COLLEGE OF GRADUATE STUDIES

MEDICAL UNIVERSITY OF SOUTH CAROLINA

GUIDE TO THE FIRST YEAR CURRICULUM
IN BIOMEDICAL SCIENCES

August 2018
Acknowledgements

This Guide is a single-source reference to the Biomedical Sciences First Year Curriculum in the College of Graduate Studies at MUSC. The Guide is updated continually online with valuable contributions from numerous faculty participating in the curriculum. The curriculum itself reflects the vision of Dr. Paula Traktman, Dean of the College of Graduate Studies, and its implementation owes much to her persuasion and the commitment of a Curriculum Task Force comprising Drs. David Kurtz, Don Menick, Robin Muise-Helmericks and Shaun Olsen. I especially acknowledge the boundless support I receive from Dean Traktman, co-Chair of the Curriculum Task Force, and the unstinting administrative assistance provided by Stephanie Brown-Guion, Amy Connolly, Maritza Dawkins-Holnes, Sue Hennigan, Amanda Karalia, Erika Lugo, Melendia Roseboro, Keisha Vaughn and Dodie Weise in the College of Graduate Studies Office.

Adam J. Smolka, Ph.D.
Professor of Medicine
Co-Chair, Curriculum Task Force
15 August, 2018
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FIRST YEAR CURRICULUM, FALL SEMESTER 2018

BIOMOLECULAR, GENETIC AND CELLULAR ESSENTIALS I

An integrated curriculum comprised of three consecutive courses (CGS 765, CGS 766 and CGS 768) and one concurrent course (CGS 768) presents a foundational study of cell structure and function from biochemical, genetic, molecular and cell biological perspectives. All first-year biomedical science PhD students take the full curriculum, but others can also take individual courses. The participation of relatively few faculty ensures a cohesive presentation of material with “foreshadowing” and “retrospective” integration across topics. Didactic sessions include lectures, presentation of data from the literature, discussion, and small-group exercises. Notably, the consecutive courses include occasional Friday “THINK” (thoughtful integration of new knowledge) sessions, which enable an in-depth discussion of specific topics that illustrate and integrate concepts developed in class. This iteration of underlying principles within the context of a specific biological problem or mechanism helps students grasp the importance of fundamental principles to their future research questions.

Course times and location
Each of the three consecutive courses meets from 9:00 am -11:00 am on Mondays, Tuesdays and Thursdays, and from 9:00 am -12:00 pm when THINK sessions are held. Classes meet in BSB 435, except where noted in the syllabus (ex., THINK sessions often meet elsewhere).

Format and texts
Attendance at all classes is required of all students. Course directors and instructors outline the key objectives to students as the classes progress. The didactic sessions include lectures, discussion, presentation of data from the literature, and group exercises. As required, students are assigned to small groups for problem-solving sessions or to utilize internet-based or software-based searches for protein motifs or domains. Active engagement of the students is important, although much of the foundational material is presented in lecture format. The THINK sessions introduce new topics of discussion and serve to illustrate and integrate principles discussed in the more general lectures. These sessions (3 hours in length) are particularly suited to discussion and problem solving.

The assigned textbook for the three consecutive Fall courses is the 8th edition of “Molecular Cell Biology”, edited by Lodish et al. Incoming students will have been given introductory chapters to learn and/or review over the summer prior to matriculation. During the courses, students are assigned reading and/or problems from the book. Additional reading materials in other textbooks or review articles may be assigned as needed, and materials from the scientific literature may also be used in class. All lecture PowerPoints, required readings and assignments are posted in advance on Moodle. Printed handouts are also provided at the start of each class. As needed, CGS laptops are provided for use in class during group projects.

Evaluation
Closed-book, in-class examinations determine students’ grasp of the fundamental quantitative and qualitative material presented in class, and also prompt students to apply the fundamental principles they have learned to current topics of biomedical inquiry. Exams are designed to integrate material from different classes to minimize compartmentalized learning and maximize "bigger picture" thinking. Questions are in long-answer format, and may require students to solve problems, design experiments or propose models. Students are encouraged to complement their written responses with models and figures in order to develop visual aid skills to convey complex concepts effectively. Faculty also evaluate attendance, preparation, and participation in class discussions and group exercises. Student participation in THINK sessions is assessed on student preparation and participation in discussion and contribution to small
group and individual activities. Final course grades reflect overall student participation (10%), participation in the THINK sessions (10%) and the examination (80%). The course utilizes the E*value system to obtain student feedback and faculty evaluation. Exam performance and class participation are assessed using objective grading rubrics.

The three consecutive Fall 2017 courses are:

PROTEINS: DYNAMIC STRUCTURE AND FUNCTION (CGS 765)

Course Description
The 18 sessions of this 5-week, 3-credit hour course present fundamental principles of protein structure and function. Proteins, the most abundant and diverse family of macromolecules within the cell, play a myriad of essential catalytic and structural roles within the cell. They undergo multiple post-translational modifications and interact with numerous partners, including other proteins, RNA, DNA and membranes. These topics are considered within the context of health and disease, with an emphasis on the molecular mechanisms underlying fundamental cellular processes and underscoring the impact of mutant proteins on cell behavior and the importance of proteins as therapeutic targets.

Course Directors
The course is co-directed by Drs. Craig Beeson (beesonc@musc.edu, 843-876-5091) and Shaun Olsen (olsensk@musc.edu, 843-876-2308). Dr. Beeson has a long track record as a professor in the first-year curriculum for CGS PhD and MS students, and his participation in the current course reflects his knowledge base in protein chemistry and his teaching experience in this area. Dr. Olsen is an Assistant Professor whose expertise is in structural biology and enzymology, and he served on the First Year Curriculum Task Force. These two professors are ideally suited to lead the first module in this curriculum. Continuity within the course is facilitated by the co-directors teaching ≥ 12 of the 18 classes.

GENES: INHERITANCE AND EXPRESSION (CGS 766)

Course Description
The 25 sessions of this 7-week, 4-credit hour course present the fundamental principles of inheritance, maintenance and expression of the genetic material. The first 6 sessions focus on the principles and practice of classical and molecular genetics, and the next 7 focus on the replication, repair and transmission of the DNA genome within the context of the mammalian mitotic and meiotic cell cycles. The final 11 sessions focus on the expression of the genome, incorporating discussions of transcription, epigenetic modifications of DNA and histones, nucleolus and rRNA synthesis and maturation, mRNA processing, nuclear export and translation, and regulation by non-coding RNAs.

