

IOWA

Department of Radiation Oncology Free Radical and Radiation Biology Program

Policies and Academic Guidelines for Graduate Students

**Department of Radiation Oncology
The University of Iowa
Iowa City, Iowa 52242-1181
Tel: 319 335 8019
Fax: 319 335 8039**

<https://frrbp.medicine.uiowa.edu>

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INTRODUCTION

- ✓ **What is FRRB?** The Free Radical and Radiation Biology (FRRB) Program is a subprogram of the Biomedical Science Program (BSP) within the Graduate College of The University of Iowa. The FRRB Program is in the Department of Radiation Oncology in the College of Medicine.
- ✓ **What do we study?** The FRRB Program is interdisciplinary with the possibilities of a major emphasis in Radiation Biology and/or Redox Biology. Although students with diverse academic backgrounds may enter the Program, each student should have a science background which include 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 are Free Radicals:** 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 effects 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 and related oxidants, such as hydrogen peroxide, in many diseases and pathological states. As examples, cancer, aging, heart attacks, strokes, diabetes, and Lou Gehrig's disease all have a free radical/oxidant component to their mechanisms of injury. Nationally and internationally, the use of free radical/oxidant modulators in the prevention and treatment of disease is under close investigation currently including clinical trials.
- ✓ **What is Redox Biology?** Redox biology is the study of the interaction of free radicals and related oxidants with biological material. These species are fundamental to good health. However, there is an imbalance associated with many human health issues; this imbalance could be either the cause or the effect of the health issue.
- ✓ **What is Radiation Biology?** The science of radiation biology is dedicated to understanding the effects of radiation on living things. 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 that 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.

PROGRAM LEADERSHIP

Chair and Departmental Executive Officer of Radiation Oncology

Bryan Allen, MBA, MD, PhD
Associate Professor
319-356-8538

FRRB Division Director and Graduate Program Director

Andreas Burnett, PhD
Associate Professor
319-384-4450

FRRB Program Faculty

Garry Buettner, PhD
Professor
319-335-8015

Joseph Caster, MD, PhD
Assistant Professor
319-467-5695

Prabhat Goswami, PhD
Professor
319-384-4666

Mitchell Coleman, PhD
Assistant Professor
319-335-7550

Corinne Griguer, PhD
Professor
319-384-4754

Michelle Howard, PhD
Assistant Professor
319-384-9340

Douglas Spitz, PhD
Professor
319-335-8001

Claudia Olivia, PhD
Research Assistant Professor
319-335-8019

James Byrne, MD, PhD
Assistant Professor
319-353-8836

Michael Petronek, PhD
Research Assistant Professor
319-335-8019

ADMISSIONS

Qualifications. 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, the student must maintain a grade point average of at least 3.0 on graduate work completed at The University of Iowa. A minimum grade-point 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 a M.S. degree). It is expected that students who enter the Program with a baccalaureate degree will complete the Ph.D. within 4-5 years (including coursework).

Application Process. For consideration into the FRRB Program, interested students must apply using the Biomedical Science Program admissions portal: [How to Apply | Biomedical Science Program \(uiowa.edu\)](https://uiowa.edu/biomedical-science). Questions about admissions procedures can be directed to BSP staff at biomedical-science@uiowa.edu or call 319-335-8306.

Application fees. The cost to apply is reimbursed by the Carver College of Medicine for all applicants who receive an interview invitation and complete the interview. Application fees may be eligible for a waiver: [Graduate Fee Waiver | Graduate Admissions - The University of Iowa \(uiowa.edu\)](https://uiowa.edu/graduate-fee-waiver).

Direct Admission to FRRBP. FRRBP does accept 'direct admits' on a selective basis using the guidelines/standards of the Biomedical Science Program. Direct Admission means that the selected student has met the qualifications for admission but has already identified a faculty mentor and laboratory upon entering the FRRB program. Medical (MD) and Medical Science Training Program (MSTP) students are welcome to join the FRRB Program by direct admissions.

English Proficiency Requirements
<https://grad.admissions.uiowa.edu/english-proficiency-requirements>

TEST	MINIMUM REQUIREMENTS	HOW TO SEND
TOEFL iBT / TOEFL iBT Home Edition	Total score 81	Send via ETS using institution code 6681 and department code 01
IELTS / IELTS Indicator	Overall score of 7 with no subscore less than 6	Send through your IELTS Testing Center
DuoLingo (DET)	Score of 120+	Send via DuoLingo English Test
PTE	Overall score of 68 with no subscore less than 58	Email internationalgrad@uiowa.edu with your Score Report Code

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CURRICULUM

Note - 1st year Biomedical Science Program students interested in FRRB will be able to complete their course work in an optimal timeframe by taking the courses in **red font** at the designated times.

YEAR 1 – FALL

Course #	Course Name	S.H.
BMED:5207	Principles of Molecular and Cellular Biology	3
BMED:5208	Topics in Principles of Molecular and Cellular Biology	1
BMED:7777	Biomedical Science Seminar	1
BMED:7888	Biomedical Science Research	5+

Research hours should be registered to bring total enrollment to 15 s.h.

Selective: Students choose one of the two statistics courses below:

PCOL:5204	Option 1: Basic Biostatistics and Experimental Design	1
BIOS:4120	Option 2: Introduction to Biostatistics (lecture and discussion sections)	3

Elective: Students choose any or none of the elective courses

FRRB:5000	Radiation Biology	4
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YEAR 1 - SPRING

Course #	Course Name	S.H.
BMED:7777	Biomedical Science Seminar	1
MMED:6260	Methods for Molecular/Translational Medicine	1
PHAR:6504	Mastering Reproducible Science	1
BMED:7888	Biomedical Science Research	5+

Research hours should be registered to bring total enrollment to 15 s.h.

