

GUIDELINES: GRADUATE PROGRAM IN CANCER BIOLOGY

These guidelines supplement and expand the regulations of the Graduate School. Students and faculty are expected to read and be aware of the contents of the Graduate School Bulletin and Regulations.

I. General Information

A. Philosophy

The Cancer Biology Graduate Program is designed to train students for a career in basic and applied cancer research, as well as in related careers associated with the application of information through biotechnology and the dissemination of information to the next generation of scientists and to the lay public. Modern cancer research is based on a broad range of disciplines, including Molecular Biology, Cell Biology, Genetics, Biochemistry, and Bioinformatics, which the students will learn through course work, scientific communication, and laboratory experience. The Cancer Biology Graduate Program is designed to develop independent thinking, problem solving, creativity, oral and written presentation skills, data and bioinformatics analysis, and dissemination of information through teaching. Thus, the proposed program combines rigorous course work with mentored hypothesis-driven laboratory research, and opportunities to develop writing, speaking, and teaching skills. Collectively, these experiences will provide students with the necessary theoretical knowledge, technical experience, and leadership training to launch productive careers using their degree in Cancer Biology. Through dissertation research, students are expected to make original contributions to current knowledge that will impact understanding of cancer biology or cancer diagnosis and treatment. Having graduated from the Cancer Biology department, students will be poised to pursue an increasingly wide range of scientific careers, including academic research, undergraduate teaching, science writing, scientific liaison, and basic or applied research in the biotechnology and pharmaceutical industries.

B. Admission into the Program

After completing laboratory rotations and the Interdisciplinary Graduate Program in Biomedical Sciences (IGP) core coursework, students interested in joining the Cancer Biology Graduate Program will apply at the end of the second semester of the first year of graduate school. Acceptance is monitored by the Graduate Executive Committee (GEC) and is contingent on satisfactory performance in both coursework and rotations during the first two semesters. In addition, acceptance into the program is contingent upon approval from the Department Chair of the preceptor's primary appointment. Mandatory documentation of approval by all involved parties will be provided by signing the Cancer Biology Graduate Program Responsibility Form.

Students admitted into the MSTP (M.D. /Ph.D.) Program in the School of Medicine are also eligible to enroll in the Cancer Biology Graduate Program. These students will rotate through the laboratories of

program members during their first two years of Medical School, and can be admitted into the Program using the same procedure and criteria as entering IGP students.

1. Transfer Student Provisions

The transfer of students into the Cancer Biology Graduate Program from another Vanderbilt Graduate Program is dependent on the approval of the Graduate Executive committee (GEC, see below). In these instances, the Director of Graduate Studies (DGS) should be contacted by the student first to request evaluation by the GEC and to assist the student in finding a suitable laboratory for his/her thesis work. (Note that failure to pass the Qualifying Exam in another Vanderbilt Graduate Program excludes admission to the Cancer Biology Graduate Program.) Similarly, the DGS should be informed if a student intends to transfer out of the Cancer Biology Graduate Program so the DGS can assist with negotiating an appropriate course of action.

2. Direct Admission Provisions

The direct admittance of graduate students to the Cancer Biology Graduate Program can be accomplished with the written permission of the mentor whose laboratory they wish to enter and approval by the GEC. Faculty wishing to accept a direct admit student should contact the GEC for approval.

C. Administrative Structure

The Cancer Biology Graduate Program is run by the **Program Director** (currently Jin Chen), who is appointed by the Cancer Biology **Department Chair** (currently Harold Moses). The Program Director also serves as the **Director of Graduate Studies (DGS)** for the Cancer Biology Program. In addition, the Chair appoints an **Interdisciplinary Graduate Program (IGP) representative** for Cancer Biology (currently Barbara Fingleton), who represents the department on the IGP admission committee. Cancer Biology Graduate Program policy is monitored and enforced by the **Graduate Executive Committee (GEC)** (currently Jin Chen, Barbara Fingleton, Ann Richmond, Hal Moses, and Kathy Gould). **The Qualifying Examination Parent Committee (QEPC)** (currently Jin Chen, Hal Moses, Ann Richmond, Vito Quaranta, Alissa Weaver, Simon Hayward, Bob Matusik, Al Reynolds, Richard Peek, and Barbara Fingleton) is responsible for maintaining consistency and continuity across the Qualifying Examination process.

1. Graduate Executive Committee (GEC). The GEC assists the Program Director in monitoring the progress and welfare of the students. Most issues can and should be resolved through consultation with the DGS, but there are limitations to the power and scope of the DGS with respect to certain types of conflict. The GEC exists to ensure fairness and to provide a general oversight role for the Cancer Biology Program. It provides an impartial mechanism for judging and resolving conflicts between and among students and faculty, and is empowered through the Department Chair to enforce its decisions. The GEC is selected by the Department Chair and the Program Director/DGS, and consists of at least 5 graduate faculty, including the Department Chair, the Program Director/DGS, the IGP representative, and a representative of the Biomedical Research, Education, and Training (BRET) office. These individuals meet as needed to arbitrate and resolve special situations that arise from time to time in the course of a student's graduate

career. For example, if deemed necessary, the committee can prohibit faculty from taking on new students based on mentoring issues.

