



**Supplement to the  
GRADUATE and GBS STUDENT HANDBOOK  
2016-2017**

Note: This information is supplemental to the material presented in the *Office of Graduate Biomedical Sciences 2016-2017 Student Handbook*. Please refer the GBS Handbook for detailed information on resources, programs and policies common to all GBS Themes.

## CANCER BIOLOGY THEME

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## Important Dates August 2016 - June 2017

Classes: GBS 707 / August -September  
GBS 708 / September -November  
GBS 709 / November - December

GBS 710 / January -February  
GBS 720 / February -  
GBS / March  
GBS 774 / March -April

GBS 770 / May

Rotations: August -November / Poster Session November , 1-3pm  
November -March / Poster Session March , 1-3pm  
March -May / Poster Session May , 1-3pm

Holidays: September  
UAB Closed November and  
December 19 (after class ends) - January 3  
January  
May

Theme Seminar September  
11am-12:15pm October  
(every 1<sup>st</sup> Wed.) November  
SHEL 105 December  
January  
February  
March  
April  
May  
June

## CANCER BIOLOGY CURRICULUM

The Cancer Biology Theme curriculum is designed to give students a broad understanding of the diverse research areas that comprise cancer research. Advanced classes and other opportunities are geared to the student's specific cancer-related interests.

### Year 1

First year students will follow a structured schedule designed to provide a broad base of knowledge for advanced studies. Concurrent with the first year of course work, each student will perform three laboratory research rotations (~8 weeks each) with mentors of his/her choosing in any of the GBS themes. At the end of each rotation, **the students will present their research in the form of a poster.**

First year students will also be required to attend the Cancer Biology Journal Club on Fridays at 2PM in the Wallace Tumor Institute, Room 101, but will not be required to register or present. Starting in the second year, students will be required to register for a journal club each semester.

### First Year Student Schedule - Fall Semester

		Title	Credit Hrs	Course Master	Days	Time	Dates
GBS	707	Basic Biochem/Metabolism	2	Ballinger, S Landar, A	.MTWRF..	08:00 - 10:00	Aug -Sept
GBS	708	Basic Genetics/Mole Bio	2	Giles, K Schneider, D	.MTWRF.	08:00 - 10:00	Sept -Nov
GBS	709	Basic Bio Organization	2	Sztul, E	.MTWRF.	08:00 - 10:00	Nov -Dec
GBS	795	Lab Rotation 1	1		.MTWRF.	00:00 - 00:00	Aug -Nov

### First Year Student Schedule - Spring Semester

		Title	Credit Hrs	Course Master	Days	Time	Dates
GBS	710	Cell Signaling	2	Miller, M	.MTWRF.	10:00 - 12:00	Jan -Feb
GBS	720	Genomic Structure / Function	2	Crowley, M	. MTWRF..	08:00 - 10:00	Feb -Feb
GBS	769	Carcinogenesis	2	Samant, L Samant R	.MTWRF.		
GBS	774	Tumor Immunology	2	Yusuf, N Strong, T	.MTWRF.	08:00 - 10:00	April
GBS	796,	Lab Rotation 2	1		.MTWRF	00:00 - 0:00	Nov -Mar
BY	755	Biometry	3	Angus, R	..T..R	1400-1530	Jan-May

### First Year Student Schedule - Summer Semester

		Title	Credit Hrs	Course Master	Days	Time	Dates
GBS	770	Pathobiology of Cancer	2	Frost	MWF	08:00-10:00	May -May
GBS	797	Lab Rotation 3	1		MTWRF	00:00-00:00	Mar -May

*\*This rotation starts during Spring Semester, but you do not register for it until Summer Semester.*

**Rotations and choosing a thesis mentor.** Laboratory rotations are meant to help students become acquainted with the laboratory and the mentor and gain practical experience in a variety of the techniques and types of scientific questions being addressed within different laboratories. At the end of the third rotation, the student will identify a thesis mentor. In choosing laboratories for rotations, students should inquire directly about the funding status of the laboratory and whether the faculty

member will be accepting students permanently. When a student and mentor come to a mutually agreeable decision about joining the laboratory, the Chairman of the mentor's primary department must sign an agreement to support the student in the event the mentor is not able. In special circumstances, a fourth rotation may be required. Detailed regulations for rotation are in the GBS handbook and appropriate forms are on the GBS website.