Selective: Students choose one of the following core courses

PATH:5270	Pathogenesis of Major Human Diseases	3
FRRB:7001	Molecular and Cellular Biology of Cancer	3
FRRB:7000	Redox Biology and Medicine	4
PCOL:6099	Special Topics in Pharmacology (Principles + 2 modules)	3

Elective: Students choose any or none of the elective courses

Electives	Electives relevant to FRRB	Arr
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YEAR 2 – FALL

Course #	Course Name	S.H.
BMED:7270	Scholarly Integrity/Responsible Conduct of Research	0
FRRB:6000	Free Radical Radiation Biology Seminar	1
FRRB:6004	Research: Free Radical Biology and Medicine	Arr
FRRB:6006	Topics in Free Radical Biology and Medicine	1
FRRB:6008	Topics in Radiation and Cancer Biology	1
FRRB:5000 or Electives	Radiation Biology	4

YEAR 2 – SPRING

Course #	Course Name	S.H.
BMED:7271	Scholarly Integrity/Responsible Conduct of Research	0
FRRB:6000	Free Radical Radiation Biology Seminar	1
FRRB:6004	Research: Free Radical Biology and Medicine	Arr
FRRB:6006	Topics in Free Radical Biology and Medicine	1
FRRB:6008	Topics in Radiation and Cancer Biology	1
FRRB:7000 or Electives	Redox Biology and Medicine	4

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Radiation Biology (FRRB:5000). All graduate students must enroll in FRRB:5000 in the Fall semester of Year 1 or Year 2. This course is a comprehensive study of the molecular and biological effects of ionizing radiation with an emphasis on biomedical therapeutic applications. Topics include mammalian radiobiology, the contribution of metabolism to radiation effects and therapeutic applications of radiation in cancer therapy.

Redox Biology and Medicine (FRRB:7000). All graduate students must enroll in FRRB:7000 in the Spring semester of Year 1 or Year 2. This course is an overview of the biochemistry of free radicals, related oxidants, and antioxidants; antioxidant (redox) enzymes—their structure, biochemical function, regulation, and function in redox biology; targets of oxidants—lipids, proteins, DNA; the redox biology of health (infants to healthy aging) and disease (e.g., cancer, cardiovascular disease, diabetes, neurodegenerative diseases).

Scholarly Integrity/Responsible Conduct of Research (BMED:7270, BMED:7271). All graduate students in the FRRB program must enroll in Scholarly Integrity (SI)/Responsible Conduct of Research (RCR) sequence course and complete the Collaborative Instructional Training Initiative (CITI) web-based training. CITI training is to be taken early in the first semester and consists of 11 modules of basic SI/RCR training offered through the CITI training web portal: <https://grad.uiowa.edu/postdocs/training-rcr/approved-courses>. Once all CITI modules are successfully completed (score of at least 80% for each quiz), students are then eligible to take the two semester SI/RCR sequence courses (BMED:7270 and BMED:7271). These courses should be taken during the fall and spring semesters of the second year.

Free Radical and Radiation Biology Seminar (FRRB:6000). Each student must give one seminar for credit a year for three years. Students should not register for seminar during 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 relevant seminars and lectures inside and outside the department is strongly 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.

Research: Free Radical Biology and Medicine (FRRB:6004). During their first year, students are to enroll for research credit (BMED:7888). Students are required to submit a research report in a manuscript format to their rotating advisor within the first week after the end of a rotation. The report will be evaluated and graded by the advisor. For FRRB students, from year 2 onwards, students will register for FRRB:6004. Research reports need to be submitted to their permanent advisor at the end of each semester, and summer term. These reports can take forms other than “manuscript form”, when appropriate, such as thesis chapters or a manuscript(s) submitted in that term.

Topics in Free Radical Biology and Medicine (FRRB:6006). During their second and third year, students are required to enroll for credit in FRRB:6006. Students are required to present and discuss new literature reports in the field of free radical biology and medicine in journal club format. All reports must be approved by the journal club director before presentation. Attendance at all journal club presentations (even if not presenting), is strongly encouraged.

Topics in Radiation and Cancer Biology (FRRB:6008). During their second and third year, students are required to enroll for credit in FRRB:6008. Students are required to present and discuss emerging concepts in the biological effects of radiation and cancer biology in journal club format. All reports must be approved by the journal club director before presentation. Journal club presentations are evaluated with a letter grade. Attendance at all journal club presentations (even if not presenting), is strongly encouraged.

LIST OF ELECTIVE COURSES

This list contains all courses that students in the Biomedical Science Program have used as electives in the past. Any of these courses would apply toward elective course credit in any of the BSP sub-programs. In some cases, these courses may also be required courses in one or more BSP sub-programs. This list is not fully comprehensive as elective courses can always be added based on the unique training and research needs of the student.

Course Number (Cross listing #)	Course Name (Alternate course name)	s.h.	Semester
ACB:5203	Gross Human Anatomy for Graduate Students	5-6	F, S
ACB:6237	Critical Thinking in Biochemistry and Molecular Biology	1	F
ACB:6238	Critical Thinking in Genetics	1	F
ACB:6239	Critical Thinking in Cell Biology	1	F
ACB:6252	Functional Neuroanatomy	4	S
BMB:3140	Experimental Biochemistry	2	S
BMB:5244	Molecular Recognition	1	S
BMB:7251	Introduction to Protein Structures	1	F
BMB:7252	Enzymes, Carbohydrates, Nucleic Acids, Lipids and Membranes	1	F
BMB:7253	Introduction to Metabolism	1	F
BMB:7254	Metabolism 2	1	S
BMB:7255	Metabolism 3 and Biosignaling	1	S
BMB:7256	Molecular Biology	1	S
BIOL:3172	Evolution	4	F, S
BIOL:3713	Molecular Genetics	4	F, S
BIOL:4333	Genes and Development	3	S
BIOL:5412	Fundamental Genetics – Graduate Lecture	3	F, S
BIOL:5512	Readings in Genetics	2	F
BIOS:4120	Introduction to Biostatistics	3	F, S, Su
CS:5110	Introduction to Informatics	3	F
FRRB:5000	Radiation Biology	4	F
FRRB:7000	Redox Biology and Medicine	4	S
FRRB:7001	Molecular and Cellular Biology of Cancer	3	S
GENE:6150	Genetic Analysis of Biological Systems	3	F
GENE:7191	Human Molecular Genetics	3	S
IMMU:6201 MICR:6201	Graduate Immunology	3	S
IMMU:6241	Writing a Scientific Proposal	2	F
IMMU:7221	Advanced Topics in Immunology	3	F