The responsibilities of the GEC are summarized below:

- monitor the program requirements and curriculum
- evaluate/monitor the participating faculty
- resolve and enforce mentoring issues
- assure high standards in the academic program
- make decisions regarding student performance, advancement, or dismissal when disputes arise

2. The Program Director/DGS serves as official spokesperson for the Cancer Biology Graduate Program, the liaison with the Graduate School, and representative of the program in matters of university policy. He/she also serves as the departmental Director of Graduate Studies (DGS) and monitors the academic and research progress of each student throughout his or her training. He/she has frequent contact with the students and is responsible for explaining the requirements and expectations. The Program Director is also the student advocate when personal problems arise and in cases of possible faculty misconduct. In addition, he/she is aware of a wide variety of medical and counseling resources available to all students under circumstances that might extend beyond departmental issues. Most student or faculty issues can and should be resolved through confidential interaction with the DGS. When necessary, conflicts can be referred to the GEC (see above).

3. The Interdisciplinary Graduate Program (IGP) representative sits on the IGP Admission Committee, which selects incoming graduate students and determines IGP policy. He/she also acts as liaison between the graduate programs of the IGP and the Cancer Biology Program, and facilitates the transition of students from the IGP into the Program.

4. The departmental administrative contact(s) (DAC) coordinates program admission in response to direction from the Department Chair and the Director of Graduate Studies (DGS), completes the graduate award forms for student tuition and fees, tracks program requirements, and maintains the student files throughout their course of study. Students are responsible for the registration of their courses.

5. Qualifying Examination Parent Committee (QEPC). The QEPC is made up of 10 primary or secondary appointees to the Department with experience with graduate student mentoring. The chair of the QEPC is the DGS. Members of the QEPC serve as Chairs of the qualifying examination committees. The QEPC meets regularly during the time of the qualifying examinations and is charged with maintaining consistent standards in examination format and consistent criteria for passing all components of the qualifying examination. The QEPC serves as the first-line arbitrator in the case of a dispute regarding the outcome of the Qualifying Examination. (Current membership of the QEPC is mentioned above).

D. Teaching

There is no formal teaching requirement. Students pursuing the doctorate may participate in the IGP Focus Groups. Also, students are encouraged to assist in the Advanced Cancer Biology course or other courses organized by the Department. The Cancer Biology Student Association (CBSA) organizes a student taught technology course every year to assist new (2nd year) cancer biology students preparing for their qualifying exam. Students are encouraged to participate in this team taught effort. One hour of graduate credit may be earned by participating in an official CANB course as a teaching assistant provided certain criteria are met, as detailed in section II.6 below.

E. Master's Degree Option

Cancer Biology does not offer a M.S. degree program. Students are admitted to the Cancer Biology Program with the intention of completing a Ph.D. degree. However, M.S. degrees can be awarded if this goal changes. The following criteria must be met for a M.S. Degree:

- Satisfactory completion of all didactic Ph.D. course work with a B average
- A Thesis acceptable to the Graduate Executive Committee and the Graduate School. Minimal requirements for a thesis are:
 - One complete figure representing unequivocal data generated by the student,
 - An abstract, introduction, materials and methods, results and discussion section in manuscript format based on the available data.

II. Requirements for the Ph.D. Degree

A. Course requirements

1. The total number of graduate credits must conform to the specification of the Graduate School (i.e., 24 didactic hours and 72 total hours). Students will be expected to maintain a B (3.0) average. Student performance will be monitored by the DGS. If a student's grade point average (derived from didactic hours and research credit hours) drops below 3.0, he/she will be placed on probation. If the sub-par performance persists into subsequent semesters, the DGS and Graduate Executive Committee will work with the Graduate School in evaluating the student's options and he/she may be subject to dismissal from the Program.
2. Entrance into the Program in the second year of graduate studies requires that students, except Medical Scientist Training program (MSTP students), complete the core curriculum governed by the IGP. In accordance with this program, each student rotates through laboratories of their choosing during the first year of their graduate studies. Students participate in experiments in these laboratories and write a short summary of their activities, which is submitted to the IGP. Grades, and a written evaluation of the student's performance, are provided to the IGP by the faculty member involved. As many as 16 hours of didactic credit may be earned from the IGP curriculum excluding elective courses.
3. Elective courses to reach the total of 24 didactic hours of formal courses (an additional 8 credits) are to be chosen from high-quality, formal 300 level courses given by the Departments

of Cancer Biology, Cell and Developmental Biology, Biochemistry, Molecular Physiology and Biophysics, Pathology, and Pharmacology in the School of Medicine, or approved courses given by the Department of Biological Sciences in the School of Arts and Sciences. A list of available courses is found in the Graduate School Bulletin. The topic will be determined by the specific research interests of the student.

