse academic backgrounds may enter the Program, each student should have a science background which includes: a) at least two years of chemistry including organic chemistry; b) at least one year of physics; c) at least two years of biology; and d) mathematics including at least one semester of calculus. Since students have different career objectives, each program of study is designed to help achieve career objectives and to reflect the student's major interests.

What is Free Radical Biology? Free radical biology is the study of the interaction of free radicals with biological material. Free radicals are atoms or molecules with at least one unpaired electron. Free radical biology is closely related to radiation biology since 70-80% of the effect of radiation on cells is due to the production of free radicals. The study of free radicals has become of extreme interest because of the role of free radicals in a large number of diseases and pathological states. As examples, cancer, aging, heart attacks, strokes, diabetes, and Lou Gehrig's disease all have a free radical component to the mechanisms of injury. Nationally and internationally, the use of free radical modulators in the prevention and treatment of these diseases is under close investigation at this time including clinical trials.

What is Radiation Biology? The science of radiation biology is dedicated to understanding the effects of radiation on living things. To many, the effects of radiation on living organisms are considered paradoxical. For example, radiation not only is known to cause cancer, but also is used to treat cancer. Studies on the physical, biological, and chemical changes which follow the interaction of radiation with living matter are of fundamental importance in understanding how radiation can be used to investigate normal and aberrant cell structure and function, and to diagnose and treat various diseases, particularly cancer.

The admission of new students depends on the qualifications of the applicant as well as the ability of the Program to support new students. All students must conform to the rules and regulations of the Graduate College detailed in the Manual of Rules and Regulations of the Graduate College. Accordingly, a minimum grade-point average of 3.0 (A = 4.0, B = 3.0, etc.) is required for admission with regular status as a candidate for a Master's Degree (M.S.). At least 30 semester hours (s.h.) of graduate credit must be completed for the M.S. degree. The student must maintain a grade-point average of at least 3.0 on graduate work completed at The University of Iowa. A minimum gradepoint average of 3.0 (A = 4.0, B = 3.0, etc.) is required for admission with regular status to the doctoral program. The doctoral program must contain at least 72 semester hours of graduate credit (including transfer credits and credits earned for the M.S. degree). It is expected that students who enter the Program with a baccalaureate degree will complete the M.S. degree within 2-3 years and the Ph.D. within 4-5 years (including coursework). To progress satisfactorily in the Program, all students must:

- (1) maintain a grade-point average of at least 3.0 on all graduate work completed at The University of Iowa.

- 1 (2) conform to the Graduate College regulations for residence requirements, plans of study, degree
2 examinations, and dissertations.
- 3 (3) meet the additional, specific requirements of the Free Radical and Radiation Biology Program.
4

5 Because of the diversity of student backgrounds, interests, and career objectives, the specific Program
6 requirements can sometimes be modified or waived. Variances from the Program requirements may be
7 requested in writing from a student to the Director of the Program (Section III-H).
8

9 To insure the continued excellence of the program, both faculty and students must make important
10 commitments as listed below.

11 The faculty should strive to:

- 12 (1) Provide an environment in which scholarly achievement and the conduct of meritorious
13 scientific research is not only possible, but expected.
- 14 (2) Encourage and support creative original research.
- 15 (3) Periodically review Program requirements and content and update as needed.
- 16 (4) Serve as models of teaching, scholarly pursuit, and research effort to be emulated by the
17 students.
18
19

20 The students should strive to:

- 21 (1) Achieve and demonstrate a clear understanding of the material presented in courses, a general
22 knowledge of current scientific literature, and a thorough knowledge of the literature in their
23 area of major emphasis.
- 24 (2) Demonstrate an aptitude for all aspects of scientific research, i.e., a familiarity with the relevant
25 literature, the formulation of a hypothesis, and the lucid presentation of the research in both
26 written and oral form.
- 27 (3) Produce research results worthy of publication.
- 28 (4) Advance in teaching and classroom skills.
- 29 (5) Seek and take advantage of opportunities to improve communication skills.
- 30 (6) Excel during graduate training and after graduation.
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II. SUMMARY OF COURSES IN THE FREE RADICAL AND RADIATION BIOLOGY PROGRAM

A. Courses offered by Free Radical and Radiation Biology Program Faculty

<u>Course</u>	<u>Course Title</u>	<u>Credits</u>
77:103	Radiation Biology (Fall)	4
77:107	Special Topics: Advanced Undergraduates (Fall)	arr.
77:108	Special Topics: Advanced Undergraduates (Spring)	arr.
77:207	Seminar: Free Radical and Radiation Biology (Fall)	1
77:208	Seminar: Free Radical and Radiation Biology (Spring)	1
77:211	Medical Physics (Fall 2000, then Spring even yrs.)	4
77:222	Free Radicals in Biology and Medicine (Spring, odd yrs.)	4
77:288	Molecular and Cellular Biology of Cancer (Spring, odd yrs.)	3
77:305	Research: Free Radical and Radiation Biology (Fall)	arr.
77:306	Research: Free Radical and Radiation Biology (Spring)	arr.
77:307	Special Topics (Fall)	arr.
77:308	Special Topics (Spring)	arr.
77:545	Current Topics in Free Radical Biology (Fall)	1
77:546	Current Topics in Free Radical Biology (Spring)	1
77:547	Current Topics in Radiation and Cancer Biology (Fall)	1
77:548	Current Topics in Radiation and Cancer Biology (Spring)	1

B. Courses offered by other departments required for Ph.D. Program

<u>Course</u>	<u>Course Title</u>	<u>Credits</u>
171:161	Introduction to Biostatistics (or equivalent)	3
99:120	Biochemistry and Molecular Biology I	4
156:201	Principles in Molecular and Cellular Biology	4
050:270	Responsible Conduct in Research	0

C. Electives often recommended to supplement required courses

<u>Course</u>	<u>Course Title</u>	<u>Credits</u>
99:130	Biochemistry and Molecular Biology II	4
02:171	Molecular Genetics	4
60:156	Scanning Electron Microscopy & X-ray Microanalysis	3
60:205	General Histology for Graduate Students	4
60:218	Electron Microscopy Techniques	3
61:147	Survey of Immunology	4
61:157	General Microbiology	5
61:201	Immunology I	3
61:202	Immunology II	3
63:260	Environmental Toxicology	3
69:201	General and Systemic Pathology (by special permission)	9
71:101	Pharmacology for Health Sciences: Medical	5
72:212	Medical Physiology	4
99:110	Biochemistry	3
99:140	Experimental Biochemistry	4
142:220	Cell Biology I	3
142:225	Cell Biology II	3

1 *D. 1. Example of academic schedule of **major** courses offered by the Program and the Graduate*
 2 *College*