Course Directors
The course is co-directed by Drs. David Long (longdt@musc.edu) and Paula Traktman (traktman@musc.edu, 843-876-2402). Dr. Traktman, the Dean of the College of Graduate Studies and Co-Chair of the First Year Curriculum Task Force, has been actively engaged in graduate education for >30 years and has significant experience teaching the topics covered in the Molecular Genetics block of this course; Dr. Long’s expertise in protein/DNA transactions and DNA biology is also a great asset. Thus, these two professors are ideally suited to lead the second module in the curriculum. Continuity within the course is ensured by close interactions between all of the faculty. Drs. Gangaraju, Smits and Kourtidis are Assistant Professors with state-of-the-art expertise in their teaching assignments, and Dr. Mohanty has been teaching topics on DNA metabolism for several years.
**CELLS: ORGANIZATION AND COMMUNICATION** (CGS 767)

The 18 sessions of this 5-week, 3-credit hour course address the fundamental principles of cell structure, compartmentalization, and function. The first 10 sessions focus on the structure, function and dynamics of the endomembrane systems of the cell, the cytoskeleton, major organelles and programmed cell death. The final 7 sessions address cell:cell and cell:matrix interactions and the complex process of signal transduction. The overarching principles involved in the process of signal transduction, which most often involves the transduction of a signal from an extracellular ligand to a nuclear response, bring together the principles discussed in the initial part of this course and those discussed in modules I and II.

**Course Directors:**
The course is co-directed by Drs. Amy Bradshaw ([bradshad@musc.edu](mailto:bradshad@musc.edu), 843-792-4959) and Robin Muise-Helmericks ([musehelm@musc.edu](mailto:musehelm@musc.edu), 843-792-4760). Dr. Bradshaw has a track record as a professor in the first-year curriculum for CGS PhD and MS students, and her participation in the current course reflects her knowledge base in cell:cell and cell:matrix interactions and her teaching experience in these areas. Dr. Muise-Helmericks has also been an engaged teacher, has an active research program in cell biology and served on the First Year Curriculum Task Force. Thus, these two professors are ideally suited to lead the third module in this curriculum. Continuity within the course is facilitated by the co-directors teaching 8 of the 18 classes in this course. Dr. Gemmill also has significant experience as a cell biologist and a teacher in the CGS curriculum. Drs. Olsen and Kurtz have served on the First Year Curriculum Task Force, and along with Dr. Muise-Helmericks facilitate integration of this course with the first two modules of the curriculum.

The concurrent Fall 2018 semester-long course is:

**TECHNIQUES AND EXPERIMENTAL DESIGN** (CGS 768, TED)

**Course Directors**
The course is co-directed by Dr. Patrick Nasarre ([nasarre@musc.edu](mailto:nasarre@musc.edu), 843-792-8393) and Dr. Jamie Barth ([barthj@musc.edu](mailto:barthj@musc.edu), 843-792-9984). Both of the course directors have a breadth of experience with numerous experimental approaches. Other instructors have been chosen for their specific area of expertise.

**Time/Location**
Wednesday 9:00 am -11:00 am
Course meets Wednesday August 22 - Wednesday December 12, 2018
BSB 302

**Course Description**
TED highlights essential tools and approaches required to achieve a high level of competency in biomedical research. TED topics are synchronized with fundamental concepts covered in the three Fall semester courses (CGS 765, CGS 766 and CGS 767). Students will become knowledgeable in protein biochemical techniques such as protein isolation, understand the basics of genetics, including the use of cutting-edge gene editing strategies and genetic screens, and gain exposure to concepts and approaches essential to cell biology. Collectively, the course focuses on experimental design, with an emphasis on understanding the key controls that are needed, the type(s) of data that are obtained and how they need to be analyzed, and the strengths and weaknesses of each approach. Of equal import, this training provides students with foundational knowledge and an invaluable toolkit that will prepare students to successfully embark on their thesis and dissertation research.
Grading
25% of the final merit grade is based upon student participation. In addition to a didactic lecture component, the lectures consist of interactive discussions whereby students are encouraged to discuss conceptual aspects of experimental design and applicable components thereof. The remaining 75% of the grade is determined by student performance on 3 exams, with each exam comprising 25% of the overall grade. Each exam is a take-home format with a one-week completion deadline. Exams consist of a defined and interconnected set of hypothetical research questions that students resolve using a rationally selected experimental approach or suite of approaches, drawn from the lecture material from the corresponding block. The objective of the exam is to evaluate whether the student has appropriately integrated the material within a conceptual and analytical framework. The Course Director ensures that the instructor-designed questions facilitate conceptual integration and reflect this philosophy.
## Overview: First Year Biomolecular, Genetic and Cellular Essentials Curriculum 2018-19

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<tr>
<th>Weeks</th>
<th>Mon</th>
<th>Tues</th>
<th>Wed</th>
<th>Thurs</th>
<th>Fri</th>
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<td><strong>FALL</strong></td>
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<tr>
<td>13-17 (Nov 12 – Dec 17)</td>
<td><strong>Cells: Organization and Communication (CGS 767)</strong></td>
<td><strong>Cells: Organization and Communication (CGS 767)</strong></td>
<td>Techniques &amp; Experimental Design (TED) (CGS 768)</td>
<td><strong>Cells: Organization and Communication (CGS 767)</strong></td>
<td><strong>Cells: Organization and Communication (CGS 767)</strong></td>
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<td><strong>SPRING</strong></td>
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</table>
| 1-5 (Jan 2 – Feb 7) | **Metabolism and Bioenergetics (CGS 776)**  
**OR**  
Immunobiology (CGS 784)  
**OR**  
Fundamentals of Neuroscience A | Learning from the Literature (LTL) (CGS 772) | **Metabolism and Bioenergetics (CGS 776)**  
**OR**  
Immunobiology (CGS 784)  
**OR**  
Fundamentals of Neuroscience A | Principles, Practices and Professionalism (PPP) (CGS 770) | **Metabolism and Bioenergetics (CGS 776)**  
**OR**  
Immunobiology (CGS 784)  
**OR**  
Fundamentals of Neuroscience A |
| 7-11 (Feb 12 – Mar 23) | Cancer Biology (CGS 782)  
**OR**  
Cardiovasc Phys/Pharm (CGS 778)  
**OR**  
Fundamentals of Neuroscience B | Learning from the Literature (LTL) (CGS 772) | Cancer Biology (CGS 782)  
**OR**  
Cardiovasc Phys/Pharm (CGS 778)  
**OR**  
**OR**  
Cardiovasc Phys/Pharm (CGS 778)  
**OR**  
Fundamentals of Neuroscience B |
| 13-17 (Mar 27 – Apr 30) | Human Genetics and Genomics (CGS 780)  
**OR**  
Host & Microbe (CGS 774)  
**OR**  
Fundamentals of Neuroscience C | Learning from the Literature (LTL) (CGS 772) | Human Genetics and Genomics (CGS 780)  
**OR**  
Host & Microbe (CGS 774)  
**OR**  
Fundamentals of Neuroscience C | Principles, Practices and Professionalism (PPP) (CGS 770) | Human Genetics and Genomics (CGS 780)  
**OR**  
Host & Microbe (CGS 774)  
**OR**  
Fundamentals of Neuroscience C |

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<th>R1</th>
<th>R2</th>
<th>R3</th>
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<tr>
<td>Three 9-week rotations</td>
<td>Sept 17 - Nov 16</td>
<td>Nov 26 – Feb 08</td>
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** - dates of spring courses and rotations may change slightly
**LABORATORY ROTATIONS AND ADVISOR SELECTION (CGS 720/721)**

Paula Traktman, PhD, Course Director

(tractman@musc.edu)

Laboratory rotations are an obligatory component of the First Year Curriculum for PhD students in Biomedical Science. Students will enroll in three consecutive nine-week lab rotations. Dr. Traktman is the course director for CGS 720/721, and 4 credit hours are assigned to each semester to reflect the importance that these rotations play in the students' education. The schedule allows time before the start of the laboratory rotations on September 17th for students to meet faculty who are willing and able to accept students, and spreads the rotations out over the full year. At the end of each rotation, students will fulfill evaluation requirements designed to introduce students early to the skills of communicating their work to a variety of audiences in written and oral form.