4. MSTP Cancer Biology students have the option of transferring courses which are particularly pertinent to training in Cancer Biology as per the current version of *The Compass*

5. All students enrolled in the Cancer Biology Program must take Introduction to Cancer Biology and Advanced Cancer Biology (CANB 340 & 342), which are offered in the fall.

6. Other than Didactic course work the remainder of the student's 72 hours will be earned through their CANB 379 (Non Candidate research) and CANB 399 (Candidate research) classes. One hour of CANB 379 credit may be earned from serving as a teaching assistant for an official CANB course. To qualify for the TA-credit, students must fulfill the following criteria:

(i) Have successfully completed both the required cancer biology courses CANB340 and CANB342;

and (ii) Have obtained approval from their mentor for participation in the program.

Participation in this program will earn 1 credit and will also entitle the student to a document citing their teaching experience. Participation in the program has four components:

(1) Prospective TAs must participate for at least 2 semesters in a monthly 1-hr journal club to discuss articles related to effective teaching techniques for science education. These journal clubs will include current Cancer Biology course directors, grad student TAs and any other faculty, post-docs or students interested in participating;

(2) Each TA will commit to 12-16 hrs class time, which may involve lecturing, discussion facilitation, one-on-one or small group tutoring, technical assistance or other facilitation as required in that course;

(3) Each TA will meet with the relevant course director to contribute to the evaluation of the students in the class. This may include test grading, assessment of written documents and/or oral presentations, and analysis of student participation;

(4) Participation in an annual workshop run by Center for Teaching personnel, when offered. Students may register for Candidate research hours once they have passed their Qualifying exams.

7. Faculty will assign Satisfactory (S) or Unsatisfactory (U) grades for CANB 379/399 research each semester. U grades should be used when the primary mentor believes that the student is not performing to expectation. Three Unsatisfactory grades results in automatic dismissal from Graduate School. **If a U grade is assigned, the faculty mentor must notify the student, the DGS, and the DAC.** The student should schedule a Dissertation Committee meeting to be held as soon as possible. At the committee meeting, the student should present his/her progress and the mentor should provide an explanation for the unsatisfactory grade. As usual, the Dissertation Committee chair should submit a report summarizing the Dissertation Committee's assessment. The student has the right to appeal a U grade, and the details of appeal process can be obtained through the DAC. **Failure of the student to convene regular dissertation committee**

meetings every 6 months can result in assignment of U grade by the Dissertation Committee.

8. Training in Biomedical Statistics is required. In view of the movement to incorporate this topic into the required IGP Bioregulation course, it is not listed as a separate requirement. However, in the event that this training is inadequate, a separate course will be developed and will become a requirement for Cancer Biology graduate students.

9. All graduate students are required to attend the weekly Cancer Biology Science Hour Seminar series. Students are required to present their research in a Work in Progress format each year they are in the Cancer Biology program from the third year in graduate school until the Ph.D. in Cancer Biology is awarded. Lisa McCawley is currently the person in charge of the seminar series. Should there be some valid reason for not being present; the student should notify Lisa ahead of time to request an excused absence. Students are expected to document their attendance each week on the sign in sheet and to participate by listening and asking thoughtful questions of the speakers.

C. Admission to the Ph.D. Candidacy (Qualifying Exam)

The qualifying exam for admission to Ph.D. candidacy consists of two parts, both pertaining to the student's intended thesis proposal. Part I will consist of a written review article covering key papers that serve as background for the student's dissertation project. The number of articles reviewed will vary depending on the topic of research. However, under most circumstances between 30 and 60 references will be cited. There should be an emphasis on the primary literature and while in some instances it may be appropriate to cite another review, the Review is not a review of reviews, but of the primary literature. The student is expected to identify what is currently known about the topic, integrate the most recent findings in the field in the context of what is current 'dogma' in the field, identify remaining questions in the field, and describe how answering these remaining questions would impact our understanding of the indicated area of cancer biology, or how answering these questions could be translated to improved clinical outcome for cancer patients. The written review should conform to the style of review articles published in *Cancer Research* (see Instructions to Authors for journal specifications regarding formatting). The written review should include at least one original schematic figure representing information integrated in the Review. The written Review must not draw from the preceptor's previously written reviews, publications, or grant proposals. The written Review must represent the student's original writing. Evidence of plagiarism will be grounds for disciplinary action.