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MICR:2157	General Microbiology	3	F, S
MICR:3147	Immunology and Human Disease	3	F
MICR:6247	Graduate Immunology and Human Disease	4	F
MICR:6259	Graduate Pathogenic Bacteriology	3	S
MICR:6267	Graduate Viruses and Human Disease	4	F
MICR:6268	Biology and Pathogenesis of Viruses	2	S
MICR:6270	Graduate Microbial Genetics and Physiology	3	F
MMED:6220 ACB:6220 MPB:6220	Mechanisms of Cellular Organization	3	F
MMED:6226 ACB:6226 MPB:6226	Cell Cycle Control	1	S
MMED:6227 ACB:6227 MPB:6227	Cell Fate Decisions	1	S
MPB:5153 MMED:8115	Graduate Physiology (Molecular Physiology)	4	F
NEUR:7235	Neurobiology of Disease	3	F
NSCI:5653	Fundamental Neurobiology	3	F
NSCI:7235	Neurobiology of Disease	3	F
OEH:6710	Human Toxicology and Risk Assessment	3	S
PATH:5270 MMED:5270	Pathogenesis of Major Human Diseases	3	S
PATH:8133	Introduction to Human Pathology Grad Students	3, 4	F
PCOL:5135	Principles of Pharmacology	1	S
PCOL:5136	Pharmacogenetics and Pharmacogenomics	1	S
PCOL:5137	Neurotransmitters	1	S
PCOL:6207	Ion Channel Pharmacology	1	S
PCOL:6225	Growth Factor Receptor Signaling	1	S
PSQF:6217	Seminar in College Teaching	2, 3	F, S
PTRS:6224	Activity Based Plasticity in Healthcare	4	F

s.h. – semester hours

F – Fall

S - Spring

2024-2025 ACADEMIC CALENDAR

Fall semester 2024:

- ✓ First day of classes – August 26
- ✓ Last day of classes – December 13
- ✓ Graduate Degree Applications due – October 4
- ✓ Plans of study for master's recipients and final exam requests – October 15
- ✓ Final thesis exam reports due – December 2
- ✓ Final thesis deposit due – December 9
- ✓ Graduate Commencement Ceremonies – December 20

Spring semester 2025:

- ✓ First day of classes – January 21
- ✓ Last day of classes – May 9
- ✓ Graduate Degree Applications due – February 28
- ✓ Plans of study for master's recipients and final exam requests – March 11
- ✓ Final thesis exam reports due – April 22
- ✓ Final thesis deposit due – April 29
- ✓ Graduate Commencement Ceremonies - May 16

Graduate College Deadlines can be found at:

<https://grad.uiowa.edu/academics/deadlines>

The University of Iowa Academic Calendar can be found at:

<https://registrar.uiowa.edu/academic-calendar>

*Note - These dates change each semester, and it is the responsibility of the student to discuss these with their advisor and check the Graduate College web page so that the deadlines are met.

FINANCIAL SUPPORT

Financial Support. Financial support (tuition and stipend) has typically been available for a FRRB Program students' entire graduate program. However, the FRRBP is not obligated to provide financial support to the graduate students in the program. Financial support is typically obtained from three sources:

- **Research grants awarded to individual faculty members.** The expenditure of these funds 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.
- **Training grants awarded to the University for the training of pre-doctoral and post-doctoral students.** The decision to award a pre-doctoral stipend from a Training Grant in the FRRBP is made by the principal investigator of the training grant with the concurrence of the FRRBP faculty by majority vote. Renewal of the stipend is dependent on the satisfactory progress of the student as determined by the academic record, evaluation by the faculty and the limitations imposed by the terms of the grant.
- **Graduate College and College of Medicine funds.** Graduate College and College of Medicine funds are often awarded to the FRRB Program for student research assistantships, teaching assistantships, and tuition scholarships. The awarding of these funds is recommended by the Director of the FRRB Program with the concurrence of the Program faculty. The award can be renewed when appropriate and when funds are available.

Tuition Support. Most awards (e.g., from training grants) pay tuition and mandatory fees (technology, activities, services, student union, building, recreation facility, arts & cultural, professional enhancement, student health, and mental health). 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.

Obligations. 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 ¼ - or ½ - 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 are scheduled for termination, the affected individual will be notified as quickly as possible, and efforts will be made to obtain funds from another source.

Research/Thesis Support. The FRRBP expects to provide financial support for the expenses of a graduate student's research. Funds are more readily available when the student's research objectives coincide with those of a research grant that has been awarded to a faculty member. All costs associated with the preparation of a thesis are the responsibility of the student. However, when some of the graphs, photomicrographs, diagrams, etc. can also be utilized for reports or publications associated with a research grant, some support for the production costs may be provided. The costs of preparing the proposal for the Ph.D. comprehensive exam are paid by the department.

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 for 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.

Health Insurance. All graduate students who hold an assistantship and are registered for classes, are eligible to receive a contribution from the University toward the cost of health and dental insurance coverage. The University contribution will begin the first day of the month following your appointment and completing your insurance enrollment in MyUI. The plans available for medical are Student Health Insurance Plan (SHIP) or UIGRADCare Plan. Dental is also available via Student Dental Plan. Graduate students may contact University Benefits Student Insurance for help in choosing a plan and questions.

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

- All vacations must be arranged in consultation between a student and his/her advisor. Vacation forms available from the Program office must be filed.
- All graduate students with a fiscal year appointment shall be allowed 15 working days of absence without pay deduction.

- Up to 30 days of vacation time may be accrued. Students are advised to use their vacation time each year.
- Some appointments may have specific vacation guidelines that vary from the general guidelines above.
- Records of vacations and sick leave will be kept on file in the Program office and utilized only as internal records.
- A leave of absence without pay may be granted at the discretion of the advisor with concurrence of the faculty. It remains the responsibility of the student to maintain the registration requirements of the university.
- Students who are repeatedly absent without permission will be given a written warning. After three such warnings, the student's appointment may not be renewed.

Holidays. Graduate students shall receive the following paid holidays which occur during the term of their appointment: New Year's Day, Dr. Martin Luther King, Jr.'s Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Day, a day before or after Christmas Day. Monday will be recognized as a holiday for all holidays occurring on a Sunday and Friday for all holidays occurring on a Saturday. Graduate students may be absent for the above holidays unless the research rotation mentor specifically requires the graduate student to be on duty. At such time, the research rotation mentor and the graduate student shall schedule alternate paid time off. Graduate students taking paid leave contiguous with a holiday shall not have the holiday counted against their paid leave.

Sick Leave. Graduate students may be absent due to illness without loss of pay not to exceed eighteen (18) days during a twelve (12) month appointment. If a graduate student has exhausted paid sick leave due to illness, they may request an unpaid leave of absence which will be granted at the sole discretion of the employer consistent with any applicable State or Federal regulations, or alternatively may request additional paid sick leave in accordance with Section 2 of the Graduate Student Employment Standards.

Family Illness Leave. Graduate students may use available sick leave for care of and necessary attention to ill or injured members of the immediate family (as defined in Section 3 of the Graduate Student Employment Standards) or for parental leave including birth and adoption. Use of sick leave for this purpose is limited to five (5) workdays per year.