**Laboratory Rotations Details**

First Year Curriculum Ph.D. students are required to enroll in three nine-week laboratory rotations spanning the Fall and Spring semesters. All students will rotate through three different laboratories to maximize their exposure to a diversity of mentors, scientific experiences and technologies. Students are urged to attend the seminars and journal clubs of the program in which they are participating in order to get a better sense of where they might be most comfortable during their thesis and dissertation work.

*MS degree students do not sign up for laboratory rotations through the first year curriculum. MS degree students should consult with their respective graduate coordinator and/or mentor to decide on the appropriate number of laboratories in which to rotate.*

**Laboratory Rotation Mentor Selection.** Before each rotation, students will have opportunities to meet faculty who are interested and prepared to take new students this year. The CGS website has a searchable [Faculty Research](#) database that allows students to explore the research interests of faculty who are willing and able to accept students. Several poster sessions are scheduled at which faculty will present overviews of their work. Attendance at these events is obligatory for first year students. In addition, students will be advised by Dr. Traktman and other designated first year advisors. Students are encouraged to meet individually with potential mentors and to visit their laboratories. Five days before each rotation begins, students will submit their first and second mentor choices for laboratory rotations via an online form to Keisha Vaughn in the Graduate Office. Every effort is made to accommodate students' first choices; however, only one student will be allowed to rotate in a given lab per rotation [with rare exceptions]. Students should ensure that their choices are drawn from the pool of faculty who will be accepting students this year. Doctoral dissertation advisors must be Full Members of the graduate faculty. Schedules for the laboratory rotations and form submission deadlines are shown below.

<table>
<thead>
<tr>
<th>Rotation</th>
<th>Submit Choices</th>
<th>Begin</th>
<th>End, and Rotations Symposiums</th>
<th>Evaluations Due</th>
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<tbody>
<tr>
<td>First</td>
<td>Sept 12, 2018</td>
<td>Sept 17, 2018</td>
<td>Nov 16, 2018</td>
<td>Nov 21, 2018</td>
</tr>
<tr>
<td>Second</td>
<td>Nov 19, 2018</td>
<td>Nov 26, 2018</td>
<td>Feb 8, 2019</td>
<td>Feb 13, 2019</td>
</tr>
<tr>
<td>Third</td>
<td>Feb 13, 2019</td>
<td>Feb 18, 2019</td>
<td>Apr 26, 2018</td>
<td>May 1, 2019</td>
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Laboratory Safety. Before starting Lab Rotations, all students must attend a biosafety seminar addressing issues pertaining to compliance, occupational safety, and biological and chemical hazards. The biosafety website is an invaluable resource in this context.

Laboratory Rotation Guidelines. To improve the lab rotation experience, specific rotation guidelines will be sent by Dr. Traktman to mentors and students at the beginning of each rotation. The objectives of each rotation generally include the following:

1. To acquaint students with potential dissertation mentors. Students will:
   a. Receive a briefing on the research focus of the laboratory
   b. Receive 1-3 review and/or research papers to read and discuss with the mentor during the rotation.

2. To introduce students to proper conduct of laboratory science. Students will:
   a. Conduct a research study with the goal of understanding the basis for the hypothesis being tested and the general approach to test the hypothesis
   b. Participate in weekly group or laboratory meetings

3. To acquire skill in diverse laboratory techniques. Students will:
   a. Learn techniques (theory, limitations, etc) associated with the rotation project by collaborating with a mentor, graduate student, postdoctoral trainee and/or technician
   b. Conduct laboratory research throughout the week and weekends when indicated

4. To acquaint students with the research of other graduate students and faculty, students will attend seminars, journal clubs, and other research activities of the department or program.

5. Mentors will encourage students to present their lab rotation project in an informal venue (eg. talk at a lab meeting) at the end of each of the three rotations.

Evaluation of Laboratory Rotations. At the end of each rotation, mentors will submit an online evaluation form to Keisha Vaughn in the Graduate Office. Prompt submission of the evaluation form allows the Course Director to assign an Honors/Pass/No Pass grade. After completion of the Fall and Spring semesters, the Course Director will submit an aggregate CGS 720/721 grade to the Office of Enrollment Management that will appear on the student’s transcript. In addition, students are required to complete an online evaluation of each laboratory rotation. Failure to submit timely evaluations will result in an incomplete grade for the course.

Lab Rotation Talks and Papers. By the end of the three rotations, students will be randomly assigned to participate in one of three formats of post-rotation wrap-up communication:

1) A 3-minute “FameLab-style” presentation without slides describing their rotation projects to other FYC students and graduate faculty

2) A 12-minute talk and 3-minute question period, with slides, similar to a podium presentation at a national meeting, describing the Aims, Methods, Results, Discussion and Significance of the research rotation project

3) A three-page, written description of their lab rotation describing the Aims, Methods, Results, Discussion and Significance of the project.

Selection of Dissertation Advisor. Laboratory rotations, faculty and program exposures, course experiences, participation in journal clubs and seminars, and thoughtful discussions with
the Dean, faculty advisors, possible dissertation mentors, and senior students should facilitate selection of a dissertation mentor and a graduate program by the end of the Spring semester. Students should submit a completed Dissertation Advisor selection form to the Graduate Office by May 20, 2019, and should join their mentor's laboratory at this time.
FIRST YEAR CURRICULUM, SPRING SEMESTER 2019

BIOMOLECULAR, GENETIC AND CELLULAR ESSENTIALS II

Having completed the Fall semester curriculum with a growing grasp of biomolecular, genetic and cellular essentials and with expanding experience of laboratory research, students are developing a sense of their preferred scientific directions, and be in a position to make informed individual decisions about further course work in the Spring semester.

As shown in the overall First Year Curriculum calendar (Page 8), the Spring semester offers first year graduate students a choice of three consecutive five-week mini-courses, selected from six different topic areas, interspersed with two semester-long “Skills” courses designed to foster critical thinking, immersion in biomedical science literature, and development of professional know-how.