The Review will be submitted to an Examination Committee comprised of Cancer Biology faculty members with sufficient published expertise in the topic to rigorously critique the Review, and assess the student's interpretation and integration of published findings. The Examination Committee will be assigned by the DGS with input from the mentor. Once the Examination Committee has received the written Review, the Examination Committee and the student will convene in the format of an oral examination to test the student's general knowledge of topics and techniques related to the field in which the Review is written. The qualifying exam committee will determine whether the student has the appropriate scientific background, writing skills, and information integration skills to answer key questions remaining in the field. Failure of part I will result in an opportunity to remediate the skills identified as insufficient through tangible efforts, such as increased journal discussion with the

preceptor, attendance at scientific writing workshops, and additional exercises in scientific problem solving through experimental approaches. The Committee will present the students with a written critique of the Review article. Within 3 months, the student will submit a revised version of the written Review to the Examination Committee, including a point-by-point response to the comments written by the Examination Committee. The Committee will convene with the student in an oral examination format. The Examination Committee will determine whether the student has the appropriate background and skills to move to the next examination phase.

When part I of the exam is passed, the student will go forward to the second phase of the qualifying exam. Part II of the qualifying exam will proceed within 3 months after the student passes Part I of the qualifying exam. Details of Part II are described under Parts C1, 2, and 3.

Both parts of the qualifying exam consist of three major components:

1. The written proposal
2. The oral defense of the proposal
3. General knowledge

The general knowledge component should constitute at least 30 minutes of the overall exam time and take the form of general knowledge questions that arise from the proposed material during the oral defense of the project. Each of the components can and should be evaluated separately. Failure of one part of the exam constitutes a fail.

1. Preparing for the Exam

It is expected that students will have to take time away from the bench during the last month or two of preparation for the exam. It seems reasonable (but is not necessary) to spend half days in the lab over the final months. However, faculty expectations can vary widely as to how much time is appropriate. Some students handle it better than others, and some faculty are more understanding than others. One should do what is necessary to pass the exam. It is a realistic exercise in that it is not that different from the demands on faculty when confronting grant deadlines in the face of teaching and other commitments. Students and mentors should discuss the issue if necessary to reach an understanding. Sometimes new faculty members are not very cognizant of the demands of the exercise and the DGS can help with this.

a. **December** The DGS will meet with the exam candidates sometime in to brief students on exam expectations. The qualifying exam is taken soon after the spring semester of the student's second year at Vanderbilt (first year in our department). Throughout the second year, students should be developing their research topic for the qualifying exam proposal.

b. **January** (exact date to be set on a yearly basis). Students will attend a grant writing workshop during which they will be given an overview of the qualifying exam process and presented with information on how to plan and prepare a grant proposal in the NIH-NRSA format. Students will also be provided copies of exemplary short review articles and the official guidelines for the review article and the NIH-NRSA, which specify page limits and other important details associated with this review article and predoc-level grant application during the workshop. Copies of reviews and proposals by students from previous years will be distributed.

c. **February 15** is deadline for approval of topic from the DGS. The student should research and decide on a topic for the review article and the research grant, meet with the mentor for his or her approval, and notify the DGS. The best way to do this is to email a paragraph describing the topic - **not more than one page for entire email**. Include a brief background, a rationale for the project, general approach and methodology, a hypothesis based on these items, and a preliminary list of up to three possible aims. It does not have to be formal or polished at this stage. (MSTP students can request more time if necessary because of the heavy work load in the spring semester, however if possible, it is better to keep on schedule with the others).

d. **March 15** is the deadline for submission of review article topic and aims of the research proposal. (MSTP students can defer to Aug. 1 if necessary). A copy of the abstract and research proposal aims should be submitted to the DGS by email. Failure to meet this deadline can result in dismissal from the Graduate Program. In rare instances, the DGS may grant an extension. The DGS will use the abstracts to select appropriate faculty for examining committees.

e. The DGS will assign examining committees with input from the mentor. In accordance to Graduate School rules for Qualifying Exam Committees, there must be at least 4 members of the Graduate Faculty on each committee (this includes the student's mentor). Three of the Graduate Faculty should be from within the Cancer Biology Program and one of the three must have a primary appointment in Cancer Biology. The fourth committee member should have their primary appointment from a different graduate program. MSTP student committees must also include one current or former member of the MSTP Faculty Advisory Committee. Each Examining Committee will consist of faculty chosen for their expertise in the subject area of the proposal and their prior experience with Qualifying Exams. The Chair of the Qualifying Exam Committee will be a member of the Qualifying Examination Parent committee, which will meet regularly and assist with consistency and continuity across student examinations. The student's mentor will provide input to the DGS on the membership of the Qualifying Exam Committee. The student will be informed of the members of his/her Examining Committee. He/she should contact them immediately and arrange a time and place for Part I of the qualifying exam. Faculty members are encouraged to be available in May and June for examination meetings.