Bereavement Leave. Graduate students may use available sick leave for three (3) workdays when a death occurs in the graduate student's immediate family (as defined in Section 4 of the Graduate Student Employment Standards). Immediate family is defined as and limited to the graduate student's spouse/domestic partner, children, grandchildren, foster children, stepchildren, legal wards, parents, grandparents, foster parents, stepparents, brothers, foster brothers, stepbrothers, sons-in-law, brothers-in-law, sisters, foster sisters, stepsisters, daughters-in-law, sisters-in-law, aunts, uncles, nieces, nephews, first cousins, corresponding relatives of the graduate student's

spouse/domestic partner, and other persons who are members of the graduate student's household.

Unpaid Leave of Absence. Enrollment in the BSP includes all three regular academic sessions. A leave of absence during any session must be specifically arranged and approved in advance by the FRRB Program Director. Additionally, the Biomedical Science Graduate Program shall authorize leave requests in accordance with the provisions of the Family and Medical Leave Act of 1993 for qualifying individuals. A student desiring a leave of absence must petition the Director in writing, giving the reasons for the request. If approved, a leave of absence is granted for a specified period of up to one year, and may be renewable for up to one additional year. The student will be dismissed and required to petition the BSP for readmission to the Graduate Program after an absence exceeding the period specifically granted. No stipend support will be provided during the time student is on leave of absence. Please refer to the Graduate Student Employment Standards for further details.

STUDENT ADVISING

Student Advisors. During the first year, each new student will be advised by a temporary advisor assigned by the BSP, who should be consulted regarding the student's schedule of courses for the first year. The student and advisor should then develop a Plan of Study. This Plan can be revised later if necessary. Students are also required to rotate through three laboratories in their first year. These rotations must be approved by the Director of the BSP. Then, by the end of the first year, and by mutual consent of the student and a faculty member, the student must choose a permanent advisor whose research interests most closely coincide with those of the student. The permanent advisor must be chosen by the end of the first year. The permanent advisor may be the same as the temporary advisor.

Changes in Permanent Advisors. During a degree program in FRRB, a student may switch advisors, but if this occurs, the student should be aware that a stipend may no longer be available. If a student wishes to switch permanent advisors during their degree program, the FRRB Program will give the student 3 months to select another permanent advisor. If a permanent advisor has not been identified and confirmed by both parties (student and advisor) by the end of the 3-month period, the student may no longer be permitted to register in the program. This is because graduate education is guided by the mentoring and support of a faculty advisor. Without a faculty advisor confirmed, there is no pathway forward in a doctoral degree program for a student. Students do have the prerogative to change subprograms in the BSP as indicated in the BSP policies and guidelines. BSP will not provide any financial and administrative support for direct admit students.

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

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

Guideline changes. The faculty will change the FRRB Program Guidelines from time to time. It is the FRRB Program policy that the student will use the version that is in place when they declare their degree objective. For most students, this will be the Guidelines in effect when they enter the program. For those who change their degree objective after entering the Program, the Guidelines that will be followed are those that are in place when the degree objective is changed.

Policy for changing subprograms in the BSP. In setting up the umbrella BSP, it was agreed that students would have the prerogative to change subprograms (as students may for any PhD program/subprogram at UI). It was agreed that such changes would be uncommon, not encouraged, but possible. Given the complexities of our Program and subprograms, and the important implications for funding, a student wishing to change subprograms should follow the steps outlined below, in the sequence in which they are presented, as relevant. Note that the final step, completing a Request for Change of Graduate College Status form for Graduate Admissions, must be completed with approval and oversight from the Office of Graduate and Postdoctoral Studies (OGPS).

- ✓ The student should have a discussion with the DGS/Director of the subprogram the student is proposing to leave. The student should have a clear, compelling rationale for the proposal to change subprograms. "Compelling rationale" could include a strong

realization/conviction that the student prefers a different field of biomedical science or has convincing career opportunities in a different field of biomedical science. Such rationale will not include unhappiness with subprogram requirements, difficulties with the comprehensive exam, or debate about the relative merits of different subprogram requirements. The student should obtain permission from the DGS/Director (of the subprogram the student is leaving) to change subprograms. If such permission is not granted, and the student wishes to continue pursuing the request to change subprograms, the student's request will be evaluated by the subprogram's Executive Committee. The Executive Committee will render a decision. If the issue remains unresolved, the student's request will be evaluated by the CCOM Associate Dean of Graduate and Postdoctoral Studies, and a final decision will be rendered.

- ✔ The student should have a discussion with the DGS/Director of the subprogram the student is joining and should obtain permission from that DGS/Director to join that subprogram. If such permission is not granted, and the student wishes to continue pursuing the request to join that subprogram, the student's request will be taken up by the destination subprogram's Executive Committee. If the Executive Committee upholds the decision to not grant permission to the student to join the subprogram, the student will not be permitted to join that subprogram.
- ✔ For students who are still in the first-year rotation phase of their training, the student should have a discussion with the relevant DGSs/Directors (the one for the subprogram the student is leaving and the one for the subprogram the student is joining) about what will be counted for lab rotations, what remains to be completed for lab rotations, and the optimal timing for the subprogram change. In the case of first-year rotation students, there may be funding implications of changing subprograms – e.g., the slot allocation for the student/subprogram may be affected, the student may be on a training grant, etc. Such financial implications should be discussed amongst the relevant DGSs/Directors and the CCOM Associate Dean of Graduate and Postdoctoral Studies, and a consensus should be reached.
- ✔ When relevant (for students who are already affiliated with a PI/lab), the student should obtain permission from the student's mentor. The student may be staying in the same lab with the same mentor or may be changing mentors/labs. In either case, the student should inform all relevant parties and obtain permission from all relevant parties. Per Office of Graduate and Postdoctoral Studies (OGPS) and BSP policies, the DEO of the supervising faculty member is required to approve lab affiliations. If a change of subprograms implies a change of the responsible DEO, the new DEO should be informed of the change, give permission for the change (if the DEO in fact approves), and accept responsibility for financial backstopping of the student (per standard OGPS/BSP policy). As stated previously above, situations where relevant permissions are not granted should be taken

to the Executive Committee of the relevant subprogram(s), and then to the CCOM Associate Dean of Graduate and Postdoctoral Studies if the matter remains unresolved.

- ✓ The student should obtain permission and approval from the CCOM Associate Dean of Graduate and Postdoctoral Studies.
- ✓ The student should obtain a “Request for Change of Graduate College Status” [form](#) from the Graduate Admissions Office (115 Calvin Hall). The form should be completed by the student, and then submitted to the OGPS office for approval. OGPS approval is required prior to submitting the form to the subprogram the student wishes to transfer into. The form may then be finalized and signed by the subprogram the student is transferring into, and then submitted to Graduate Admissions per instructions on the form.