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Year	Fall	Spring	Summer
2008-09	77:103 Radiation Biology 77:207 Seminar 77:305 Research 77:545 Current Topics in Free Radical Biology 77:547 Current Topics in Radiation and Cancer Biology 050:270 Responsible Conduct of Research 156:201 Principles of Cellular and Molecular Biology 99:120 Biochemistry Elective courses	77:208 Seminar 77:222 Free Radicals in Biology and Medicine 77:288 Molecular and Cellular Biology of Cancer 77:306 Research 77:546 Current Topics in Free Radical Biology 77:548 Current Topics in Radiation and Cancer Biology 050:270 Responsible Conduct of Research 171:161 Biostatistics (or equivalent) Elective courses	77:305 Research (2 h) Elective courses
2009-10	77:103 Radiation Biology 77:207 Seminar 77:305 Research 77:545 Current Topics in Free Radical Biology 77:547 Current Topics in Radiation and Cancer Biology 050:270 Responsible Conduct of Research 156:201 Principles of Cellular and Molecular Biology 99:120 Biochemistry Elective courses	77:208 Seminar 77:211 Medical Physics 77:306 Research 77:546 Current Topics in Free Radical Biology 77:548 Current Topics in Radiation and Cancer Biology 050:270 Responsible Conduct of Research 171:161 Biostatistics or equivalent Elective courses	77:305 Research (2 h) Elective courses

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III. GENERAL POLICIES AND REGULATIONS OF THE FREE RADICAL AND RADIATION BIOLOGY PROGRAM

A. *Financial support*

Although the Free Radical and Radiation Biology Program is not obligated to provide financial support to the graduate students in the program, support has usually been available for the students' entire graduate program. The funds have been obtained from three sources:

- (1) Research grants awarded to individual faculty members.
- (2) Training grants awarded to the University for the training of pre-doctoral and post-doctoral students.
- (3) Graduate College and College of Medicine funds awarded to the Free Radical and Radiation Biology Program for student research assistantships, teaching assistantships, and tuition scholarships.

The judicious expenditure of funds from source (1) is the responsibility of the Principal Investigators. They must approve of the awarding of any *research assistantships* paid by funds from their research grants. The renewal of these assistantships is dependent upon the availability of funds and the satisfactory performance of the duties assigned by the Principal Investigator.

The decision to award a *pre-doctoral* or *post-doctoral stipend* from a Training Grant, source (2), is made by the principal investigator of the grant with the concurrence of a Steering Committee. Renewal of the stipend is dependent on the satisfactory progress of the student as determined by the academic record and evaluation by the faculty, the limitations imposed by the terms of the grant, and the duration of the grant.

The awarding of an *assistantship* from source (3) is recommended by the Director of the Free Radical and Radiation Biology Graduate Program with the concurrence of the Program faculty. The award can be renewed when appropriate and when funds are available.

Most awards (*e.g.*, from training grants) pay tuition in addition to a stipend. Some assistantships do not pay tuition, but do confer "resident" status with consequent lower tuition fees provided the appointment is at least 1/4 time. Federal, state income taxes, and social security taxes, are withheld from an assistantship stipend. Under some circumstances, it may be possible to recover federal income taxes withheld; although Program personnel may have relative information, it is each student's responsibility to deal with the Internal Revenue Service.

The obligations associated with a stipend vary and depend on the source. Any graduate assistantship (research or teaching) provided by university funds will be coupled to a service requirement. These assistantships are usually either 1/4- or 1/2-time assistantships for which 10 or 20 hours, respectively, of service is required per week. The obligations associated with a stipend provided by the grant of a principal investigator, usually the advisor, are at the discretion of the advisor. Appointments are usually for a fiscal year from July 1 to June 30 of the following year. Newly appointed assistants may begin at a different time, usually coinciding with the beginning of a semester. The students will be notified of an appointment as soon as practical after the Program budget for the next fiscal year has been determined, usually in the period from April to June. Official notification of an appointment is made by the Office of the President of The University of Iowa. If the funds that provide an assistantship are terminated or

1 are scheduled for termination, the affected individual will be notified as quickly as possible and efforts
2 will be made to obtain funds from another source.

3
4 The Free Radical and Radiation Biology Program expects to provide financial support for the expenses
5 of a graduate student's research. Funds are more readily available when the student's research objectives
6 coincide with those of a research grant that has been awarded to a faculty member.

7
8 All costs associated with the preparation of a thesis are the responsibility of the student. However, when
9 some of the graphs, photomicrographs, diagrams, etc. can also be utilized for reports or publications
10 associated with a research grant, some support for the production costs may be provided. The costs of
11 preparing the proposal for the Ph.D. comprehensive exam are paid by the department. The costs of
12 preparing a thesis are a student's obligation.

13 14 15 *B. Vacation*

16 Vacation policy for students who receive stipends is as follows:

- 17 (1) All vacations must be arranged in consultation between a student and his/her advisor. Vacation
18 forms available from the Program office **must** be filed.
- 19 (2) Students are entitled to all official University holidays.
- 20 (3) Additional absence during usual working hours should not exceed 22 days per year.
- 21 (4) Up to 44 days of vacation time may be accrued. Students will be advised to use their vacation
22 time each year.
- 23 (5) Some appointments may have specific vacation guidelines that vary from the general guidelines
24 above.
- 25 (6) Records of vacations and sick leave will be kept on file in the Program office and utilized only as
26 internal records.
- 27 (7) A leave of absence without pay may be granted at the discretion of the advisor with concurrence
28 of the faculty. It remains the responsibility of the student to maintain the registration
29 requirements of the university.
- 30 (8) Students who are repeatedly absent without permission will be given a written warning. After
31 three such warnings, the student's appointment may not be renewed.

32 33 34 *C. Advisors*

35 Each new student will be assigned to a temporary advisor appointed by the faculty. The advisor should
36 be consulted regarding the student's schedule of courses for the first semester. The student and advisor
37 should then develop a Plan of Study as soon as possible and not later than the beginning of the second
38 semester of enrollment. This Plan can be revised later if necessary. Students are also encouraged to
39 rotate through three laboratories in their first semester to determine research interests of all faculty
40 members. Then, by the end of the first year, and by mutual consent of the student and a faculty member,
41 the student must choose a permanent advisor whose research interests most closely coincide with those
42 of the student. This decision may also be influenced by the research and teaching load of a potential
43 advisor and the research and stipend funds that a potential advisor can use at his discretion.
44 Nevertheless, the permanent advisor **must** be chosen by the end of the first year. The permanent advisor
45 may be the same as the temporary advisor. The student may select different advisors for the M.S. and
46 Ph.D. degrees. During a degree program, a student may also switch advisors, but if this occurs, the
47 student should be aware that a stipend may no longer be available.

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D. Seminar

Each student must give one seminar for credit a year for three years. Students should not register for seminar their first year. All students are **required** to attend and participate regularly in the program seminar series and are strongly **encouraged** to interact with the speaker through questions and comments. Attendance at other seminars and lectures outside the department is also encouraged.