2. Schedule for Part I of the Qualifying Exam

A. **Early March.** The student meets with his or her mentor to develop the topic for the short review covering the body of work that forms the background for the student's dissertation project. The student then writes the review with some guidance from the mentor or members of the laboratory and/or collaborating faculty. The article should be completed by June 15 and submitted to the qualifying exam committee.

b. Upon final approval of the review article by the mentor, the student, mentor, and Committee members should set a date for Part I of the qualifying exam. The student should reserve a room for a three-hour block of time for the Oral Examination. It should take place one to two weeks after the June 15 deadline for completion of the review article.

c. When an exam date is confirmed, the student is required to immediately inform the DAC and members of the examining committee of the confirmed date. The DAC is required by the Graduate School to turn in the Request to Schedule Qualifying Exam form at least 2 weeks prior to the exam. If the student fails to notify the DAC in time, this mechanism will fail and the exam will have to be rescheduled. A formal memo will be distributed to the committee members and the DGS one week prior to the exam. The student is required to submit the review article to members of the Qualifying Exam Committee at least one week prior to the exam date.

d. The Qualifying Exam Committee will evaluate the written content of the review article and during the oral exam will question the student on the background area of the research topic, the key questions that remain in the field covering the review article, how experiments would be designed to answer those questions, and the student's general knowledge in the areas of Cancer Biology, Biochemistry, Cell and Molecular Biology, Biostatistics, and Responsible Conduct in Research.

e. The student will receive a pass or fail on both the written document and the oral exam. A grade of fail on either part of the exam constitutes a fail and the student will have the opportunity to retake the exam only once and this must be completed within 3 months of the initial exam. If the examination must be repeated, a written detailed description of expectations and suggestions to improve the deficiencies must be conveyed to the student and to the Qualifying Examination Parent Committee, with a copy placed in the student's file. If the student fails a second time there will not be an opportunity for another retake of the exam and the student must follow the Graduate school guidelines for failure of Qualifying Exam. In the case of a dispute regarding the result of the qualifying examination, the QEPC will act as an arbitrator, hearing both the committee and the student's viewpoint on the outcome of the examination.

3. Part II of the Qualifying Examination

a. NIH/ NRSA grant instructions will be provided at the Grant Writing Workshop held in January. This document contains specific instructions regarding page length, etc. The student is required to complete the research plan, the front page, and the abstract page. While the student is not required to complete the portions of the grant dealing with animals, he/she must follow the NIH guidelines for the humane treatment of animals for any studies proposed.

- b. The student should assume that the grant is for three years of support (the typical Pre-doctoral F31 fellowship) and that he/she has adequate supplies available for the proposed research.
- c. The student is encouraged to refer to successful grant proposals to use as a guide. Examples are distributed at the January workshop.
- d. Within three months following Part I of the qualifying exam, the student is required to write and present a Thesis Proposal in the form of an NIH NRSA predoctoral proposal. The NRSA proposal is 6 pages plus one specific aims page. The topic must represent a significant body of work that advances scientific knowledge. The dissertation proposal will be written and defended similarly to Part I of the qualifying exam. However, the proposal itself represents collaboration between student and mentor and constitutes a mock business plan that organizes and outlines the plan of attack. Although the student is responsible for researching, organizing, and writing the proposal, he/she can and should seek advice from any relevant source, including the mentor and committee members.
- e. The student will write the Research Plan of an NIH NRSA pre-doctoral proposal. This should be a comprehensive document, encompassing the background literature relevant to the proposed research, aims that will be pursued by the student as their thesis proposal, preliminary data (the student's data and other relevant preliminary data from the lab), and a plan of attack. The proposal should include a Specific Aims page (one page only) consistent with NIH style formatting, including an Impact statement. The proposal should include a narrative section, with the following general outline: A. Significance; B. Innovation; C. Research Design (Background, Hypothesis, Aims). Each Aim should include sections discussing the following: 1.) Statistical Considerations; 2.) Expected Findings, Limitations & Alternative Interpretations; 3.) Experimental Pitfalls & Alternatives. The proposal narrative should not exceed 6 pages. The references should start on a separate page, and will not count towards the 6-page limit.
- f. Students are encouraged to have other students or postdocs critique the proposal for general overall readability and make suggestions to improve the format of the grant (i.e., amount of detail in the methods, clarity of why a specific experiment is being performed, etc.).
- g. The proposal will be submitted to the Examination Committee (the same committee from part 1) for critical review by one week prior to the dissertation committee meeting. The student is responsible for setting the date and arranging the place for the oral presentation. A three-hour time slot should be scheduled. The proposal should be the original work of the student. Within one week after receiving the document, the Committee will convene with the student in an oral examination format. The student is expected to defend the proposal. The Examination Committee will evaluate independent through, critical problem solving skills analytic skills, grant/scientific writing skills, and scientific communication.