Note: The policies articulated herein for changing subprograms in the BSP are not meant to address or otherwise cover situations where students are having difficulty affiliating with a lab home. The responsibility for placing students in a lab home lies with the subprogram into which the student initially matriculated. Changing subprograms should not be used as a mechanism to solve lab placement problems. Subprograms have the prerogative to place students in labs of PIs outside the subprogram, with appropriate agreements, co-mentoring arrangements, and full understanding by all relevant parties (so-called “subcontracting”). Such placements need not require the student to change subprograms.

DOCTOR OF PHILOSOPHY (PH.D. PROGRAM)

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. The student must maintain a GPA of at least 3.0 on all graduate work completed at The University of Iowa.

Plan of Study. A flow chart depicting the sequence of events of a typical Ph.D. graduate student is shown in Appendix I. 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 no later than the end of the second semester of enrollment. The student should do rotations to learn of the research interests of the different faculty members and select a permanent advisor, with mutual consent of the advisor, no later than the end of the second semester of enrollment after lab rotations are complete. The Plan of Study form can be found [here](#). To change a submitted Plan of Study, use the form found [here](#).

Specific course requirements. The curriculum is as presented on pages 7-8. In addition to the curriculum presented on pages 7-8, students must take Collaborative Instructional Training Initiative CITI GRAD:7270 within their first year. During the second year, you must complete Scholarly Integrity/Responsible Conduct of Research 1 and 2 (BMED 7270 (Fall) and BMED 7271 (Spring)). Students are also required to do 4 journal clubs and 4 seminars including their final defense as well as 7 electives. Each fulltime student (students with a one-half time assistantship) must take at least 9 but up to 15 semester hours in the fall semester, and again in the spring semester. The rest of the semester hours will be fulfilled with your remaining required courses, electives, and hours of research. A maximum of 6 semester hours of research may be taken at any time. Any deviation from these rules requires special permission from the permanent advisor. Credits earned from English as a second language (ESL) courses do not count towards the Ph.D. degree. Students may register for Post-comprehensive Registration (000:000) during their final semester of study if all research has been completed. Students who are less than full time should negotiate their Plan of Study with the faculty. To qualify for the comprehensive examination, students must complete the required intramural courses each with grades of 'B' or better. Further, students must receive a grade on the final examination of 'B' or better. Students that fail to meet these benchmarks will be given a second opportunity to register for the course and earn a 'B' or complete the final exam and earn a 'B', as appropriate. Failure to successfully earn a 'B' on this second attempt will result in entrance into the M.S. program rather than matriculation through the Ph.D. program.

PhD. Comprehensive Examination. Ph.D. candidates must successfully pass the Ph.D. comprehensive examination. For the Ph.D. comprehensive examination, the student must develop, present, and defend a research proposal that is based on the research project the student has selected for their Ph.D. research. The proposal must demonstrate the student's familiarity with relevant scientific literature, laboratory methods available, and ability to design a series of experiments, and interpret the results. The written proposal shall be prepared following the general guidelines for National Institutes of Health (NIH) research grant proposals (minus administrative pages). Prototypic instructions are provided in the NIH publication PHS-398. Proposals typically follow R01 guidelines, but the structural format of the proposal should be discussed thoroughly with the student's advisor and other faculty, as appropriate (see Appendix II). In both the written research proposal, and the oral defense of the proposal, the student should be able to demonstrate an in-depth understanding of the scientific principles that relate to the proposal. Audiovisual aids may be used by the student for the oral defense of the proposal. This examination may be taken at any time after successfully completing all required FRRB coursework, but no later than February of the spring semester of the student's third year. Students may seek extension of this deadline by sending a letter to the FRRB Program Director with the request, the response to which will be determined by a majority faculty vote. If a student fails to satisfactorily complete the comprehensive exam, the student will be allowed one additional attempt to satisfactorily complete the exam. The second attempt can be no sooner than June (at least four months after the first attempt) and no later than August of that same year. A revised version of the original proposal may be presented for evaluation. A Graduate College Plan of Study

must accompany the request for the Ph.D. Comprehensive Examination. Students who fail the exam on two successive occasions will be terminated from the Ph.D. program, but may qualify for finishing with a M.S. degree. Students who elect to leave the Ph.D. program may request to qualify for finishing with a M.S. degree.

Examination Committee. The examining committee will consist of at least five faculty members recommended by the faculty advisor and the student, approved by the Program Faculty. Appendix III provides the exact guidance from the Graduate College for selection and approval of committee members. The same committee that approves the student's proposal will usually (but not necessarily) serve as the committee for the final defense of the Ph.D. dissertation. The student must develop a proposal, present a written copy of the proposal to each member of the examining committee, then orally defend the proposal two to four weeks later. The committee will evaluate the student's proposal and the presentation as satisfactory, satisfactory with reservations, or unsatisfactory. If two or more votes are "unsatisfactory", the committee may agree that the student can repeat the examination one additional time. If one or more votes are "satisfactory with reservations" the conditions for removing the reservations shall be stipulated in the report to the Graduate College.

Ph.D. Final Examination. The final examination of the Ph.D. program of study is a defense of a thesis and explanation of the scientific principles involved. The student's Ph.D. research must be summarized in the format required by the Graduate College (see The Graduate College Thesis Manual (<https://grad.uiowa.edu/academics/thesis-and-dissertation/preparing-formatting>)). Students should especially note that there is a thesis deposit date set by the Graduate College for the anticipated term of graduation. The completed Ph.D. thesis should be given to each member of the examining committee at least two weeks before the final examination and four weeks before the final deposit of the thesis in the Office of the Graduate College. The examination will be judged satisfactory or unsatisfactory. Two unsatisfactory votes make the report of the committee unsatisfactory. The candidate may not present for reexamination sooner than the next semester. In accordance with Graduate College rules, the examination may be repeated only once.

Graduation Requirements. Before the Ph.D. degree is recommended by the Free Radical and Radiation Biology Graduate Program and granted by the Graduate College, the candidate must:

- ✓ satisfactorily complete at least 72 semester hours of graduate credit (including transfer credits and credits earned for the M.S. degree). Of those 72 semester hours, at least 39 must be earned while registered in The University of Iowa Graduate College, and after formal program admission.
- ✓ must be registered in the same semester in which they earn their degree.
- ✓ satisfactorily defend their PhD thesis research during the final examination
- ✓ have an accepted original first-author or co-first-author manuscript unless otherwise approved by the FRRB faculty (see Appendix IV).