Mini-Courses For the first five weeks of the Spring semester, students’ enrollment option is either “Metabolism and Bioenergetics” or “Immunobiology”; the second five-week option is “Cancer Biology” or “Physiology and Pharmacology”; and the last option is “Human Genetics and Genomics” or “Host-Pathogen Interactions”. These 2 credit hour classes meet at 9:00 to 11:00 am on Mondays, Wednesdays and Fridays. The course work draws on didactic lectures providing a substantive topic overview, followed by interactive discussions and group exercises designed to bring students to an understanding of the cutting-edge questions in the field, and an appreciation of the approaches to advance that understanding. Further details of these six mini-courses, including syllabi, locations, faculty, prerequisite readings and resources, and contact information are posted online.

Skills Courses There are two obligatory concurrent semester-long, 2 credit hour courses.

"Learning from the Literature" (CGS 772) meets every Tuesday at 9:00 to 11:00 am in BSB 435. This course is designed to foster skills in critical thinking, critical evaluation of the primary research literature. Papers are presented and discussed in terms of their background, significance, hypothesis, experimental methods, data quality, and interpretation of results. Students are asked to propose future research directions, to generate new hypotheses, and to design experiments aimed at testing them.

"Principles, Practices and Professionalism" (CGS 770) meets every Thursday at 9:00 to 11:00 am in BSB 435. This course introduces students to all aspects of professional complexities surrounding the pursuit of biomedical laboratory research, including development of critical thinking and essential scientific skills, consideration of the fundamental tenets of responsible conduct of research, rigor and reproducibility, and familiarity with the requirements for successful professional development.

Further details of the six mini-course options and the two semester-long courses, including syllabi, locations, faculty, prerequisite readings and resources, and contact information are provided here, and are posted on Moodle. Class formats, text and supplementary reading requirements, and student evaluation metrics conform closely to guidelines described above for the Fall semester courses. All lecture PowerPoints, required readings and assignments are posted in advance on Moodle.
METABOLISM AND BIOENERGETICS (CGS 776)

Credit hours: 2.0
January 2 to February 7, 2019
Mondays, Wednesdays, Fridays, 9:00 am - 11:00 am

Course Co-Directors
Craig C. Beeson, PhD (Primary Contact)
Department of Drug Discovery and Biomedical Sciences
Office: QF309C
Tel: 843-876-5091

John J. Lemasters, MD, PhD
Department of Drug Discovery and Biomedical Sciences
Office: DD504
Tel: 843-876-2360

Course Justification
Although basic elements of bioenergetics metabolism are imbedded in curricula in most professional courses, there is little or no foundational material that covers the integration of bioenergetics at the levels of the cell, organ, or whole animal. There are also no courses that describe regulation of bioenergetics metabolism and its roles in human disease and pathology.

Course Description
Although the basic biochemistry and physiology of bioenergetics metabolism (i.e., glycolysis, mitochondria, etc) had their heydays in the 1950-1960s, it is common for many biomedical researchers to assume that we now know it all and it can be summarized in 1-2 chapters of a good biochemistry textbook. In contrast, even a brief perusal of current literature demonstrates about 2000 bioenergetics-related primary journal publications per year in nearly all fields of biomedical sciences. Indeed, with recent technological advances there has been a resurgence in research of bioenergetics metabolism with an emphasis on integration, regulation, and disease. The proposed course assumes a basic knowledge of bioenergetics metabolism and weaves this into a detailed exposure to the most current knowledge of how cytosolic and mitochondrial metabolism are integrated via cell signaling pathways, intracellular ultrastructure and redox physiology. The course incorporates new technologies in metabolomics and cellular imaging to illustrate how they contribute to ongoing studies of how dysfunction of bioenergetics metabolism contributes to diseases ranging from metabolic disorders, cancer, and degenerative pathologies.

Course Objective
The primary objective is to enable students to dissect the current literature with respect to what is the current knowledge of bioenergetics and metabolism as opposed to reliance on dated (although important) knowledge found in common textbooks. For example, it was widely assumed that energy production via glycolysis or mitochondrial respiration was largely a supply versus demand process rather than being regulated via signaling pathways that converge with cell cycle, intercellular communication, and cell death. The predominant view of mitochondria still largely remains that of a small “sausage” shaped organelle rather than what is now known to be a dynamic morphological cycle whose regulation is highly complex. Finally, switching between different metabolic substrates and the associated bioenergetics pathways was viewed a being primarily supply driven and it is now recognized that these switches can control immune function, oncogenesis, and degenerative pathologies. In a nutshell, achievement of the objective will bring the students into 22nd century of bioenergetics and prepare them for the unfathomed future.
Course Format The class meets MWF, 0900-1100 for five weeks and relies on didactic recitals from the faculty with an emphasis on current literature supplemented with student presentations of assigned journal papers for class discussions. There are two student presentations each Wednesday, and faculty lectures with student discussions Mondays and Fridays. The selection of the papers is both retrospective and prospective – one covers the prior material and the second prepares for new material. There is a final short essay style exam on the last day of classes.

Course Directors The course is co-directed by Drs. Craig C. Beeson (beesonc@musc.edu, 843-876-5091) and John J. Lemasters (lemaste@musc.edu, 843-876-2360). Dr. Beeson has a long track-record as a professor in the curriculum for CGS PhD and MS students, and his participation in the current course reflects his knowledge base in mitochondrial physiology and bioanalytical techniques of metabolic studies. He is the director of the Bioenergetic Profiling Core. Dr. Lemasters is a Professor with world-renowned expertise in mitochondrial physiology and pathophysiology. He is also a world leader in cellular imaging with a particular focus on mitochondrial function and is the director of the Molecular Imaging Core. Together with other fellow “mitochondriacs” on campus, Drs. Beeson and Lemasters have elevated MUSC to one of the most highly respected academic institutions in the field of bioenergetics and metabolism.

Evaluation
Exam The course has one closed book, in class examination. The purpose of this examination is to determine whether students have learned the fundamental quantitative and qualitative material presented in the class, and also prompts students to think about how the fundamental principles that they have learned can be applied to current topics of disease and pathology. Course directors outline the key objectives to students as the class progresses. The examination is designed to integrate material from different class sessions to minimize compartmentalized learning and maximize "bigger picture" thinking. Questions are of the short-essay format, and may require students to solve problems, and design experiments or propose models. Students have the opportunity to complement their written responses with drawn models and figures in an effort to develop their skills in using visual aids to more effectively convey complex concepts.

Participation Student participation is evaluated using objective rubrics, and will reflect attendance, participation in discussions and exercises, and in particular participation in the student presentation sessions.

Grading Faculty evaluates attendance, preparation, and participation in the overall discussion and any group exercises that occur using objective rubrics.
IMMUNOBIOLOGY (CGS 784)

Credit Hours: 2.0
January 3 to February 7, 2019
Mondays, Wednesdays, Fridays, 9:00 am - 11:00 am

Course Director
Chrystal Paulos, PhD
Associate Professor
Department of Microbiology and Immunology
Department of Dermatology
Office: HO612C
Tel: 843-792-3210

Description This mini-course is composed of fifteen sessions over a period of five weeks (M, W, F at 9:00-11:00 am) focused on a specific component of immunobiology. Two sessions are designated as THINK sessions prior to in-class assignments and engage the student in immune system experimental design exercises in the form of literature-based lectures from the course.