**First Year Student Schedule -Summer Semester** – Students will continue with Nondissertation research in the summer after their first year.

**Transfers to Cancer Biology Theme.** If a student would like to transfer into the Cancer Biology Theme after the first year, courses taken in other themes will count toward meeting the course requirements for Cancer Biology. Specific advanced courses may be required. These additional courses will be determined on a case-by-case basis in consultation with the mentor, theme director, and thesis committee.

**Individualized Development Plan (IDP)** – The IDP will be initiated during the student's first year and should be updated and modified as the student progresses through graduate school. Students will have an information session after class on **Wednesday, August 19**, and will participate in the workshop with Dr Jeffrey Engler on Thursday, August 27, immediately following class.

Beginning with their first committee meeting, students should present a slide/handout of 2-4 goals from their IDP at their committee meeting, and plans to meet those goals/progress towards those goals and/or changes to the goals should be reviewed briefly at subsequent committee meetings. Please see the GBS Handbook for general information about the Individualized Development Plan (IDP).

### **Year 2 and beyond.**

**Bioethics (GRD 717-Principles of Scientific Integrity)** Bioethics is required and should be taken in the Fall of the student's second year. The class must be completed before taking the Qualifying Exam.

**Seminar (GBS 777).** Beginning in the second year, students will take the Cancer Biology Seminar course each Fall and Spring semester until graduation. Because the cancer related seminars are offered through a variety of departments and centers, GBS 777 will allow students to attend cancer-related seminars of their choosing at UAB or associated institutions (SRI, HudsonAlpha). Each student will keep an **electronic** seminar journal that includes each seminar date, title and a **brief** synopsis of the seminar. The journal will be emailed to the theme program office at the end of the semester. For the Fall 2015 semester, Seminar Journals **will be due no later than 10am on December** . Anyone turning in a journal after this deadline will receive NP for the course. At least 12 cancer-related seminars must be attended and documented in the Journal each semester for GBS 777. *Seminar guidelines:* Seminars should be cancer relevant, but do not need to specifically address cancer. Acceptable seminars include regular departmental seminars, Cancer Center seminars, and special seminars/multi-speaker symposium/retreats (but not more than 2 journal entries per event). Seminars given by graduate students or postdoctoral fellows do not count towards the 12 seminar total, except for final Defense of Dissertation seminars. Students attending tumor board presentations may include up to 4 such sessions in their 12 seminar total.

### **Suggested format for Seminar entries:**

File name: Please adopt a standard file name format as below. This will help the Theme Directors and Administrator clearly identify your submissions.

Seminar Journal\_Semester (Spring or Fall) Year\_Name LastName

Title:

Name and Affiliation of speaker:

Date / time / venue of talk:

Hypothesis/objective:

Data/approach:

Summary of findings/take home message

*Note: descriptions should be concise; bullet points are acceptable*

**Journal Club.** Cancer Biology students must participate in a cancer-relevant journal club related to the student's research interests during the Fall and Spring semesters. Journal club provides students with valuable experience in critical assessment of the scientific literature, enhances presentation skills and keeps students up-to-date on emerging cancer research. Most Cancer Biology students will take the Cancer Biology Journal Club (GBS 776); however other journal clubs may be included upon approval of the mentor and Cancer Biology theme director. Students are required to present at least once a year in the journal club but are encouraged to present more often if possible. Alternative journal clubs relevant to the Cancer Biology theme include but are not limited to: Advanced Pharmacology Seminar (PHR 790), Journal Club in Cell Signaling (GBS 774), and Cell Death Mechanisms Journal Club (GBS 786).