- ✓ provide a signed and approved (by the advisor) electronic copy of their thesis to the Graduate College and FRRB Program administration by the thesis deposit date set by the Graduate College for the anticipated term of graduation.

MASTER'S DEGREE (M.S.) PROGRAM

The FRRB Program only offers the M.S. degree with thesis under special circumstances. Currently we are not accepting or matriculating Master's students into the program. Only under certain situations, with approval by the faculty, can a Master's thesis be considered by vote. The specific requirements are listed below.

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 GPA of at least 3.0 on all graduate work completed at The University of Iowa.

Plan of Study. A flow chart depicting an example of a series of events for a FRRB Program M.S. student is shown in Appendix V. 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 no 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 no 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 semester in which the degree is to be granted and by a date to be established by the Graduate College Dean". The non-doctoral plan of study form can be found [here](#). To change a submitted Plan of Study, use the following [form](#).

Specific Course Requirements. In addition to the curriculum presented on pages 7-8, students must take Collaborative Instructional Training Initiative CITI GRAD:7270 within their first year. During the second year, you must complete Scholarly Integrity/Responsible Conduct of Research 1 and 2 (BMED 7270 (Fall) and BMED 7271 (Spring)). A minimum of eight semester hours of Research FRRB:6004 credit and a written thesis 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, a course substitution, or an exemption. Credits earned from English as a second language (ESL) courses do not count towards the M.S. degree. Except for new students enrolled for their first year, each candidate must register at least once a year in the Program Seminar FRRB:6000 and enroll for a

minimum of one semester hour of credit in Current Topics in Free Radical Biology FRRB:6006, and Current Topics in Radiation and Cancer Biology FRRB:6008 and present one or more research papers. Performance in seminar courses will be evaluated with letter grades, but the Current Topics courses will be evaluated on an S/U basis. Attendance at other seminars and lectures outside the FRRB Program is strongly encouraged.

Each fulltime student (students with a one-half time assistantship) must take at least 9 credit hours per semester. Each student must take at least two (2) semester hours of Research every semester the student is in the Program. Any deviation from this rule requires special permission of the faculty. Students may register for Master's Final Registration (000:001) during their final semester of study if all research has been completed. Students who are less than full time should negotiate their Plan of Study with the faculty.

Research Plan of 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 research plan will consist of the following:

- ✓ **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.
- ✓ **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.
- ✓ **Significance and Innovation** (2 pages): This section should critically evaluate the relevant scientific literature and summarize the 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 practice, or to practical problems of society should be explained when possible. While doing this, the importance of the research to the specific aims should be described.
- ✓ **Preliminary Studies** (up to 2 pages including display items): 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.
- ✓ **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.

✔ **Literature Cited** (no page limit)

The faculty will meet to review the plan of study and vote on the plan according to the following action:

- satisfactory; proceed with research
- satisfactory with reservations; review required before proceeding with research or
- 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.

M.S. Final Examination. The Final Examination of the M.S. program of study is a defense of a thesis and explanation of the scientific principles involved. The student's M.S. research must be prepared in the format required by the Graduate College. (see The Graduate College "Thesis Manual", <https://grad.uiowa.edu/academics/thesis-and-dissertation/preparing-formatting>). Students should especially note that there is a final thesis deposit date set by the Graduate College for the anticipated semester of graduation. The completed M.S. thesis should be submitted to an examining committee at least two weeks before the final M.S. examination and at least 4 weeks before final thesis deposit. The M.S. examining committee consists of at least three members of the graduate faculty approved by the Director of the Program after consultation with Program Faculty. At least two members of the M.S. committee shall be faculty members of the FRRB Program. Appendix III provides the exact guidance from the Graduate College for selection and approval of committee members. This examination will be judged satisfactory or unsatisfactory with two or more negative votes making the examination unsatisfactory. If the examining committee so recommends, a candidate who fails may present himself/herself for reexamination, but not sooner than the next semester or Summer session. In accordance with Graduate College rules, the examination may be repeated only once. If the student has declared their intention to seek admission to the Ph.D. Program in Free Radical and Radiation Biology, then the M.S. Committee should direct questions to the candidate such that the Ph.D. potential of the student can be assessed.

Graduation Requirements. Before the Ph.D. degree is recommended by the Free Radical and Radiation Biology Graduate Program and granted by the Graduate College, the candidate 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 that "at least 24 semester hours must be completed under the auspices of The University of Iowa".
- ✔ must be registered in the same semester in which they earn their degree.
- ✔ satisfactorily defend their MS thesis research during the final examination

The University of Iowa prohibits discrimination in employment, educational programs, and activities on the basis of race, creed, color, religion, national origin, age, sex, pregnancy (including childbirth and related conditions), disability, genetic information, status as a U.S. veteran, service in the U.S. military, sexual orientation, gender identity, or associational preferences. The university also affirms its commitment to providing equal opportunities and equal access to university facilities. For additional information on nondiscrimination policies, contact Office of Institutional Equity, the University of Iowa, 202 Jessup Hall, Iowa City, IA 52242-1316, 319-335-0705, oie-ui@uiowa.edu.

- ✓ provide a signed and approved (by the advisor) electronic copy of their thesis to the Graduate College and FRRB Program administration by the thesis deposit date set by the Graduate College for the anticipated term of graduation.

Eligibility for admission to Ph.D. degree program. The student may seek admission to the Ph.D. Program after successful completion of the M.S. degree in The University of Iowa Free Radical and Radiation Biology Program. The Program faculty will vote on the request of a particular student to enter the Ph.D. track. The decision will be based on course work, research accomplishments and aptitude, and M.S. thesis quality. A quorum constitutes 3/4 of the Free Radical and Radiation Biology Program faculty (faculty can abstain). Majority vote will rule. In case of a tie vote, the student will be admitted to the Ph.D. program. Admission does not guarantee financial support. Although the Free Radical and Radiation Biology Program is not obligated to provide financial support, support has usually been available for the students' entire graduate program.