Performance in the program seminars is evaluated with a letter grade. The presenting student will meet briefly with the attending faculty immediately after presentation of a seminar to receive an evaluation of his/her performance.

E. Scientific meetings, workshops, and short courses

Student attendance at scientific meetings, symposia, short courses, or workshops is encouraged. Presentation of a paper or a poster at a meeting is **required** to obtain financial support from the Program. Students may request permission to attend or a faculty member may suggest that the student attend. There is no limit on the number of meetings a student may attend. There is no obligation on the part of the faculty or the Program to provide funds for student travel to the meetings. Where individual research grants can pay travel expenses, decisions about travel support are made by the principal investigator(s). When other departmental funds or special travel awards are available, decisions about student travel support will be made by the faculty as a group.

F. Research reports

Students enrolled for research credit are **required** to submit a research report to their advisor on the last day of classes each semester. The report will be evaluated and graded by the advisor. The report should define the goals, aims and objectives for the specific semester, and describe the progress made by the student toward completion of the research objectives. The report does not need to be lengthy, and may consist of abstracts, drafts of papers, or thesis chapters being prepared for submission to peer reviewed journals or for the thesis.

G. Student progress reviews

The progress of each student in the Program is reviewed by the assembled faculty at the end of the Fall and Spring semesters (soon after grades are issued). The research report (Section III-F.) will be shared with the faculty as part of the overall review. Each student will receive a letter from the Director of the Program that includes an evaluation of their progress. Should the student's progress be considered unsatisfactory by the faculty, the student will be so notified and the deficits noted. Suggested remedial measures will be included in the letter. Continued lack of satisfactory progress after the written notice describing the weaknesses may be grounds for dismissal of the student from the Program. The student may appeal this decision (Section III-I.).

H. Variations from Program requirements

1 If a student wants to deviate from the usual program requirements or course of study, the student, after
2 consulting with their advisor, must request permission for this variation and justify the variance in
3 writing to the Director of the Program who will present the request to the faculty. In some instances, it
4 may be desirable for the student to personally present the request to the faculty. The faculty will discuss
5 the matter and then decide whether to grant the request. The Program Director will promptly notify the
6 student of the faculty decision; the notification may be verbal with confirmation in writing. If a student
7 feels that the faculty decision is improper, the student may appeal the decision as outlined in Section III-
8 I. that follows.

9 10 11 *I. Appealing a faculty decision*

12 If a student feels that a dismissal decision or other major decision pertaining to the student's status is
13 improper, the student may appeal the decision in writing to the Director of the Graduate Program with
14 copies to other faculty members if desired. A special committee will then be constituted; the committee
15 will be composed of (1) the student's academic advisor, (2) the Director of the Program or a designated
16 representative, and (3) another faculty member from the College of Medicine whose selection is
17 mutually agreeable to the student and the Director. This committee will meet with the student within 10
18 working days from the time that the written appeal is lodged with the Program Director. The decision of
19 the committee will be final except in the conditions outlined by the Graduate College. Accordingly,
20 questions involving judgment of performance will not be reviewed beyond the department level. If,
21 however, the student feels there has been unfairness or some procedural irregularity concerning
22 dismissal, the student may request a review by the Graduate College. The review by the Graduate
23 College is final.

24 25 26 *J. Role of the student representative to faculty meetings*

27 The students may select two representatives who are encouraged to attend all regular meetings of the
28 Free Radical and Radiation Biology Faculty. The student representatives have the primary
29 responsibility of acting as a medium for exchange of information and ideas between faculty and
30 students. The student representatives should meet with the students regularly and transmit significant
31 proceedings of the faculty meetings, as well as encourage students to voice their opinions.

32 33 34 *K. Test of English as a Foreign Language (TOEFL) requirements*

35 The Graduate College of The University of Iowa and the Free Radical and Radiation Biology Program
36 requires a score of 550 or higher on the paper-based (PBT) version of the Test of English as a Foreign
37 Language (TOEFL), a score of 213 or higher on the computer-based test (CBT), or a score of 81 on the
38 Internet-based test (IBT). Newly admitted graduate students who present TOEFL scores below 600 on
39 the PBT (or below 250 on CBT, or below 100 on the IBT) are required to complete an English
40 Proficiency Evaluation on campus before their first registration for classes. English as a Second
41 Language coursework (ESL) specified as a result of the English evaluation must be completed
42 satisfactorily, typically within the first year of graduate study. Credits earned from English as a Second
43 Language can not be counted towards the M.S. or Ph.D. degree.

1 *L. Graduation requirement deadlines*

2 Students must be registered for the session in which the degree (M.S. or Ph.D.) is to be conferred.

3 Graduate College deadlines to be met include:

4

5 (a) Application for Degree;

6 (b) Plan of Study;

7 (c) Final Exam Request;

8 (d) First deposit of complete thesis (before defense); and

9 (e) Final deposit of thesis.

10

11 These dates change each session and it is the **responsibility of the student** to discuss these with their
12 advisor so that the deadlines are met.

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15 *M. Guideline changes*

16 The faculty will change the Guidelines from time to time. It is the Free Radical and Radiation Biology
17 Program policy that the student will use the version that is in place when they declare their degree
18 objective. For most students, this will be the Guidelines in effect when they enter the program. For those
19 who change their degree objective after entering the Program, the Guidelines that will be followed are
20 those that are in place when the degree objective is changed.

IV. MASTER'S DEGREE (M.S.) PROGRAM

The Free Radical and Radiation Biology Graduate Program offers the M.S. degree with thesis. The specific requirements are listed below.

A. Entrance requirements

Students with the Bachelor's degree or equivalent and the proper background courses must have a 3.0 grade-point average (GPA) for admission to regular status. A student with the M.S. objective must maintain a grade-point of at least 3.0 on all graduate work completed at The University of Iowa.

B. Plan of Study

The student and temporary advisor should select courses for the first semester of study and develop a Plan of Study for the M.S. degree as soon as possible, but not later than the beginning of the second semester of enrollment. The student should learn of the research interests of the different faculty members and select a permanent advisor not later than the end of the second semester of enrollment in the Free Radical and Radiation Biology Program.

The Graduate College requires that an "applicant for a Master's degree must file a Plan of Study approved by the advisor and the departmental executive with the Graduate College within the session in which the degree is to be granted and by a date to be established by the Graduate College Dean".

C. Graduate College minimum requirements

Each candidate for the M.S. degree must satisfactorily complete at least 30 semester hours of graduate credit. The student must maintain a grade-point average of at least 3.0 on all graduate work completed at The University of Iowa. The Graduate College specifies (Section X-D., Manual of Rules and Regulations of the Graduate College) that "at least 24 semester hours must be completed under the auspices of The University of Iowa". English as a Second Language (ESL) courses do not count towards this requirement. All M.S. candidates must pass a M.S. Qualifying Exam and a M.S. Final Examination. The timing for these procedures is illustrated in Figure 1 (Appendix).