Since the written examination is separate from the oral examination, members of the committee can request that the grant proposal be rewritten before the oral examination is completed if it is found unusually deficient. The Thesis Proposal Evaluation Form will be completed and signed by the committee at the proposal meeting and returned to the DAC following the meeting for the student's file. If the proposal is deemed unsatisfactory by the committee, a written detailed description of expectations and suggestions to improve the deficiencies and a date by which the students must make the corrections, must be conveyed to the student and to the Dissertation Committee, with a copy provided to the DAC for placement in the student's file. If the student's proposal does not meet expectations a second time, the student's case must be referred to the DGS and Chairs for further recommendations.

h. Upon approval of the written thesis proposal, the oral defense and general knowledge portion of the exam will go forward. Usually, there will be a brief pre-meeting where the student leaves the room and the faculty discusses the proposal and the student's progress. The student will make an oral presentation to the dissertation committee followed by a comprehensive discussion of the specific aims of the proposal. The defense itself is a formal presentation and defense of the scientific reasoning on which the proposal is based and the rationale for experimental design. It should result in agreement between student, mentor, and committee regarding the overall plan and direction. During the student's presentation, the mentor will not participate in the discussion. The purpose of the discussion is to ensure that the student has the opportunity to receive advice and the opinions of the committee members in the endeavor to accomplish the goal of obtaining a Ph.D. degree.

The questioning by the committee members will generally follow the topics included in the grant proposal, but can comprehensively cover areas of cancer biology and any topics that the committee feels the student should be familiar. Questions will determine both the depth and breadth of the student's knowledge. At least 30 minutes should be dedicated to general knowledge questions.

i. The committee will meet again following the oral examination and evaluate the student's performance. (The student will again be asked to leave while the committee deliberates and reaches a decision). Performance will be broadly assessed according to three criteria: (1) Written examination; (2) Oral presentation; (3) General knowledge. The exam will also evaluate the student's ability to think critically, understand the rationale and potential pitfalls for experimental design. Alternative strategies, biostatistical considerations, RCR topics, and knowledge in the area of the research proposal will be evaluated.

j. If the student does not pass the oral exam, the committee can give the student one additional chance to repeat any part of the exam that is deemed inadequate. This must be done within 6 months of the original exam. For example, the student might be required to rewrite one or several sections of the proposal or it may be necessary to repeat a particular aim where general knowledge or logic is lacking. Additionally, the student might be asked to research and write a report on a particular technical issue where

knowledge is lacking. If the examination must be repeated, a written detailed description of expectations and suggestions to improve the deficiencies must be conveyed to the student and to the Qualifying Examination Parent Committee, with a copy provided to the DAC for placement in the student's file. The QEPC will provide advice to the examination committee as to the criteria required for passing the Qualifying Examination. If the student fails a second time there will not be an opportunity for another retake of the exam and the student must follow the Graduate school guidelines for failure of Qualifying Exam. In the case of a dispute regarding the result of the qualifying examination, the QEPC will act as an arbitrator, hearing both the committee and the student's viewpoint on the outcome of the examination.

D. Dissertation Committee and Proposal

1. Dissertation Committee Selection

a. A dissertation committee should be selected within 6 months of completion of the qualifying exam. The dissertation committee, chosen jointly by the student and mentor, will consist of (1) Not fewer than four members, (2) three of which must be Graduate Faculty within the Cancer Biology Program and at least one member should have their primary faculty appointment in Cancer Biology; (3) one member must have their primary graduate school appointment from a graduate program other than Cancer Biology. If the person from outside is not graduate faculty at Vanderbilt or is from another university, the Dean of the Graduate School requires a letter from the DGS stating the reason(s) for appointing this person to the student's committee and a copy of the CV of the person to be appointed). Secondary faculty within the Department of Cancer Biology with a Primary appointment in another Ph.D. granting department within the Basic Sciences may serve as the "outside" committee member. MSTP student committees must also include one current or former member of the MSTP Faculty Advisory Committee.

Although the mentor is responsible for the scientific direction of the dissertation research, one of the other committee members with an appointment in the Dept. of Cancer Biology will serve as the Administrative Chair of the committee.

The choice of committee members can be critical and should be carefully considered. Committee members are considered co-mentors for the duration of the graduate career and can be extremely valuable assets, particularly if the primary mentor lacks expertise in a particular technology or field. Good scientists do not limit projects to their own restricted area of expertise, and students should consider whether their choices of committee members can close critical gaps in their mentor's experience. While students are always encouraged to seek external expertise, the individuals on the thesis committee will be especially committed as co-mentors to needs that are unmet by primary mentors. The thesis committee will oversee and approve the thesis project and continue to monitor the student's progress throughout the remainder of his/her graduate career. Committee meetings should be scheduled at least every 6 months, and can be more frequent if progress is slow or there is a particular issue to be resolved. The student is responsible for assuring that these meetings are held at appropriate times. Failure of

the student to convene the Dissertation Committee for the established regular meeting times can result in a grade of Unsatisfactory.