**Advanced Courses.** Students must successfully complete at least three advanced courses (700 level; graded classes only) with a grade of B or better prior to graduation. A letter grade of C indicates that the student has failed the course. The student can choose to either re-take the course (when offered next) or successfully pass another advanced course. Advanced courses are chosen after consultation with the mentor and, if applicable, the student's thesis committee. Advanced courses offered by any theme or department will count toward this requirement. Cancer Biology offers one advanced course each semester. In addition, spring introductory courses from other themes can be completed for advanced credit. In most cases, additional assignments will be required to bring the course up to an advanced level.

#### Advanced Course Offerings by Cancer Biology

		Title	Credit Hrs	Course Master	Days	Dates
GBS	725	Cancer and the Microenvironment	3	Yang, Y	. M. W. F.	Fall odd yrs
GBS	728	Cancer Genomics & Epigenetics	3	Varambally, S	.M.W	Fall even yrs
GBS	778	Cancer Metastasis	3	Hurst, D	. M. W. F.	Spring odd yrs
GBS	779	Translational Research in Cancer	3	Yang, E.	. M. W. F.	Fall odd yrs
GBS	775	Cancer Treatment	3	Yoon, K Wiley, C.	. M . W . F.	Spring even yrs

**Nondissertation Research.** Cancer Biology students generally take a total of 9 credits per Fall and Spring semesters and 9 hours in the summer. Nondissertation research is laboratory research performed prior to admission to candidacy (before the qualifying exam). Nondissertation research credits are graded on a Passed/ Not Passed scale. After enrolling for Advanced Classes, Journal Club and Seminar, students will register for nondissertation research up to the required number of credit hours each semester.

**Assembling a thesis committee.** At the beginning of their second year and before the qualifying exam, students must assemble a thesis committee. Instructions and requirements for the thesis committee are detailed in the GBS handbook. In general, the committee consists of 5 faculty, each of whom contributes some expertise to guide the student's project. The committee must be approved by the Graduate School. It is required that the thesis committee meet at least one time prior to the qualifying exam. After the

qualifying exam and during years 2-4, the student should meet with the committee at least once a year. After year 4, the student must meet with the committee every 6 months. After each committee meeting, a written progress report must be completed and submitted to the Theme Administrator for review by the Cancer Biology Curriculum Committee each year.

**Special Topics in Cancer Biology GBS 746– Qualifying Exam Preparation.** This course is offered to students in the Fall of the third year. This course is designed to assist the student in preparing a proposal for their qualifying exam by providing general instruction on writing an R01 style proposal and familiarizing the student with the review process. The class is a guided self-study class, and the scope of work for the proposal will be determined by the student in consultation with their mentor and committee. The course is required for third year graduate students and is expected to result in a completion of a high quality proposal by November, in preparation for the QE later that fall or in the spring. MSTP students who have taken STP2043 are exempt from this course.

**Qualifying Exam.** The details of the requirements for the qualifying exam are discussed in the GBS handbook. Briefly, the exam will include a written research proposal as well as an oral defense of this proposal. The proposal will be written on the topic of the student's thesis research and will be formatted like a 12 page NIH R01 grant. It is expected that the proposal represent the student's original efforts towards developing a unique project independently. A student may not use a project that his/her mentor has written. During the oral phase of the exam, the student will be required to defend the proposal as well as address general scientific questions to gauge the students general knowledge, comprehension, and critical thinking skills. The qualifying exam should be completed sometime between the summer of the second year and end of the third year. Most students will take their qualifying exam in the Spring of their third year. Students are required to have one of the Cancer Biology co-directors in attendance at their qualifying exam.

**Dissertation Research.** Students will register for dissertation research after the successful completion of the qualifying exam.

**Clinical Opportunities for Advanced Cancer Biology Students** After successful completion of the qualifying exam, candidates will also have the opportunity to advance their understanding of clinical issues in cancer prevention, diagnosis and therapy through involvement in clinical forums and interaction with cancer clinicians including Grand Rounds with the Division of Hematology/Oncology and Tumor Boards in Pathology. Students should discuss these opportunities with the Theme Directors.