D. Specific course requirements

Each candidate must satisfactorily complete the four major courses offered in the Program. These courses are Radiation Biology (77:103), Medical Physics (77:211), Molecular and Cellular Biology of Cancer (77:288), and Free Radicals in Biology and Medicine (77:222). In addition, each candidate must satisfactorily complete Principles in Molecular and Cellular Biology (156:201). All of these courses must be taken for a letter grade. M.S. candidates must also complete Responsible Conduct in Research (050:270). A minimum of eight semester hours of Research (77:305 or 77:306) credit and a written thesis (Section IV-G.) are required for the M.S. degree with thesis. If a student has had the equivalent of a course elsewhere, either as a course or through work experience, the student may formally ask for the opportunity to take a by-pass exam (Section III-H.).

Except for new students enrolled for their first year, each candidate must register at least once a year in the Program Seminar (77:207 or 77:208), and enroll for a minimum of one semester hour of credit in

1 Current Topics in Free Radical Biology (77:545 or 77:546), and Current Topics in Radiation and Cancer
 2 Biology (77:547 or 77:548) and present one or more research papers. Performance in seminar courses
 3 will be evaluated with letter grades, but the Current Topics courses will be evaluated on an S/U basis.
 4 Attendance at other seminars and lectures outside the Free Radical and Radiation Biology Program is
 5 strongly encouraged.

6
 7 Each fulltime student (students with a one-half time assistantship) must take at least 9 semester hours in
 8 the fall semester and again in the spring semester and at least 2 semester hours of research in the
 9 summer session until the M.S. Qualifying Examination is passed. After passing the M.S. Qualifying
 10 Examination, the student may after prior consultation with his/her advisor sign up for less than 9 credit
 11 hours per semester. Each student must take at least 2 semester hours of Research every semester
 12 including the Summer session, starting the first Summer session the student is in the Program. Any
 13 deviation from this rule requires special permission of the faculty. It should also be noted that credits
 14 earned from English as a Second Language (ESL) courses do not count towards the M.S. or Ph.D.
 15 degrees. Students may register for Master's Final Registration (000:001) during their final semester of
 16 study if all research has been completed. Students who are less than full time should negotiate their Plan
 17 of Study with the faculty.

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 20 *E. Summary of M.S. degree course requirements*

21
 22 **Intramural Courses**

Free Radical and Radiation Biology

Credits

23		
24		
25	Radiation Biology (77:103)	4
26	Medical Physics (77:211)	4
27	Molecular and Cellular Biology Cancer (77:288)	3
28	Free Radicals in Biology & Medicine (77:222)	4
29	Seminar (77:207 or 208)	1
30	Current Topics in Free Radical Biology (77:545,546)	1
31	Current Topics in Radiation and Cancer Biology (77:547,548)	1
32	Research (77:305 or 306)	8

33

34 *Sub-Total Semester Hours for Intramural Courses* 26

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 36
 37 **Extramural Courses**

38	Responsible Conduct of Research (050:270)	0
39	Principles in Molecular & Cell Biology (156:201)	4

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41 *Subtotal Semester Hours for Extramural Courses* 4

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43 *Total Semester Hours for M.S. Degree* 30

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F. Plan of research study for M.S. degree

Between the first and second year of graduate study in consultation with the advisor (usually during the summer after the first two semesters), and no later than 1 month after the start of the third semester of study, the student (in conjunction with their advisor) will prepare and submit a written plan of research that will lead to the M.S. degree with thesis. The faculty will meet to review the plan of study and vote on the plan according to the following action:

- 1) satisfactory; proceed with research;
- 2) satisfactory with reservations; review required before proceeding with research; or
- 3) unsatisfactory.

The student will have two attempts at presenting an acceptable research plan to the faculty. If on the second attempt the student fails to present an acceptable plan, the student will be terminated from the graduate program. The time between the first and second attempt will be no greater than one month.

The research plan will consist of the following:

1. **Summary** (1/2 page)

This section should state the broad and specific objectives of the investigation. The experimental design and methods to be used for meeting these goals should be concisely described. In addition, the potential significance of the possible results should be noted. This summary should “stand alone” as an accurate description of the work proposed.

2. **Specific Aims** (1/2 page)

A concise statement of the hypothesis or hypotheses should be presented. The specific aims should be listed or stated in a few short sentences.

3. **Background and Significance** (3 pages)

This section should critically evaluate the relevant scientific literature and summarize the current status of the concepts that relate to the research proposal. The potential contribution of the proposed research to obtaining key information missing from the literature or extending knowledge in the field should be described. The relevance of the potential findings to advances in the basic sciences, clinical practise, or to practical problems of society should be explained when possible. In the course of doing this, the importance of the research to the specific aims should be described.

4. **Preliminary Studies** (up to 2 pages including illustrations)

This section is not required, but the candidate will benefit from describing with appropriate text, tables, and figures any preliminary results obtained. This section should describe what was done, why it was done, summarize the data obtained, and state what the findings may mean.

5. **Experimental Design and Methods** (3 pages)

Outline the proposed experimental design and state the procedures that will be used to accomplish the specific aims of the project. Be explicit about methods for data collection, analysis, and interpretation. Defend the methods you propose to use and especially identify new methodology and its potential advantages, as well as potential limitations.

1 **6. Literature Cited** (no page limit)

2
3 *G. M.S. Qualifying Examination*

4 To qualify for entry into the M.S. Program in Free Radical and Radiation Biology, the student must
5 satisfactorily complete a written qualifying examination. The student will usually take the exam after
6 successfully completing the major required courses in the Free Radical and Radiation Biology Graduate
7 Program, but no later than the beginning of the **fifth semester** after entering the Program. The exam
8 will be offered after the close of spring semester classes on the first class day of the 8 week summer
9 session. A student shall have two attempts to satisfactorily complete the exam. If the first attempt is
10 unsuccessful, the student may make another attempt no later than **four weeks** after the initial attempt.
11 Students who do not satisfactorily complete the exam in these two attempts will be terminated from the
12 Program (see Figure 1, Appendix).

13
14 The exam will be written on two consecutive mornings (four hours each) and cover concepts specific to
15 the core curriculum of the Program. The general guidelines are that a score greater than 70% on any
16 section constitutes a Ph.D. pass in that section; between 60% and 70% is an M.S. pass and below 60% a
17 failing grade. A student who passes (Ph.D-pass or M.S-pass) some sections on the first attempt will not
18 be required to repeat an exam for that section. New questions will be written for the exam sections to be
19 repeated. An overall average of 70% or greater on the exam sections repeated constitutes a Ph.D-pass.
20 An average equal to or greater than 60% constitutes a M.S. pass and progress toward completion of
21 M.S. degree requirements. (See Figure 1 in the Appendix).