- b. Upon passing the qualifying examination, the students should proceed immediately to form a thesis committee in consultation with the mentor and the DGS. The DGS will follow up within 6 months following the qualifying exam to make sure that the dissertation committee has been selected.
- c. The student is responsible for contacting and establishing the willingness of faculty members to serve on this committee. After selection of suitable committee members, the student should submit the list of names to the DGS for approval, then the DGS will forward to the DAC so that a formal record/file is established. (Note: There are particular requirements and issues that sometimes invalidate particular faculty).

2. Dissertation Research

The first meeting of the dissertation committee will allow for discussion of the Thesis Proposal and allow for incorporation of any revisions after the second phase of the qualifying exam. Following the acceptance of the Thesis Proposal, the student is required to meet with the dissertation committee once every six months to discuss progress. The student should prepare a short (1 - 2 pages) written progress report, which should be emailed to committee members one week prior to the meeting. Following the meeting, the Administrative Chair of the dissertation committee is responsible for making certain that there is written feedback to the student on their progress and the expectations for the next meeting are clearly defined. A copy of the written communication should be submitted to the student, the DGS and the DAC who will place the electronic copy of the report in the student's file. The committee can consider more frequent meetings if necessary. At all stages of the student's graduate training, continuation in the program is contingent upon satisfactory progress in research-oriented activities.

E. Dissertation Completion and Final Defense

- 1. Three to six months prior to the anticipated defense date, the student should schedule a committee meeting to review the dissertation progress and request permission from the committee to write.
- 2. The dissertation should be written in close consultation with the mentor, and the mentor must read and approve the dissertation before it is copied and distributed to other dissertation committee members. The dissertation should be submitted in printed format to members of the dissertation committee at least 2 weeks prior to the defense. The dissertation must conform to the guidelines set by the Graduate School and must be submitted to the dissertation committee at least one week before the final defense. The student should consult the Academic Regulations section of the Graduate School catalog for detailed information on the dissertation requirements. Further, students should consult with Graduate School personnel to be certain of required format. A checklist of information for students preparing their dissertation is also available at this site:

http://www.vanderbilt.edu/gradschool/form_locator/thesis_and_dissertation_submission/thesis_guide.pdf

3. The dissertation research project must result in publication of an appropriate number of original and first author research articles as approved by the mentor and the Dissertation Committee. It is preferred that all requirements for the Ph.D. be completed prior to the scheduling of the defense, including publication of relevant papers documenting accomplishment of the aims of the research proposal. In no instance will the Ph.D. be conferred without publication of original research with first authored papers or the equivalent. There are some cases where a student can receive permission from the Chair to complete their Oral Defense prior to publication of manuscript(s) derived from the dissertation research. In this case the student's committee will hold off on signing the student's title pages for their thesis until the requirements for Ph.D. are completed. The committee may, however, sign the Results Form for the defense to be turned in to the DAC following the Oral presentation. Degree confirmation will be based on when the actual written thesis, including the signed title pages, is finally submitted to the graduate school.

4. The final defense is administered by the student's dissertation committee after obtaining approval from the DGS. It is the student's responsibility to inform the Committee members and DAC of the date, time, place, and title of the final defense at least 3 weeks ahead of time. The student fills out the Request to Schedule Defense Form located at:

http://www.vanderbilt.edu/gradschool/form_locator/phd_committee_qualifying_exam_and_dissertation_defense_forms/request_to_schedule_dissertation_defense_form.pdf.

This must be turned in to the Graduate School and the DAC at least one week prior to the defense date to allow time for processing of paper work. Failure of the student to notify the DGS, DAC and graduate school within the above time frame can result in postponement of the defense.

Committee members will receive an official notice from the Graduate School at least one week prior to the defense if paper work has been turned in prior to that. The date and time of the defense will be published in the Vanderbilt Calendar as a public announcement. The final defense should be completed at least 14 days before the deadlines posted by the Graduate School each semester for Thesis Submission. This will allow ample time for any possible revisions suggested by the Committee to be completed and approved.

5. Dissertation defense announcements will be distributed to the Cancer Biology Department and to the appropriate Calendars and E-mail lists by the DAC 1 week prior to the defense. This will publicize the event and provide topic information to those attending the defense. Students needing to postpone should give the information to the DAC prior to that time.