**Thesis defense.** Details of the policies and forms required for the thesis defense are listed in the GBS and Graduate School Handbooks. The Graduate School requires at least two semesters between the qualifying exam and the thesis defense. In addition, the student must be registered for at least three to five credit hours in the semester of the thesis defense, depending on the need for continued health insurance. In general, Cancer Biology students should have at least two first author publications related to their thesis work. Exceptions can be approved by the thesis committee. Deadlines and rules for the final preparation of your dissertation and graduation requirements are available from the Graduate School and may be obtained from the Graduate School website under the UAB website (<http://main.uab.edu/>, and <https://www.uab.edu/graduate/images/acrobat/forms/theses/FormatManual.pdf>). On average, students should plan for 1-2 months to devote to writing their dissertation. Students should schedule a private defense with their committee prior to the public defense, with the public defense scheduled 10-14 days after the private defense. Students passing the private defense will go on to give their public Defense of Dissertation.

When students are ready to schedule their final (public) defense, they should confer with the Theme Administrator and schedule the defense at a time that does not conflict with other student defense presentations, and allows attendance of at least one of the CANB Co-Directors at the public defense. Theme co-directors should be provided with an electronic copy of the dissertation.

**Thesis Format.** In addition to the prescribed Thesis format, UAB Graduate School's "UAB Format Manual for Theses and Dissertations" allows for preprints (submitted or in preparation) to be included.

### **The Preprint/Reprint Option**

The preprint/reprint option (i.e., journal articles that appear as chapters) is for students who have written closely related articles which have already been published (reprint) accepted for publication, are under review for publication, or are being prepared for publication (preprint). Students considering this option **must first obtain the approval of their graduate committee.** Doctoral students are typically expected to be first author on a minimum of two articles. Master's level students are typically expected to be first author one or two articles; however, final requirements are at the discretion of the department and/or the graduate committee and are not dictated by the Graduate School.

If the graduate committee approves the submission of the Thesis in the Preprint/reprint style, the following mandates must be followed:

1. The dissertation must include an expanded Introduction section. This can be formatted so as to introduce each of the manuscripts or a single Introduction section for the Thesis.
2. There must be an expanded section on Materials and methods. This is essential because very often, manuscripts have an abbreviated version to comply with the word requirements of journals.
3. There needs to be an expanded Discussion section that can be formatted to summarize the findings of each manuscript or the entire body of the research.
4. Copying exact wording and using that in the expanded Introduction and Discussion section is not permitted. The students are expected to write these sections in a manner that is comprehensive and non-overlapping with the manuscript(s).
5. Given that manuscripts often have co-authors who have contributed to the research, such data should be clearly indicated in the Thesis with due credit given to the co-author (i.e. data courtesy of Dr. John Smith).

**Special requirements for students after their fifth year.** Once a student enters into a laboratory (after completing the core curriculum) he or she will receive up to 5 years of support by the mentor. The stipend is not an entitlement and will be evaluated on a yearly basis for research progress and thesis committee evaluation. After 5 years, the student will have to petition their Graduate committee for an extension of the graduate stipend. Both the Graduate committee and Drs. Shevde-Samant and Strong will have to approve this extension. The extension will be for 1 year and must be re-approved each subsequent year. Obviously, this does not insure that the student will complete his/her thesis during this timeframe, but may mean that the student will have to complete the thesis work without benefit of a stipend. Exceptions to this rule include maternity leave or an extended illness. Those students that transfer to another laboratory during their thesis work would be evaluated based on the recommendations of their new thesis committee and with the approval of Drs. Strong and Shevde-Samant. Policies regarding leave of absence and displaced students are detailed in the GBS Handbook.

**Participation in Cancer Biology functions.** Students are required to attend Cancer Biology functions, including:



- Monthly Cancer Biology Student Seminar Series – A student led seminar series will provide a forum for advanced students to present their current research progress to their peers. Two students will present in each session (One 30 min presentation, 15 min discussion; a second student will present on contemporary noteworthy advances in cancer research for 10 – 15 min). These seminars will occur on the first Wednesday of the month, at 11:15-12:30 (lunch included).
- Defense of Dissertation for Cancer Biology students (these can count towards the 12 seminar total for GBS 777 Cancer Biology Seminar class);
- Cancer Biology theme meetings
- The annual Comprehensive Cancer Center Retreat (all students, 2<sup>nd</sup> year and beyond, should present their research in the poster session);

In addition, we ask that students plan to participate in recruitment activities for Cancer Biology GBS applicants.