22
23
24 *H. M.S. Final Examination*

25 The Final Examination of the M.S. program of study is a defense of a thesis and explanation of the
26 scientific principles involved. The student's M.S. research must be summarized in the format required
27 by the Graduate College. One copy of the thesis must be submitted to the Graduate College for a
28 preliminary check of the format at least four weeks before the graduation date at which the degree may
29 be conferred (see The Graduate College "Thesis Manual" <http://www.uiowa.edu/~gradcoll/thesis.htm>).
30 Students should especially note that there is a final thesis deposit date set by the Graduate College for
31 the anticipated semester of graduation. The completed M.S. thesis should be submitted to an examining
32 committee at least two weeks before the final M.S. examination. The M.S. examining committee
33 consists of at least three members of the graduate faculty approved by the Dean upon recommendation
34 by the student's advisor and the Director of the Program after consultation with Program Faculty. At
35 least two members of the M.S. committee shall be faculty members of the Free Radical and Radiation
36 Biology Program. This examination will be judged satisfactory or unsatisfactory with two or more
37 negative votes making the examination unsatisfactory. If the examining committee so recommends, a
38 candidate who fails may present himself/herself for reexamination, but not sooner than the next semester
39 or summer session. In accordance with Graduate College rules, the examination may be repeated only
40 once.

41
42 If the student has declared his/her intention to seek admission to the Ph.D. Program in Free Radical and
43 Radiation Biology, then the M.S. Committee should direct questions to the candidate such that the Ph.D.
44 potential of the student can be assessed.

1

2 *I. Eligibility for admission to Ph.D. degree program*

3 The student may seek admission to the Ph.D. Program after successful completion of the M.S. degree in
4 The University of Iowa Free Radical and Radiation Biology Program. The Program faculty will vote on
5 the request of a particular student to enter the Ph.D. track. The decision will be based on course work,
6 research accomplishments and aptitude, M.S. thesis quality, and evaluation of performance on the
7 written qualifying examination. A quorum constitutes 3/4 of the Free Radical and Radiation Biology
8 Program faculty (faculty can abstain). Majority vote will rule. In case of a tie vote, the student will be
9 admitted to the Ph.D. program.

V. DOCTOR OF PHILOSOPHY (Ph.D.) PROGRAM

Students may be accepted into the Ph.D. program in Free Radical and Radiation Biology by earning the M.S. degree with thesis in Free Radical and Radiation Biology at the University of Iowa and/or becoming Ph.D. eligible. Students who have earned a M.S. degree with a thesis in another science program at The University of Iowa or another accredited university may also be accepted into the Ph.D. program in Free Radical and Radiation Biology.

A. Entrance requirements

Students with the Bachelor's degree or equivalent and the proper background courses must have a 3.0 grade-point average (GPA) for admission. A student with the Ph.D. objective must maintain a GPA of at least 3.0 on all graduate work completed at The University of Iowa.

B. Plan of Study

The student and temporary advisor should select courses for the first semester of study and develop a Plan of Study for the Ph.D. degree as soon as possible, but not later than the beginning of the second semester of enrollment. The student should learn of the research interests of the different faculty members and select a permanent advisor not later than the end of the second semester of enrollment in the Free Radical and Radiation Biology Program. This is especially crucial for those who have already earned the M.S. degree at Iowa or elsewhere. The advisor may be, but need not be, the same as the M.S. program advisor.

C. Graduate College minimum requirements

Each candidate for the Ph.D. degree must satisfactorily complete at least 72 semester hours of graduate credit (including transfer credits and credits earned for the M.S. degree). The student must maintain a grade-point average of at least 3.0 on all graduate work completed at The University of Iowa. The Graduate College specifies (Section XII-C., Manual of Rules and Regulations of the Graduate College, 2000 edition) that "the candidate is expected to have completed at least three years of residence in a graduate college. At least part of this residence must be spent in full-time involvement in one's discipline, at this University, beyond the first 24 semester hours of graduate work; this requirement can be met either by: (1) enrollment as a full-time student (9 semester hours minimum) in each of two semesters, or (2) enrollment for a minimum of 6 semester hours in each of three semesters during which the student holds at least a one-third-time assistantship certified by the department as contributing to the student's doctoral program." English as a Second Language (ESL) courses do not count towards this requirement. All Ph.D. candidates must pass a Ph.D. Comprehensive Examination and a Ph.D. thesis defense. The timing for these procedures is illustrated in Figure 2 (Appendix). The Comprehensive Exam and the Ph.D. thesis defense may not be taken in the same semester.

D. Specific course requirements

Each candidate for the Ph.D. in Free Radical and Radiation Biology must complete four of the major courses offered regularly in the Program (Section V-E.). These courses include Radiation Biology (77:103), Medical Physics (77:211), Molecular and Cellular Biology of Cancer (77:288), and Free Radicals in Biology and Medicine (77:222). Students must also satisfactorily complete Introduction to

1 Biostatistics (171:161) or equivalent, Biochemistry and Molecular Biology I (99:120), and Principles
2 in Molecular and Cellular Biology (156:201). All of these courses must be taken for a letter grade. Ph.D.
3 candidates must also complete Responsible Conduct in Research (050:270). A Ph.D. student must also
4 take at least six hours of electives. The faculty, in consultation with the advisor, will decide whether
5 the courses chosen are appropriate. Special topics (77:307 and 77:308), Current Topics (77:545, 77:546,
6 77:547, and 77:548), and Research (77:305 and 77:306) may be taken on an S/U basis. Current Topics
7 in Radiation and Cancer Biology must be taken at least two (2) times and Current Topics in Free Radical
8 Biology must also be taken two (2) times. Students in the Ph.D. program must enroll in the Seminar
9 course (77:207 and 77:208) and present a talk every year during the Ph.D. program of study, except the
10 first year, for a minimum total of three semester hours. Presentation of papers at scientific meetings is
11 encouraged, but not required.

12
13 Each fulltime student (students with an one-half time assistantship) must take at least 9 semester hours
14 in the fall semester and again in the spring semester and at least 2 semester hours of research in the
15 summer session until the Ph.D. comprehensive exam is passed. After passing the Ph.D. comprehensive
16 examination, the student may after prior consultation with his/her advisor sign up for less than 9
17 semester hours per semester. Each student must take at least two (2) semester hours of Research every
18 semester including the Summer session, starting the first Summer session the student is in the Program.
19 Any deviation from this rule requires special permission of the faculty. It should also be noted that
20 credits earned from English as a second language (ESL) courses do not count towards the M.S. or Ph.D.
21 degrees. Students may register for Postcomprehensive Registration (000:000) during their final semester
22 of study if all research has been completed. Students who are less than full time should negotiate their
23 Plan of Study with the faculty.