General Reading and Resources Janeway’s Immunobiology, 9th edition (2016), Kenneth Murphy and Casey Weaver. This edition has been thoroughly revised bringing the content up-to-date with significant developments in the field, especially on the topic of innate immunity, and improving the presentation of topics across chapters for better continuity. The library has on-line access to 9th Edition Janeway.

Dr. Harris Goldstein Immunology Lecture Mini-Course, Albert Einstein College of Medicine
http://www.einstein.yu.edu/video/?SCID=23&ts=conferences#top

Specific Reading Papers are posted on Moodle as required.

Grading and Attendance Policy Merit graded using the College of Graduate Studies 0 to 4.0 grade scale. Student grades are based on participation in class discussions (20%), role as a small group facilitator (15%), weekly ‘Journal Article Worksheets’ (30%), and the final exam (35%).

a) Students must read the assigned papers in advance and are expected to contribute to the class discussion. The course co-directors monitor the class discussion. Students who do not participate in the class discussion are advised to increase their interaction with the group. All students are required to complete a ‘Journal Article Worksheet’ for each paper to the course director(s) for grading prior to the start of each small group session. Assessment Tool: Journal Article Worksheet and Class Participation Rubric.

b) For the THINK sessions: Selected students lead a small group discussion in which the group critiques the assigned paper(s), interprets the data, and discusses the implications of the results. Each registered student is required to participate at least one paper discussion. Assessment Tool: Discussion Facilitator Rubric.

c) The take-home assignment and final exam consist of essay questions and experimental design. These series of questions and concept maps are derived from information in the course and reading material. Assessment tool: Written Assignment Rubric.

d) The course director monitors student attendance through a sign-in sheet. Students are allowed one unexcused absence. An excused absence is given on a case-by-case basis (for example, presentation at a conference). Students who anticipate missing a class must contact
the course director(s) before class. Students with emergency absences must contact the course director(s) as soon as possible. Assessment Tool: Sign-In Sheet.

**Course Objective** The course aims are to guide the student through the immune system in all its aspects - from basic cellular immunology, first engagement of innate immunity, to the generation of the adaptive immune response and its clinical/disease consequences. The course encompasses topics such as antigen presenting cells, B cell function, complement system, Toll-like receptors, mucosal immunity, T cell tolerance and immunity.

**Course Outcomes** By completing this course, students come to understand:

- Differences between innate and adaptive immunity
- Structure, function and cellular constituents of immune system
- Immune programing
- Normal function of immune system
- Immune system and disease
- Introduction to key methods in Immunology

**Faculty roster:**

- Chrystal Paulos, PhD
- Mark Rubinstein, PhD
- Zhai Li, PhD, MD
- Bei Liu, MD
- Eric Barlee, PhD
- Carl Atkinson, PhD
- Eric Meissner, PhD
FUNDAMENTALS OF CANCER BIOLOGY (CGS 782)

Credit Hours: 2.0
February 12 to March 23, 2019
Mondays, Wednesdays, Fridays, 9:00 am - 11:00 am

Course Director
Stephen P. Ethier, Ph.D.
Department of Pathology and Laboratory Medicine Office: BEB 412
Phone: 843.876.2537

Course Justification
Currently there is no course that provides students with an understanding of the fundamentals of cancer biology. Advanced topics courses in Cancer Biology are offered by two distinct graduate school tracks in cancer biology at MUSC (MCBP program and Department of Pathology and Laboratory Medicine graduate program). However, students come to these courses without the fundamental knowledge needed to appreciate their full value. Thus, if we are to have graduate tracks in cancer biology, it is essential that the fundamental groundwork be put down so students have a thorough grasp of this important subject.

Course Description
This course begins with a discussion of what cancer looks like, at the gross and histological levels, and a demonstration of the basic aspects of cancer as a latent, and progressive disease that culminates in pathological processes that result in death. Next, the course provides an understanding of how research into the causes of cancer has elucidated in molecular detail the biology of this disease. The lectures in carcinogenesis also educate the students on the fundamental environmental causes of cancer and how that translates into public health policies that influence cancer mortality. The course then turns to molecular mechanisms of carcinogenesis by discussing the discovery and characterization of viral carcinogens, oncogenes, tumor suppressor genes and how that is connected to genetic susceptibility of cancer. That understanding of the genetic and genomic causes of cancer is used to link the action of these genes to the key phenotypes expressed by cancer cells, such as growth factor independence, immortalization, dysregulated cell death, dysregulated cell cycle progression, and discuss how these phenotypes mediate disease. The course then progresses to discussion of host effects of cancer and how the tumor microenvironment influences cancer progression, leading to discussions on invasion and metastasis, the proximate cause of death in the majority of cancer cases. Having laid this fundamental groundwork on the basic biology of cancer, the course concludes with a discussion of conventional forms of cancer therapy and how they work, or don't work, and with lectures on the future of cancer therapy based on genomically targeted drugs and immunotherapy.

Course Objective
The objective of this course is to provide students with a thorough understanding of the basic aspects of Cancer Biology. The goals are to provide students with a basic understanding of the causes of human cancer, an understanding of the mechanisms of disease progression, and a fundamental knowledge of how cancer patients are treated in the clinic, and why some cancer treatments are successful, while others are not. The objective is to have students fully prepared to take on the more advanced topics courses in Cancer Biology offered at MUSC, and to be more prepared to move into research labs that do cancer research.

Course Outcomes
By the end of this class students will know what cancer looks like, why and how cancer cells behave as they do and how this causes disease that ultimately still has high mortality rates. The students also gain valuable insight about how cancer is treated and sometimes cured now, and in the future, which is essential for successful application of cancer biology for translational research. The students acquire a good handle on the causes, both
environmental and genetic, of cancer, how those causal factors change the fundamental biology of cancer cells, how those changes progress over time to result in disease with specific features, and they should have a solid grasp about how understanding cancer in molecular detail is leading to new treatment strategies.

**Grading policy** The course is merit graded based on the score of one take-home mid-term exam (45%) and on an in-class final exam (45%), with 10% of the grade being based on class participation and preparedness for each lecture, using the College of Graduate Studies 0 to 4.0 scale. As this course is designed to be primarily a didactic lecture course, class participation is less important than in other more advanced topics courses, though students are expected to have completed assigned reading before each class. The mid-term exam is a take-home exam in which students have one week to write a 5-page paper on the key published papers that underlie some fundamental aspect of cancer biology. The final exam is an essay-type exam, consisting of one major essay, and several short essays that cover the breadth of material covered in class. Participation and Examination rubrics will be used to assess student's performance and to assign grades.