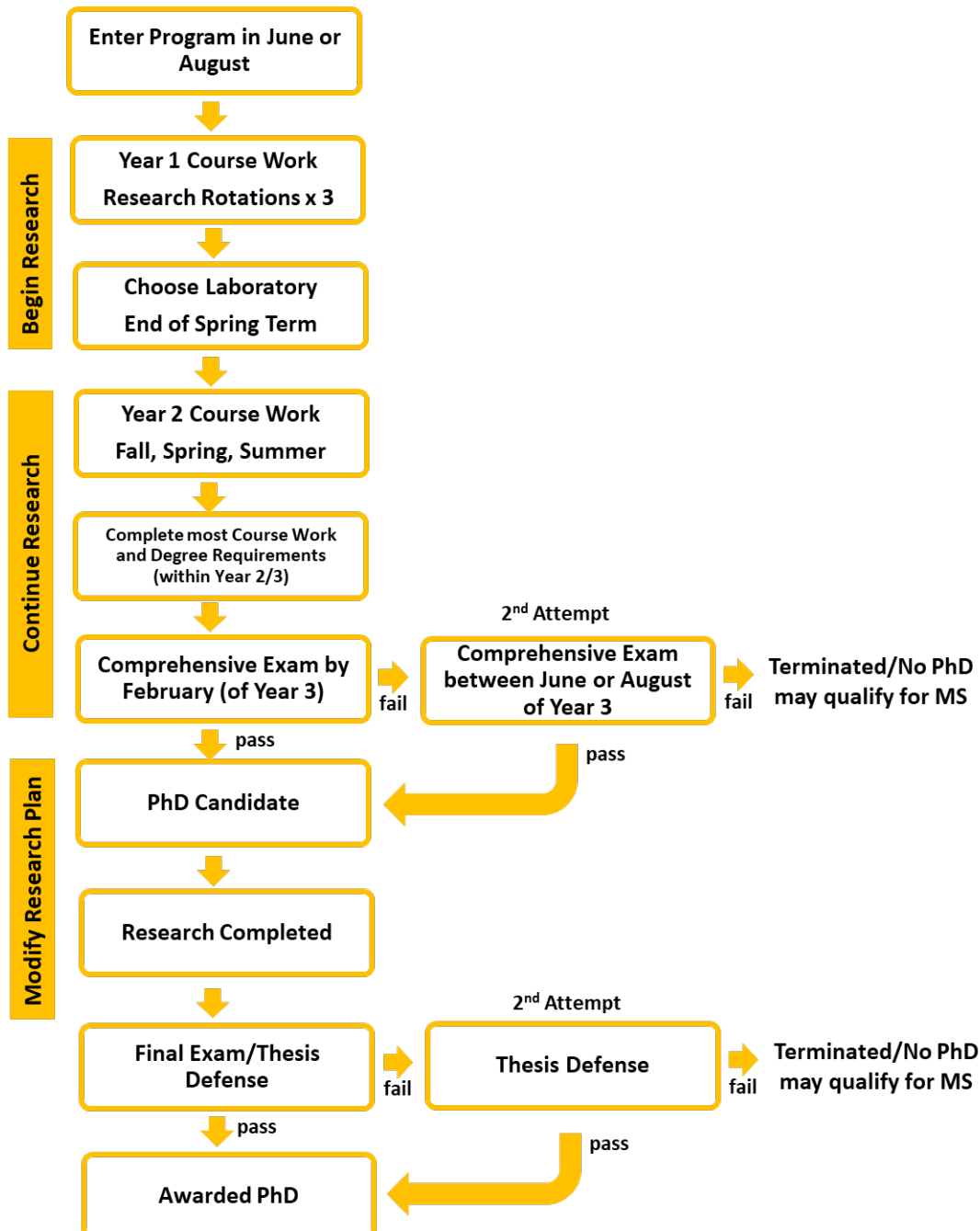
OTHER INFORMATION

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

Disclaimer: Considerable effort has been invested by the faculty and staff to make this document an accurate description of the Free Radical and Radiation Biology Graduate Program, especially the requirements for successful completion of this graduate program. However, because of continued evolution in course offerings, Graduate College requirements, and graduate study in general, there may be adjustments that need to be made to meet the changes in the landscape of a student's graduate program. Any needed changes will be made in a manner that will not impede a student's progress yet meet the philosophy and goals of the degree objective.

APPENDICES

Appendix I. Flow Chart for a Ph.D. Degree with Thesis



The University of Iowa prohibits discrimination in employment, educational programs, and activities on the basis of race, creed, color, religion, national origin, age, sex, pregnancy (including childbirth and related conditions), disability, genetic information, status as a U.S. veteran, service in the U.S. military, sexual orientation, gender identity, or associational preferences. The university also affirms its commitment to providing equal opportunities and equal access to university facilities. For additional information on nondiscrimination policies, contact Office of Institutional Equity, the University of Iowa, 202 Jessup Hall, Iowa City, IA 52242-1316, 319-335-0705, oie-ui@uiowa.edu.

Appendix II. Format for Ph.D. Comprehensive Examination

Title of the Research Proposal:

Specific Aims (One page limit; Font size, Arial 11)

Briefly describe the research topic, what is already known about this topic, and what you think is missing. Include the research hypothesis, aims and overall impact.

(Example) Cancer incidence increases exponentially with age, suggesting that a common mechanism contributes to both of these biological processes. One such mechanism is thought to be oxidative stress, due to an imbalance between the production of reactive oxygen species (ROS, e.g. $O_2^{\bullet-}$ and H_2O_2 , arising from O_2 metabolism), and their removal by the antioxidant network. A majority of aging-research is focused on understanding the mechanisms regulating replicative lifespan (Hayflick limit), which is attributed to telomere shortening and mitotic attrition. This proposal is investigating mechanisms regulating a different mode of cellular aging, chronological lifespan that is independent of both mitotic attrition and telomerase activity.

Research Hypothesis

(Example) We hypothesize that *MnSOD* and ROS ($O_2^{\bullet-}$ and H_2O_2) regulate the chronological lifespan of human fibroblasts as well as their ability to influence the proliferation of epithelial cancer cells via redox-sensitive cell cycle regulatory pathways involving *DUSP1*.

Aims

Aim 1/2: Determine if ----- . **Rationale:** Rationale is based on preliminary data or results from literature. **Approach:** Concisely summarize experimental approaches or methods that will be used.

(Example) Aim 1: Determine if *MnSOD* and ROS ($O_2^{\bullet-}$ and H_2O_2) dependent expression of *DUSP1* regulates the chronological lifespan of normal human fibroblasts. **Rationale:** Preliminary results from antioxidant-PCR array showed that mRNA levels of *DUSP1* (dual-specific phosphatase) increased 3- to 5-fold in old vs. young quiescent normal human fibroblasts, which correlated with a loss in the proliferative capacity of fibroblasts. Molecular and nutrition-based overexpression of *MnSOD* blunted these effects. **Approach:** The proliferation and lifespan of normal human fibroblasts that lack or express endogenous *DUSP1* will be assayed following altered expression of *MnSOD* and its substrate, superoxide.