1 *E. Summary of Ph.D. degree course requirements*

2

3 **Intramural Courses**

4

5

	<u>Credits</u>
6 Radiation Biology (77:103)	4
7 Medical Physics (77:211)	4
8 Free Radicals in Biology & Medicine (77:222)	4
9 Molecular and Cellular Biology of Cancer (77:288)	3
10 Seminar (77:207 & 77:208) ⁼	3
11 Current Topics in Free Radical Biology (77:545,77:546)	2
12 Current Topics in Radiation and Cancer Biology (77:547, 77:548)	2
13 Research (77:305 & 77:306)	<u>20</u>
14 <i>Sub-Total Semester Hours for Intramural Courses</i>	42

15

16 **Extramural Courses**

17

18 Biochemistry and Molecular Biology I (99:120)	4
19 Introduction to Biostatistics (171:161) or equivalent	3
20 Principles in Molecular and Cell Biology (156:201)	4
21 Responsible Conduct in Research (050:270)	0
22 Electives	<u>7</u>
23 <i>Sub-Total Semester Hours for Extramural Courses</i>	18

24

25 *TOTAL Semester Hours for Ph.D. Degree* 60^{=**}

26

27

28 *F. Plan of research study for Ph.D. degree*

29 Between the first and second year of graduate study, and no later than 1 month after the start of the third
30 semester of study, the student (in consultation with their advisor) will prepare and submit a written plan
31 of research that will lead to the Ph.D. degree with thesis. The faculty will meet to review the plan of
32 study and vote on the plan according to the following action:

33

- 34 1) satisfactory; proceed with research;
35 2) satisfactory with reservations; review required before proceeding with research; or
36 3) unsatisfactory.

37

38 The student will have two attempts at presenting an acceptable research plan to the faculty. If on the
39 second attempt the student fails to present an acceptable plan, the student will be terminated from the
40 graduate program. The time between the first and second attempt will be no greater than one month.

41

42 The research plan will consist of the following:

43

⁼ Seminar must be taken once a year after the first year, so the number of semester hours will vary depending on how long the student is enrolled. A minimum of 3 seminar semester hours is necessary.

^{**} Note, the minimum requirement of the Graduate College for the Ph.D. degree is 72 semester hours. Students should enroll in Research, and Electives to bring their total semester hours to 72 to complete the Plan of Study.

1 1. **Summary** (1/2 page)

2 This section should state the broad and specific objectives of the investigation. The
3 experimental design and methods to be used for meeting these goals should be concisely described. In
4 addition, the potential significance of the possible results should be noted. This summary should “stand
5 alone” as an accurate description of the work proposed.

6
7 2. **Specific Aims** (1/2 page)

8 A concise statement of the hypothesis or hypotheses should be presented. The specific aims
9 should be listed or stated in a few short sentences.

10
11 3. **Background and Significance** (3 pages)

12 This section should critically evaluate the relevant scientific literature and summarize the current
13 status of the concepts that relate to the research proposal. The potential contribution of the proposed
14 research to obtaining key information missing from the literature or extending knowledge in the field
15 should be described. The relevance of the potential findings to advances in the basic sciences, clinical
16 practise, or to practical problems of society should be explained when possible. In the course of doing
17 this, the importance of the research to the specific aims should be described.

18
19 4. **Preliminary Studies** (up to 2 pages including illustrations)

20 This section is not required, but the candidate will benefit from describing with appropriate text,
21 tables, and figures any preliminary results obtained. This section should describe what was done, why it
22 was done, summarize the data obtained, and state what the findings may mean.

23
24 5. **Experimental Design and Methods** (3 pages)

25 Outline the proposed experimental design and state the procedures that will be used to
26 accomplish the specific aims of the project. Be explicit about methods for data collection, analysis, and
27 interpretation. Defend the methods you propose to use and especially identify new methodology and its
28 potential advantages, as well as potential limitations.

29
30 6. **Literature Cited** (no page limit)

31
32
33 *G. Student Teaching*

34 All Ph.D. candidates are encouraged to assist in the teaching of at least one of the major courses offered
35 in the Free Radical and Radiation Biology Program. There is no formal teaching requirement.

36
37
38 *H. Ph.D. Qualifying Examination*

39 To qualify for entry into the Ph.D. Program in Free Radical and Radiation Biology, the student must
40 satisfactorily complete a written qualifying examination. The student will usually take the exam after
41 successfully completing the major required courses in the Free Radical and Radiation Biology Graduate
42 Program, but no later than the beginning of the **fifth semester** after entering the Program. The exam
43 will be offered after the close of spring semester classes, typically Monday and Tuesday of the first
44 week of the regular summer session. A student shall have two attempts to satisfactorily complete the
45 exam. If the first attempt is unsuccessful, the student may make another attempt no later than **four**
46 **weeks** after the initial attempt. Students who do not satisfactorily complete the exam in these two
47 attempts will be terminated from the Program (see Figure 2, Appendix).

1
2 The exam will be written on two consecutive mornings (four hours each) and cover concepts specific to
3 the core curriculum of the Program. The general guidelines are that a score greater than 70% on any
4 section constitutes a Ph.D. pass in that section; between 60% and 70% is an M.S. pass and below 60% a
5 failing grade. A student who passes (Ph.D. pass) some sections on the first attempt will not be required
6 to repeat an exam for that section. New questions will be written for the exam sections to be repeated.
7 An overall average of 70% or greater on the exam sections repeated constitutes a Ph.D. pass. An
8 average equal to or greater than 70% constitutes a Ph.D. pass and progress toward completion of the
9 Ph.D. degree requirements. (See Figure 2 in Appendix).

10 11 12 *I. Ph.D. Comprehensive Examination*

13 Ph.D. candidates must successfully pass the Ph.D. Comprehensive Examination. This examination may
14 be taken at any time after successfully completing the qualifying exam but no later than **the first**
15 **February after successfully completing the qualifying exam.** If a student fails to satisfactorily
16 complete the comprehensive exam, the student will be allowed one additional attempt to satisfactorily
17 complete the exam. The second attempt can be no sooner **than June (at least four months after the**
18 **first attempt) and no later than August of that same year.** Students who fail the exam on two
19 successive occasions will be terminated from the Ph.D. program but may qualify for the M.S. degree
20 (see Figures 1 and 2, Appendix).

21
22 For the Ph.D. comprehensive examination, the student must develop, present, and defend the research
23 proposal (Section V-J.) that will be used for their Ph.D. research and which demonstrates the student's
24 familiarity with relevant scientific literature, laboratory methods available, and ability to design a series
25 of experiments and interpret the results. Two unsatisfactory votes on the comprehensive examination
26 make the committee report unsatisfactory. With the consent of the committee, this examination may be
27 repeated once. The second examination may not be taken sooner than four months from the date of the
28 first exam, or more than twelve months later. A revised version of the original proposal may be
29 presented for evaluation. As noted earlier, a Plan of Study must accompany the request for the Ph.D.
30 Comprehensive Examination.