**Faculty Roster**

Stephen P. Ethier, PhD, Professor  
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Tel: 843-792-1414

Alan Diehl, PhD, Professor  
Biochemistry and Molecular Biology  
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Stephen Guest, PhD, Assistant Professor  
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Amanda Larue, PhD, Professor  
Pathology and Laboratory Medicine  
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Steven Rosenzweig, PhD, Professor  
Cell and Molecular Pharmacology  
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Paula Traktman, PhD, Professor  
Dean, College of Graduate Studies  
Tel: 843-876-2414

John Wrangle, MD, Assistant Professor  
Medicine, Division of Hematology/Oncology  
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INTEGRATED PHYSIOLOGY & PHARMACOLOGY OF THE CARDIOVASCULAR SYSTEM (CGS 778, Spring 2019). A physiological system other than cardiovascular will be studied in Spring 2020.

Credit Hours: 2.0
February 12 to March 23, 2019
Mondays, Wednesdays, Fridays, 9:00 am - 11:00 am

Course Co-Directors
Donald R. Menick, Ph.D.
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Telephone: 843-876-5045

Jeffrey A. Jones Ph.D.
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Course Justification There is currently no 1st year selective covering Physiology and Pharmacology. This is one of two courses covering Physiology and Pharmacology that are taught in alternate years. Each of these courses focuses on a different organ system to teach the principles of Physiology and Pharmacology. This course uses the Cardiovascular System as an example and introduction to Physiology and Pharmacology.

Course Description The course has four thematic focuses of Cardiovascular System: 1) Cardiovascular physiology and pathophysiology: neuromuscular transmission and excitation-contraction coupling; 2) Electrical activity of the heart; 3) Cardiac output and its alterations during exercise and failure; and 4) Circulation and vascular hemodynamics. The class minimizes lectures, didactic discourses, and has no simple regurgitation of “facts”. The first few minutes of each Theme provide a broad overview of the subject area tying in the clinical significance.

Course Objectives To deepen student understanding of integrated physiology with an emphasis on regulation; to help students identify innovative approaches and questions and help them determine if a hypothesis or experimental approach really matters; and to encourage sound analysis and interpretation of experiments in pre-clinical models. Students explore how the heart works, what can go wrong, and how we target specific ion channels, G protein coupled receptors, and enzyme systems to manipulate how the heart works and functions.

Course Outcomes By the end of the course the student should: 1) have a basic understanding of membrane potential and action potentials; 2) have a basic understanding of channels, pumps and exchangers; 3) have knowledge about neurohumoral control of cardiac function; 4) be able to describe excitation-contraction coupling; 5) have an understanding of SA and AV nodes and pacemaker currents, 6) be able to describe different pharmacological interventions that can be made to improve heart function; 7) be able to describe what generates cardiac fibrosis and its impact on diastolic heart function; 8) understand the basics of cardiac hypertrophy; and 9) be able to describe the progression of atherosclerosis and resulting ischemic injury in the heart.

Course Format This 2-hour mini-course is given over a period of 5 weeks. Each week consists of three sessions lasting 2 hours. The majority of the time is dedicated to Socratic discussion around questions and problems posed by faculty and the students themselves. The faculty give very brief presentations and then work to facilitate discussion among the students to propose ideas, hypothesis etc. Students are encouraged to rebut and defend their ideas and/or hypothesis. Each week the class discusses at least one classic and one cutting-edge paper. At
the end of each thematic focus there is class discussion led by both a clinical-scientist and a basic scientist. Faculty give brief presentations in order to stimulate class discussion.

**Grading and Attendance Policy** Students receive a merit grade based on the CGS 0 to 4.0 grading scale. Grades are based on attendance and participation in class discussions (20%), lead in presentation and discussion of a paper (30%), and final exam (50%).

a) The course co-directors monitor student attendance through a sign-in sheet. Students are allowed one unexcused absence.

b) Students must read the assigned papers in advance and are expected to contribute to the class discussion. Course co-directors monitor the class discussion. Students who do not participate in the class discussion will be advised to increase their interaction with the group. All students are required to answer a question given by the instructor on the Journal Article. Answers are submitted for grading prior to the start of each class.

c) Each registered student is required to lead at least one paper discussion. Selected students lead a small group discussion in which the group critiques the assigned paper(s), interprets the data, and discusses the implications of the results.

d) The in-class closed book final exam consists of short essay questions in which students interpret data and propose experimental protocols to test specific hypotheses.

**Faculty Roster**

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*John Woodward*, Ph.D.  
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*Rupak D. Mukherjee*, Ph.D.  
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*Lauren Ball*, PhD  
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**HUMAN GENETICS AND GENOMICS (CGS 780)**

Credit Hours: 2.0  
Mar 27 to April 30, 2019  
Mondays, Wednesdays, Fridays, 9:00 am - 11:00 am

**Course Director**  
Julie Woolworth Hirschhorn, Ph.D.  
Children's Hospital, Room 222B  
Phone: 843-792-1181

**Faculty Roster**  
Stephen P. Ethier  
Gerard T. Hardiman  
Linda E. Kelemen  
Paula S. Ramos  
G. Shashidhar Pai  
Daynna Wolff

**Description and Objectives**  
This course is an introduction to human heredity and molecular genetics. Students develop an appreciation for the power and limitations of genetics and genomics, and develop skills to address questions in genetic/genomic research and clinical practice. This course is open to students in their 2nd year (and beyond) who are interested in human genetics and genomics.

**Faculty**  
The course is directed by Julie Woolworth Hirschhorn, Ph.D. (843-792-1181). Dr. Hirschhorn has a strong track record as a teacher of first-year CGS students; she is a faculty member in the Department of Pathology and provides services in the Clinical Genetics laboratory. Dr. Wolff directs the Clinical Genetics laboratory and is a well-trained geneticist. Dr. Linda Kelemen is a genetic epidemiologist in the Department of Public Health whose work is aimed at identifying early biomarkers for cancer and determining how environmental modifiers influence genetic susceptibility to cancer as well as risk and prognosis. Dr. Ramos, a faculty member in the Division of Rheumatology & Immunology, uses genetic epidemiology, statistical genetics, population genetics, and bioinformatic and genetic tools to identify factors that predispose to autoimmune disorders. Dr. Hardiman is a faculty member in the Department of Medicine and also the Director of Bioinformatics for the Center of Genomic Medicine. His interests and expertise lie in functional and comparative genomics and their application to identifying genetic targets in a breadth of diseases. Dr. Ethier is a faculty member in the Department of Pathology and also the Director of the Center for Genomic Medicine. He is a highly regarded cancer biologist and utilizes a variety of genetic and genomic tools in his cancer research.
HOST AND MICROBE: PARTNERS AND PATHOGENS (CGS 774)

Credit Hours: 2.0
Mar 27 to April 30, 2019
Mondays, Wednesdays, Fridays, 9:00 am - 11:00 am

Course Co-Directors
Ozlem Yilmaz, DDS, PhD
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Eric Bartee, PhD
Basic Science Building 208C
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bartee@musc.edu

Course Description Ever wonder what the little guys are like…I mean the REALLY little guys? The world is filled with diverse microbes from bacteria that kill us to viruses that are used to cure cancer. The complex interaction of these microbes with their hosts helps to shape both our daily health and to advance our understanding of life in its most basic forms. This course introduces students to this amazing complexity by examining the fundamental characteristics of the bacteria and viruses which live both in and around us as well as how these tiny microbes have such oversized impact. So come explore the microbial world with us and learn what makes both them and us tick.