Overall Impact

(Example) The overall impact of the proposed study to **aging and cancer** research is very high. A deeper mechanistic understanding of events regulating chronological lifespan is anticipated to provide a robust biochemical rationale for predicting how the cellular redox environment regulates chronological lifespan. This information will in turn greatly facilitate the development of novel nutritional-based approaches that can be integrated into a lifestyle to promote healthy aging and suppression of cancer cell progression to malignancy.

Research Strategy

Include the following sections:

(A) Significance: why your proposed research will be significant to basic science and/or translational research?

(B) Innovation: why your proposed study is unique (different than others)?

(C) Approach: Use the below sections for each Aim.

- **Aim 1:** Determine if ----- . *Rationale:* ---
- **Research Design and Methods**
- **Anticipated Results**
- **Alternative Approaches**
- **Timeline for Aim 1:**

Page Break, then

(D) References: Try using EndNote

(Example) Sarsour EH, Kalen AL, Xiao Z, Veenstra TD, Chaudhuri L, Venkataraman S, Reigan P, Buettner GR, Goswami PC. (2012) Manganese superoxide dismutase regulates a metabolic switch during the mammalian cell cycle. **Cancer Res.** 72:3807-3816. PMID: 22710435 <http://dx.doi.org/10.1158/0008-5472.CAN-11-1063> PMID: PMC3429130

Appendix III. Examining Committee

<https://grad.uiowa.edu/academics/manual/academic-program/section-xii-doctors-degrees>

Examining Committees: The Graduate College encourages departments and programs to construct PhD and examining committees which are comprised of faculty members with varying, but related, areas of expertise.

The comprehensive and final examinations are conducted by committees of no fewer than four members of the Graduate Faculty appointed by the Dean upon recommendation of the major department or program. These committees are composed as follows:

- ✓ At least three of the faculty members must be members of the University of Iowa tenure-track faculty (appointment codes FS11-13 and FT11-13).
- ✓ At least two of the faculty members are from the major department (defined as faculty members who hold any appointment in the major department or program) and are members of the University of Iowa tenure-track faculty.
- ✓ A department or program may impose additional structure on the composition of its examining committees.

Departments and programs may request the Dean's permission to replace one of the four members of the Graduate Faculty by a recognized scholar of professorial rank from another academic institution. Also, a voting member may be added at the discretion of the Graduate College Dean.

COMMITTEE SIZE	PASS	STILL PASS WITH	FAIL WITH	RESERVATIONS (FOR COMP EXAMS ONLY)
7 members	5 positive votes	2 negative votes	3 negative votes*	3 reservation votes
6 members	4 positive votes	2 negative votes	3 negative votes*	3 reservation votes
5 members	4 positive votes	1 negative vote	2 negative votes*	2 reservation votes
4 members	3 positive votes	1 negative vote	2 negative votes*	2 reservation votes
3 members	2 positive votes	1 negative vote	2 negative votes*	N/A

*Or, a member who is unable to attend

Appendix IV. FRRBP Authorship Guidelines

Overall Requirements for Authorship: Authorship is defined as significant creative scientific input into the gathering of data, analysis of data, and manuscript preparation, including a personal investment in the overall quality of work such that the individual can defend a critical fraction of the work during the peer review process. All authors should have read and accept responsibility for their critical fraction of the work prior to publication.

Specific Requirements for Authorship:

- First Authorship:** In general, the person primarily responsible for the scientific content, the writing and the correspondence necessary to prepare the manuscript for publication.
 - ✓ Person whose intellectual and experimental skills were necessary to solve the largest and/or most critical portion of the scientific problem
 - ✓ Senior author (if applicable), has the prerogative to choose the first author when several individuals have had similar levels of significant input (See Guidelines for Senior Author)
- Co-Authorship:** Person directly responsible for some creative aspect of the scientific content of the manuscript with a large enough investment in the work to be able to defend that aspect during critical review. (Most difficult determination, must be aware of including individuals who had very little actual input as well as be aware of excluding individuals who had very significant input).
 - ✓ In general, co-authors should have been necessary to some aspect of the creative process, including the experimental design and lab meetings, executing the experiments, measuring necessary biological/biochemical endpoints, gathering/presenting the data, analyzing data, interpreting the data, and preparing the manuscript for submission as well as defending the work during critical review. In general, the simple teaching of techniques, editorial services, and discussion of results between colleagues are best recognized with an acknowledgment.
- Senior Authorship (if applicable):** Person who provides significant overall guidance and creative input into the development of the ideas and manuscript as well as assumes responsibility equal to that of the 1st author.
 - ✓ This individual represents the senior investigator responsible for the overall development and direction of the project.

- ✓ This individual assumes the responsibility of administrating (in a fair and ethical manner) all aspects involved with development of the work.
- ✓ This individual must adhere to the highest of moral and ethical standards as well as possess the wisdom, integrity, and leadership to guide all aspects of the decision-making process throughout the development of the published work.
- ✓ The senior author (in conjunction with the first author), should be ultimately responsible for determining the inclusion of outside collaborators as coauthors.
- ✓ Senior authorship can be shared when more than one PI involved in the study made equal contributions and by mutual consent to this arrangement.

Recommendations:

1. There will be an elected ad hoc Arbitration Committee to aid in the resolution of any authorship disputes within the FRRBP.
 - ✓ The intent of this committee is to provide a forum for discussion and arbitration of any disagreements concerning authorship within the FRRBP
 - ✓ The committee shall listen objectively and impartially to both sides of a disagreement
 - ✓ The committee shall act to bring about fair and mutually acceptable resolutions utilizing the guidelines
 - ✓ The ad hoc committee shall consist of at least three tenure track faculty members, and can also include 1 senior technician, 1 graduate student, 1 non-tenure track faculty, or 1 postdoctoral fellow (approved by a vote at FRRBP faculty executive session). Each member will be selected by a majority vote of the people in attendance at the faculty meeting where the dispute is introduced.
 - ✓ The ad hoc committee shall be chaired by the faculty member who is elected by a majority of the other members of the ad hoc committee and is not associated with the disputed case.
2. The Faculty of FRRBP recommends that the order of authorship be determined by the senior author or project leader at the beginning of a series of experiments expected to result in a publication no later than when the publication is in outline form. Early determination of authorship will aid in avoiding any ambiguity regarding the role of each author as the project progresses.

Appendix V. Flow Chart for a M.S. Degree