31
32 The examining committee will consist of at least five faculty members recommended by the faculty
33 advisor and the student, approved by the Program Faculty and the Dean of the Graduate College. At
34 least one member of the committee should have a major appointment in a department other than the Free
35 Radical and Radiation Biology Program. At least three members of the committee shall be from the
36 Free Radical and Radiation Biology Program. The official approval of the committee will be given
37 when the Ph.D. comprehensive examination is scheduled. The same committee that approves the
38 student's proposal will usually (but not necessarily) serve as the committee for the final defense of the
39 Ph.D. dissertation.

40
41 The committee will evaluate the student's proposal and the presentation as satisfactory, satisfactory with
42 reservations, or unsatisfactory. If two or more votes are "unsatisfactory", the committee may agree that
43 the student can repeat the examination one additional time. If one or more votes are "satisfactory with
44 reservations" the conditions for removing the reservations shall be stipulated in the report to the
45 Graduate College.

1 *J. Research proposal for Ph.D. degree*

2 For the Ph.D. comprehensive examination (Section V-I), the student must develop a proposal, present a
3 written copy of the proposal to each member of the examining committee, then orally defend the
4 proposal two to four weeks later. This research proposal will be based on the research project the
5 student has selected for his/her Ph.D. research. The written proposal shall be prepared using a word
6 processor, be no more than fifty (50) double-spaced pages, and follow the general guidelines for
7 National Institutes of Health (NIH) research grant proposals (minus administrative pages) (See
8 instructions that are provided in the NIH publication PHS-398, available from the NIH web site.) In
9 addition, the structural format of the proposal should be discussed thoroughly with the student's advisor
10 and other faculty, as appropriate.

11

12 The proposal should consist of the following:

13

14 1. **Summary** (up to 1 page)

15 This section should state the broad and specific objectives of the investigation. The
16 experimental design and methods to be used for meeting these goals should be concisely described. In
17 addition, the potential significance of the possible results should be noted. This summary should "stand
18 alone" as an accurate description of the work proposed.

19

20 2. **Specific Aims** (1 page)

21 A concise statement of the hypothesis should be presented. The specific aims should be listed or
22 stated in a few short sentences. After each specific aim or at the end of the list (if more appropriate),
23 explain how accomplishment of these specific aim(s) will contribute to proper testing of the proposed
24 hypothesis.

25

26 3. **Background and Significance** (2-5 pages)

27 This section should critically evaluate the relevant scientific literature and summarize the current
28 status of the concepts that relate to the research proposal. The potential contribution of the proposed
29 research to obtaining key information missing from the literature or extending knowledge in the field
30 should be described. The relevance of the potential findings to advances in the basic sciences, clinical
31 practise, or to practical problems of society should be explained when possible. In the course of doing
32 this, the importance of the research to the specific aims should be described.

33

34 4. **Preliminary Studies** (up to 10 pages including illustrations)

35 This section is not required, but the candidate will benefit from describing with appropriate text,
36 tables, and figures any preliminary results obtained. This section should describe what was done, why it
37 was done, summarize the data obtained, and state what the findings may mean.

38

39 5. **Experimental Design and Methods** (10 or more pages)

40 Outline the proposed experimental design and state the procedures that will be used to
41 accomplish the specific aims of the project. Be explicit about methods for data collection, analysis, and
42 interpretation. Defend the methods you propose to use and especially identify new methodology and its
43 potential advantages, as well as its limitations.

44

45 6. **Literature Cited** (no page limit)

46

1 Note the order in which experiments will be done and the alternative approaches that may be taken.
2 Estimate the time it may take to complete each phase of the investigation. This will help the candidate
3 and the Comprehensive Exam Committee determine whether the various approaches suggested are
4 feasible.

5
6 In both the written research proposal and the oral defense of the proposal, the student should be able to
7 demonstrate an in-depth understanding of the scientific principles that relate to the proposal.
8 Audiovisual aids, e.g. slides or transparencies, may be used by the student for the oral defense of the
9 proposal.

10 11 12 *K. Ph.D. Final Examination*

13 The final examination of the Ph.D. program of study is a defense of a thesis and explanation of the
14 scientific principles involved. The student's Ph.D. research must be summarized in the format required
15 by the Graduate College. One copy of this dissertation must be presented to the Office of the Graduate
16 College for a preliminary check of the format at least four weeks before the graduation date at which the
17 degree may be conferred (see The Graduate College "Thesis Manual"
18 <http://www.grad.uiowa.edu/Students/ThesisResources/>). Students should especially note that there is a
19 final thesis deposit date set by the Graduate College for the anticipated semester of graduation. The
20 completed Ph.D. thesis should be given to each member of the examining committee at least two weeks
21 before the final examination and three weeks before the final deposit of the thesis in the Office of the
22 Graduate College. The final examining committee must consist of no fewer than five members of the
23 graduate faculty recommended by the faculty of the Program to the Director of the Free Radical and
24 Radiation Biology Program and approved by the Dean of the Graduate College. This committee need
25 not be the same as the Ph.D. comprehensive examination committee, but at least three members shall be
26 from the Free Radical and Radiation Biology Program. One member of the final examination committee
27 must be from a department outside the Free Radical and Radiation Biology Program. On occasion, a
28 scientist with appropriate expertise from outside of The University of Iowa will be recommended to the
29 Dean of the Graduate College to serve on the committee. The examination will be judged satisfactory or
30 unsatisfactory. Two unsatisfactory votes make the report of the committee unsatisfactory. The candidate
31 may not present for reexamination sooner than the next semester. In accordance with Graduate College
32 rules, the examination may be repeated only once.

33
34 **Before the Ph.D. degree is recommended by the Free Radical and Radiation Biology Graduate**
35 **Program and granted by the Graduate College, the candidate must:**

- 36
37 1) submit at least one manuscript (or ready to submit) to a peer-reviewed journal, and
38 2) deposit two complete copies of the thesis with the advisor.
39 3) provide an electronic copy of the thesis to the FRRBP.