Course Objectives The overall objective of the course is to introduce students to the fundamental aspects of both bacteriology and virology. Students are encouraged to think about ways to apply this knowledge to advance their own research interests. Topics covered include microbial classification, structure, metabolism/physiology, life cycle, pathogenesis, transmission and behavior in bacteria, viruses, and fungi including their ecology, life in a biofilm and in association/interaction with host. A particular emphasis is given to understanding of cellular/molecular characteristics and activities of bacteria and viruses and their relation to human health and disease. There are also unified themes dedicated to emerging major bacterial and viral pathogens, and antibiotic resistance mechanisms.

Course Format This 2-credit course is given in 15 sessions spread over 5 weeks from April 2nd to May 4th. The class format is a short (30-45min) introductory lecture to introduce the daily topic followed by group discussion of primary literature (2-3 papers) that demonstrates and reinforces that topic. Students are expected to read the primary literature prior to class and be able to participate in moderated discussion. Students are given two homework assignments during the course, one on bacteria and one on viruses. A final exam is given during the final session.

Textbook and Reading Assignments A textbook is not required for this class. Primary literature reading assignments are provided at least 2 days prior to class discussions via emails to the enrolled students or distributed following the previous class session.

Student Evaluation and Grading Course grades are assigned based on input from distinct assessments: Participation in class discussions, take home assignments, and a final exam. Participation Students are expected to have read the primary literature provided prior to class and be able to participate in moderated discussion of that literature as well as how it fits into the
overall daily theme. Participation is assessed daily by at least two independent faculty (Drs. Yilmaz, Bartee and Chowdhury) using an objective rubric. 

*Homework Assignments* Students are given two homework assignments during the course. These are take-home questions and are due at the beginning of the next lecture session. Each assignment consists of 15-20 short answer questions designed to test basic knowledge. The goal of these assignments is to assess the student’s retention of fundamental concepts discussed in lectures. Testing the student’s ability to synthesize new concepts from lectures is not the goal of these homework sets; that will be assessed in the final exam.

*Final Exam* Final exam is a closed book exam given during final session (May 4th). Format of the final exam is 2-4 short essay questions covering all material from the course. Drs. Yilmaz and/or Bartee grade exams.

*Weighted influence of assessments on overall course grade*

Assignments: 40%  
Final: 40%  
Participation: 20%

*E*Value As part of our commitment to continuously assess our curriculum, students will be asked to evaluate courses and instructors through E*Value. These mandatory, confidential evaluations will be distributed electronically at the close of each semester, and students are asked to provide constructive feedback designed to enhance their education and experience in the College of Graduate Studies.

**Faculty Roster**

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PRINCIPLES, PRACTICES AND PROFESSIONALISM (CGS 770)

Credit Hours: 2.0
January 3 to April 25, 2019
Thursdays, 9:00 am - 11:00 am

Course Director
Ed Krug, PhD
Regenerative Medicine and Cell Biology
Office: BE 101
Telephone: 843-876-2404

Co-director TBD

Course Justification In acquiring graduate level understanding of the foundations of macromolecular structure, function and dynamics, inheritance and expression of genes, and cellular organization and communication, it is essential that students also develop facility in critical thinking, an awareness of responsible conduct of research, the imperatives of rigor, transparency and reproducibility, and a sense of the professional career opportunities available to them and how best to ensure success in realizing those goals. This course seeks to fulfill these requirements.

Course Description This semester-long course introduces graduate students to essential concepts in the practice of biomedical science, such as critical thinking, responsible conduct of research, reproducibility of data, transparency in communication, rigor in experimental design and analysis, and professional development. The course utilizes didactic lectures, group activities based on hypothesis development, student discussion of case studies, and a range of skills focused on optimal development of career options.

Course Objectives The objectives of this course are to give students an understanding of the processes involved in deploying critical thinking in approaching a problem by development of testable hypotheses, and to reinforce that understanding by a series of exercises focused on determining the degree of rigor and reproducibility inherent in a given experiment approach to testing a hypothesis. Additional objectives of the course are to inculcate adherence to best practices in the conduct of research by reviewing standards of ethical conduct, the spectrum of federal and other regulations regarding research, and emphasis on the prerequisites and pitfalls of scientific publication. Lastly, a series of objectives relating to development of productive mentor-mentee relationships, optimal approaches to participation in team science and charting of career options following graduation will be addressed.

Course Format This 2 credit hour course is given over a period of 16 weeks. Each 2-hour class meets Thursdays in the Spring semester. The instructors provide an overview of their given topic at the beginning of their section. The objective of didactic lectures is to lay the foundation for active development of assigned group exercises (ie, hypothesis development) and discussion of articles or other resources related to the specific skills addressed in that section. All students should come prepared to present, discuss and question all aspects of assignments. Specific goals and objectives of each class session are detailed in the syllabus.

Grading and Attendance Policy The course is Honors/Pass/No Pass. Student grades are based on attendance, timely completion of all assignments and quizzes, and scoring a minimum of 80% on the CITI exam. Those students who repeatedly take a “leadership” role in discussions and whose written work is considered “exemplary” earn an Honors. Students are allowed one
excused absence with justification. Any missed assignments related to the absence must be remedied within one week. Assessment tools will include the following:

- **Activities**
  - Small group projects
  - Small group discussion
- **Quizzes (on-line)**
  - Elements of formulating an hypothesis and experimental design
  - Plagiarism
- **Assignments**
  - Pre-assessment of knowledge of plagiarism
  - Presenting examples of research misconduct in the press to the class
  - Essay on summative impact of course for them personally (the “take home” impact) and how they will integrate it into their training as a graduate student at MUSC
- **Exam**
  - CITI Biomedical Responsible Conduct of Research (9 modules). Because training in RCR and RTR is mandated by the NIH and considered to be an essential component of scientific practice and professionalism, the students should be comfortable with the full scope of scientific compliance even if their near-term project doesn’t involve some of the areas being covered.

**Participation in class discussions** Students must read the assigned materials in advance and are expected to contribute to class discussions. The course co-directors monitor the class discussion and facilitate participation by those reticent to contribute.