6. The defense begins with a public seminar. Following the seminar, the committee meets with the student for the final oral examination phase of the defense. The final examination is concerned with the student's dissertation, the literature relevant to the research topic, unanswered questions, conclusions, and the significance of the study. Passing the final oral examination is denoted by signatures of the dissertation committee members on the Dissertation Results Form. The student should download this form and bring it to the defense:

http://www.vanderbilt.edu/gradschool/form_locator/phd_committee_qualifying_exam_and_dissertation_defense_forms/dissertation_defense_results_form.pdf). The signed form should be

submitted by the student to the DGS for signature and submitted to the DAC for posting to the Graduate School. A copy will be made for the student's file. Passing the written dissertation is denoted by signatures on the required title page in the dissertation, and can occur at a later date if additions or corrections are required.

7. The policy regarding distribution of fees and costs associated with preparing the dissertation follows:

a. The mentor will pay for figure expenses and for photocopying the dissertation drafts for him/herself and committee members.

b. The department will pay the fees required by the Graduate School for binding and microfilming the dissertation. The department also pays for the binding of the Cancer Biology library and the mentor copies of the thesis. The student will obtain a binding fee payment form for the Graduate School charges from the DAC when ready to turn in the thesis to the Graduate School editor.

c. Per formatting guidelines from the graduate school, hard-bound copies of the dissertation for the mentor and department library should be an original and on bond paper. The student is responsible for the cost of bond paper and printing. Students may go to Campus Copy for binding services. The student is responsible for binding costs for all other copies and should be prepared to pay for those up front.

d. Photocopied soft-bound copies are appropriate for committee members.

F. Graduation and Degree Conferral

1. A student is considered *Graduated* when a student has completed the oral defense, the Dissertation Results form has been signed as "passed" by the dissertation committee members and the DGS, and the thesis has been accepted by the graduate school. Once the committee has signed the title pages for the thesis, the student is required to turn the thesis in to the graduate school within a week. A student may not hold on to a signed thesis in order to prolong enrollment. Once a student is graduated, they should no longer be working in their labs unless they have been hired as an employee in that lab. To complete the graduation process a student must fulfill the following.

a. Complete and turn in Intent to Graduate Form by the stated deadlines for each semester. See the Graduate School website for deadline dates: (http://www.vanderbilt.edu/gradschool/current_students/intent_to_graduate/index.php). The student completes the form and obtains the signature of the DGS. The DGS forwards the completed form to the DAC who then makes a copy of the form for the student's file and sends the original to the Graduate School prior to the deadline.

b. Successfully pass the Dissertation Defense. Turn in the completed and signed Dissertation Defense Results form to the DAC along with a signed grade form for any outstanding grades that have not been turned in. (The dissertation defense results

form can be downloaded by the student from the Graduate School website before the defense. The student will obtain the signature of the DGS on the forms signed off on by the dissertation committee and submit this to the DAC who will make copies for the student's file and send the originals to the Graduate School.

http://www.vanderbilt.edu/gradschool/form_locator/phd_committee_qualifying_exam_and_dissertation_defense_forms/dissertation_defense_results_form.pdf).

- c. Turn in the final copy of the thesis, including any revisions suggested by the student's committee, to the Graduate School by the stated deadlines for each semester. See the Graduate School website for deadline dates. If a student can not turn in the thesis by the deadline his degree conferral will be postponed until the next semester.
2. Degree Conferral occurs 3 times a year: May, August and December. The actual date the degree is conferred is usually toward the end of the semester. There may be a lag time up to several months between the date of *graduation* and the date of *conferral* if a student defends at the beginning of a semester or after the thesis submission deadlines for the prior semester.
 - a. If a student has graduated but has not yet had his degree officially conferred they may request letters from the Graduate School confirming the student has completed all the requirements for a Ph.D. and giving the official conferral date.
 - b. Students receiving degree conferral in August and December can make arrangements with the Registrars office to pick up their diplomas but otherwise diplomas will be mailed to the permanent address indicated on the Intent to Graduate form.
 - c. The Commencement Ceremony is only held in May. It is optional and has no bearing on the official graduation or degree conferral date. It is a ceremonial recognition of the student's accomplishment only. All students graduating in the summer or fall just prior to the May ceremony may participate but will have already received their diplomas in the mail. Spring recipients will be handed their diplomas at the ceremony if they have indicated they will be participating on their Intent to Graduate Form. If not their diplomas will be mailed to the permanent address listed on the Intent to Graduate form.
 - d. The student may obtain information about ordering regalia and participation in the ceremony on the grad school website. If a student chooses to participate they must notify the DAC of who will be hooding them and confirm that the person has agreed to do so. A student may request the Chair of the Department hood them if their mentor is not available. The DAC will notify the Graduate School of the names of graduates and the faculty members who will be responsible for the hooding of each graduate.