40
41 *end*

VI. APPENDIX

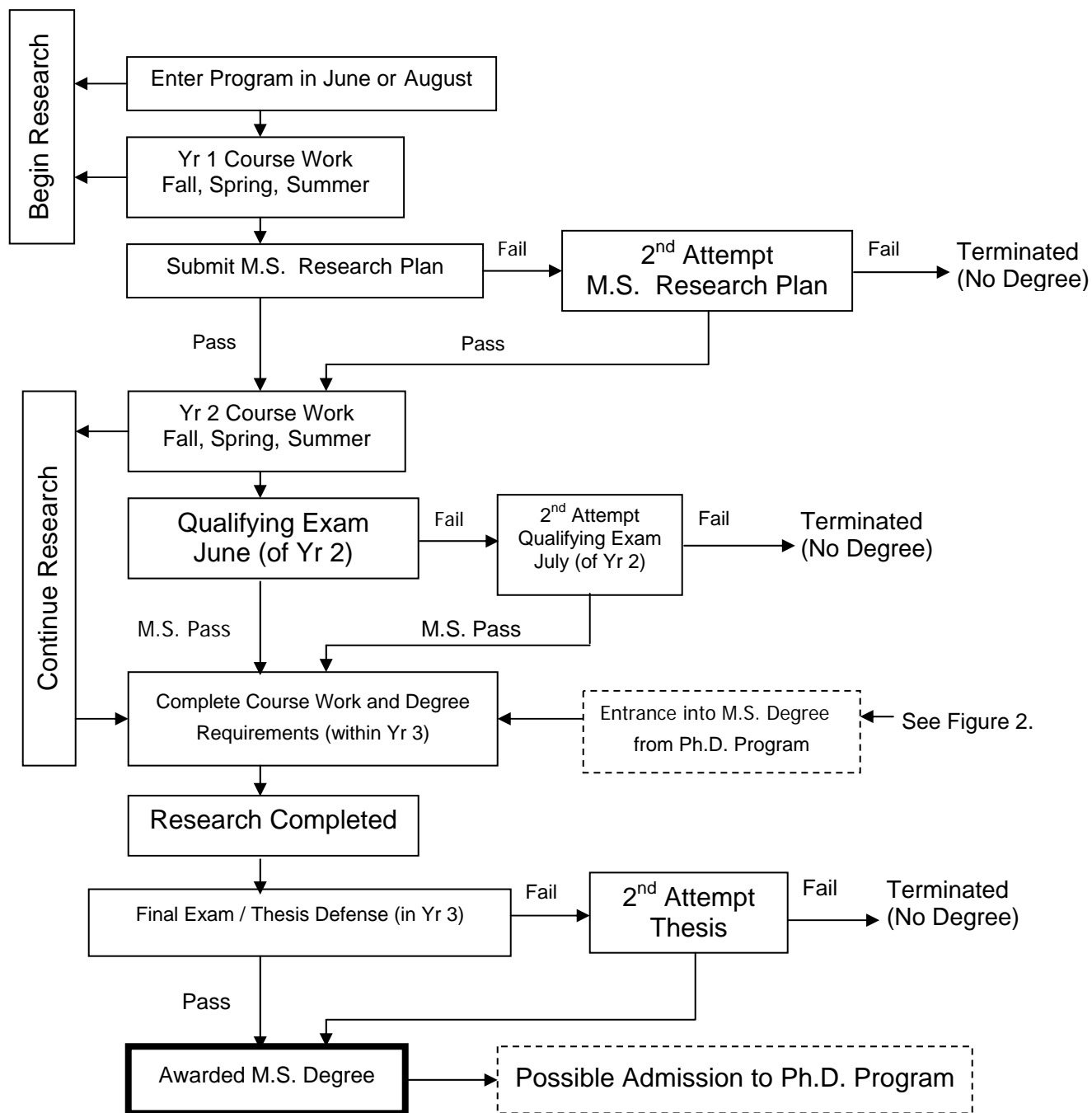


Figure 1. Flow Chart for a M.S. Degree with Thesis

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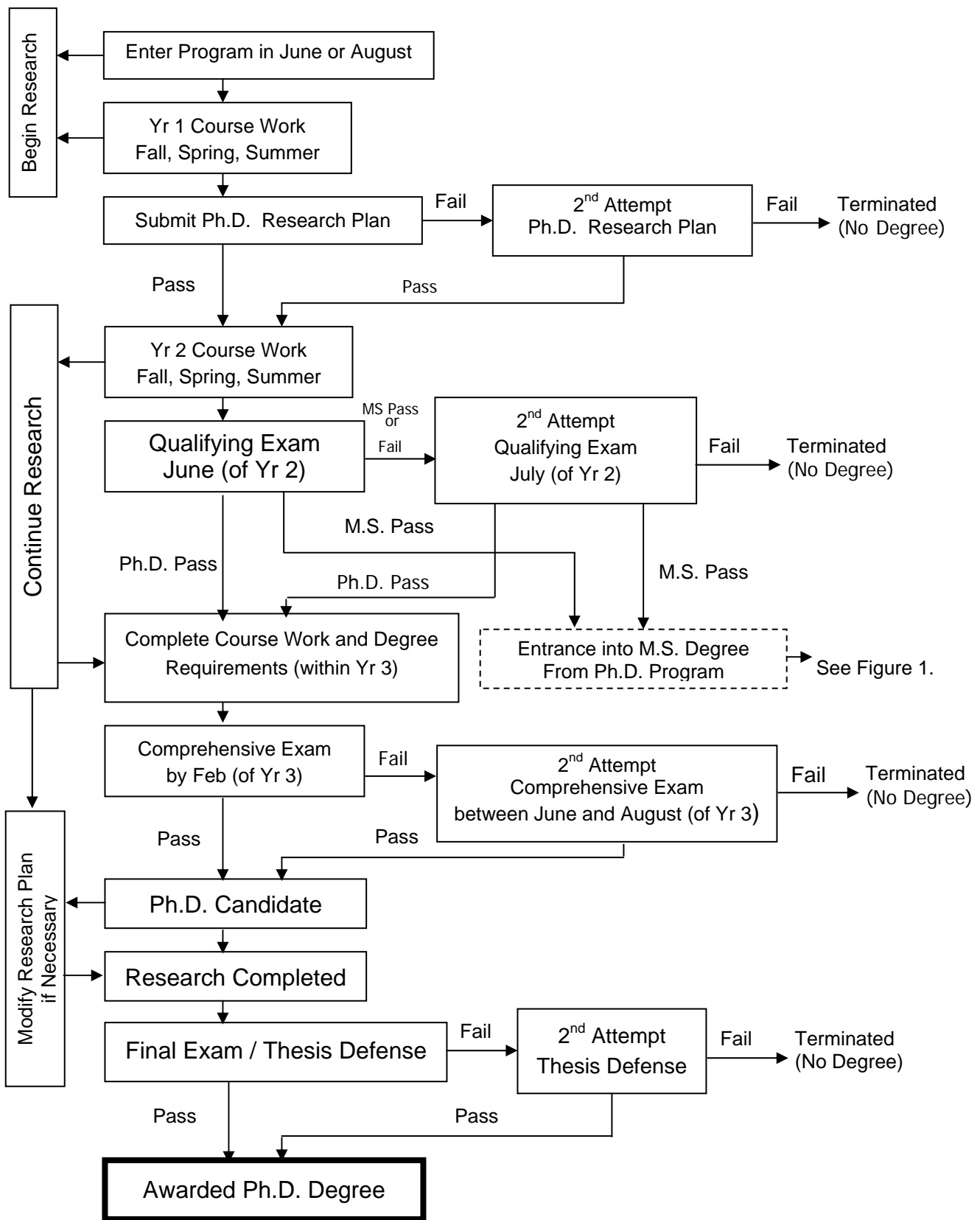


Figure 2. Flow Chart for a Ph.D. Degree

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