Students should check emails regularly for announcements from the Theme Manager or Co-Directors, and are expected to respond within 24 hours of a request for information.

**Certificate Programs.** The GBS offers certificate programs with specialized instruction for specific career paths. Students can enroll in these programs with the permission of their mentor and committee members. More information can be found at:

<http://www.uab.edu/gbs/home/component/content/article/126-programs/118-certificate-programs>

**Cancer Biology Faculty:** Faculty who are officially designated as Cancer Biology faculty can be found on the GBS website. Note that there are additional faculty doing cancer related research at UAB and associated institutions (SRI, HudsonAlpha), and those faculty members may apply to join the Cancer Biology faculty at any time.

### **First Year Course Descriptions.**

**Core curriculum GBS 707, 708, 709-** Overview of basic biochemistry, genetics, and cell biology.

**Cell Signaling GBS710 (Michael Miller)** - This course covers major extracellular and intracellular signal transduction cascades that regulate animal development and physiology. Topics include the mitogen activated protein kinase cascade, transforming growth factor beta, insulin, and cytokines.

**Genomics GBS 720 (Michael Crowley)**- This course covers gene mapping and linkage in humans and animal models of disease. Disease gene mapping and single gene disorders will be covered. Development and use of genomic technology including microarrays and next generation sequencing will be covered in the context of future personalized medicine applications.

**Tumor Immunology GBS 774 (Nabiha Yusef and Theresa Strong)**- This course will review basic concepts in immunology, including the innate and adaptive immune response and immunological methods. The lectures will then examine topics in tumor immunology including the interaction of the immune system and tumors, and cancer immunotherapy.

**Pathobiology of Cancer GBS 770 (Andra Frost)**- In this course, students will gain an understanding of the pathology and epidemiology of cancer in general and an appreciation of the gross, histologic and molecular pathology of cancers of multiple organs, including the brain, lungs, skin, breast, prostate, colon, bone marrow and lymph nodes. The students will learn the basis of the pathologic classification of cancers of particular organs, including the gross, microscopic and molecular features that aid in classification. The clinical implications (i.e., prognostication and treatment) of the classification systems will be discussed.

**Carcinogenesis GBS 769 (Lalita Samant and Rajeev Samant)**- This course is intended to introduce the concepts in carcinogenesis, followed by understanding the etiology, molecular events and signaling pathways involved. Topics include Oncogenes and tumor suppressor genes, cancer stem cells, DNA damage and repair, cell cycle, apoptosis and cell death, and developmental signaling in cancer.

**Biostatistics BY755 (Robert Angus)**- The objectives of the course include: 1) To introduce the student to appropriate statistical techniques for data analyses in common biological research situations. 2) To provide the student with the computer skills sufficient to store, manipulate, graph and analyze research data using two popular software packages. 3) To provide the student with an understanding of statistics sufficient to understand experimental designs and analytical methods described in the biological literature.

**Bioethics GRD 717 (Jeff Engler)**- This course surveys ethical issues and principles in the practice of science. Among the topics discussed are the nature, extent, and causes of fraud in the sciences; UAB policies on fraud; ideals of good science; the responsibilities of authorship and peer review; potential problems raised by the commercialization of research; scientists as public policy advisors; and ethical issues involved in animal experimentation and in clinical trials.

**The following first year course may be taken as an advanced course, with the permission of the instructor and appropriate modification to the requirements.**

**Pharmacology and Molecular Medicine GBS 753 (C Falany)** This course is designed to provide an introduction to several of the basic principles and areas of Pharmacology and Toxicology. The course is primarily interactive lectures and discussion focused on introducing graduate students to several aspects of pharmacology. The course is divided into sections on Pharmacokinetic/pharmacodynamic principles and Drug Metabolism, Chemotherapy, Drug Discovery and Development, Autonomic Pharmacology and Toxicology.