**Faculty Roster**

- **Critical Thinking in Science series**: Paula Traktman, Dean, College of Graduate Studies
- **Responsible Conduct of Research series**:
  - **Ed Krug**, Professor of Regenerative Medicine and Cell Biology, MUSC Research Integrity Officer, 876-2404
  - TBD biostatistics faculty – for reproducibility session
  - **Susan Sonne**, Associate Professor of Psychiatry, Chair of IRB2,
  - **MA McCrackin**, Associate Professor of Comparative Medicine,
  - **Christine Dixon-Thiesing**, Licensing Officer, MUSC Foundation for Research Development,
  - **Mary Evelyn Armstrong**, Conflict of Interest Officer
- **Professional Development series**:
  - **Craig Beeson**, Associate Professor of Drug Discovery and Biomedical Research,
  - **Ed Krug**, Professor of Regenerative Medicine and Cell Biology, MUSC Research Integrity Officer, 876-2404
  - Other potential instructors
    - **Don Menick**, Professor of Medicine, 876-5045
    - **Colleen Hanlon**, Associate Professor of Psychiatry, 792-5732
    - **Heather Davidson**, Assistant Professor of Neuroscience, 792-1134
    - **Tom Smith**, Professor of Library Science and Informatics, 792-2790
    - **Kimberly McGhee**, Managing Editor of MUSC Progress Notes, 792-7877
    - **Sheila Champlin**, Chief Communication and Marketing Officer, 792-2691
    - **Carol Feghali-Bostwick**, Professor of Medicine, 876-2315
    - **Alice Libet**, Associate Professor of Psychology, Director of Counseling and Psychological Services, 792-1570
- **External speaker and panel of senior graduate students and postdocs TBD**
LEARNING FROM THE LITERATURE (CGS 772, LFTL)

Credit Hours: 2.0
January 8 to April 30, 2019
Tuesdays, 9:00 am - 11:00 am

Course Director
Paula Traktman, PhD
Bio-Engineering Building 101
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Description and Objectives One of the key transitions made by students is the transition to learning what is known to exploring what is not yet known, and moving from textbook learning to the reading of the literature. LFTL is focused on helping students understand how to learn from the literature. How does one approach a manuscript and understand the background, the hypothesis and the experimental design? How does one critically evaluate the data and incorporate them into what’s known about the system? The LFTL syllabus is designed to incorporate each of these questions. The students learn by example as well as by practice. Opportunities for working individually and in groups are plentiful, and discussion of the different ways in which data can be presented and interpreted is central to the course. LFTL presents a concrete framework for the incorporation of “critical thinking” into the students’ education as they gain skill and confidence in “learning from the literature”.

Course Director and Instructors Dr. Paula Traktman is the course director (traktman@musc.edu; 843-876-2405, 843-876-2414). Dr. Traktman has led a research laboratory for >30 years, has extensive graduate teaching experience, and also serves as the Dean of the College of Graduate Studies. As co-Chair of the First Year Curriculum Task Force, Dr. Traktman played an integral role in the development of LFTL. Several other members of the Task Force play key instructional roles (Drs. Olsen, Muise-Helmericks, Kurtz and Smolka). Other members of the MUSC faculty with a track record as thoughtful instructors also participate in LFTL.

Evaluation This course is graded as “Honors, Pass and Fail”. Most of the grade will be based on participation; students participate in many discussions (35% of grade) and several presentations (35% of grade). Participation and presentation grades are assigned using objective grading rubrics. Students will also submit a few one-page reflections after LFTL sessions, and these count for 30% of the grade, cumulatively. E*value is used to obtain student feedback.
FIRST YEAR CURRICULUM, SUMMER SEMESTER 2019

The last component of the First Year Curriculum is a semester-long introduction to the art of communicating scientific information to a variety of audiences who are critical determinants of the success or otherwise of a scientific investigator's work.

SCIENCE WRITING AS PERSUASION: AUDIENCE, GENRE, AND STYLE (CGS 764)

Credit hours: 1.0
June 3 to July 26, 2019
Thursdays, 9:00 am to 11:00 am

Course director
Michael Madson, PhD
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Office hours
Thursdays from 11:00 a.m. to 12:00 p.m. or by appointment
ECL-201G
You can also schedule a conference with other Writing Center faculty members through LifeNet

Faculty Roster

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Kimberly McGhee, PhD
Business Development and Marketing Services
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Tom Smith, PhD
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Description This nine-week, interdisciplinary course prepares students to move their ideas persuasively from pipette to pen. Students encounter a variety of scholarship on science and persuasion, focusing on the fundamentals of audience (who you write for), genre (what patterns you write from), and style (how you work with words), and develop rhetorical competencies for both professional and public contexts. To these ends, the instructors deploy an array of teaching techniques that include interactive lectures, group discussions, on-the-spot quizzes, and small-scale team projects. Each week, students can reasonably expect to write between 500 and 1,500 words outside of class. That number may vary according to the assignment and the instructor.
Objectives  Upon completion of the course, students should have demonstrated competence in the following areas related to persuasion.

- **Reading audiences.** Students should deepen their familiarity with diverse (and often composite) audiences relating to their scientific discipline. Across contexts, they should recognize who they are writing for and why, what expectations those readers might have, and how to approach the writing process deliberately.

- **Appropriating genres.** Students should gain greater awareness of, and mastery over, genres in their scientific discipline. In particular, students should know how to parse genres, enabling them to describe those genres’ linguistic features and social “scenes” (see Bawarshi & Reiff, 2010).

- **Strategizing style.** Students should acquire an assortment of stylistic devices that they can use to persuade their intended audiences. Across audiences, students should show skill in tailoring language for clarity, concision, and tone.

Format  The course is delivered in person, with no distance delivery component. Class meetings, each two hours in length, are held each Thursday from June 1 to July 27, 2017. The course is divided into three units: audience, genre, and style. Each of these units in turn consists of three class meetings. The agenda for the class meetings generally follows the format below.

During a unit’s first class meeting, the instructor provides an *interactive lecture*. The interactive lecture emphasizes content that students will need in order to complete the major writing assignments for that unit. At the end of class, students complete an editing quiz that tests their understanding of—and ability to apply—the lecture content. The instructor then assigns a brief memo for homework.

During a unit’s second class meeting, the instructor presents *integrative activities*. These activities are intended to help students review the lecture content, as well as practice competencies they need to complete the major assignments for that unit. (Examples may include case studies on audience, analyses of journal abstracts, or student-led “micro-teachings” on stylistic devices.) In small groups, students share their memos and, at the end of class, complete an editing quiz. The editing quiz, as above, tests students’ understanding of—and ability to apply—the lecture content.

During a unit’s third class meeting, students focus on *reflection*. They present their work on the major assignments, self-assess their learning, and complete an editing quiz. At the end of the last class meeting, on July 27, students write a final reflection on the course.

Grading  The grading format is Pass/No Pass/Honors. Students who complete all required major and minor assignments, contribute actively and meaningfully in class discussions, and also demonstrate consistent, exceptional mastery of the course content, and score at least 85% earn Honors. Students completing all of the required major assignments, complete most of the required minor assignments, participate in class discussions, demonstrate competence in the course content, and score between 70% and 84% earn a Pass. Students who do not submit a major assignment, do not submit most minor assignments, fail to demonstrate reasonable competence of the course content, and score 69% or lower do not pass. To guide their feedback and grading decisions, instructors use objective rubrics to grade written work and class participation.
**Major writing assignments** These allow students to demonstrate competence in reading audiences, appropriating genres, and strategizing style. The assignments constitute 60% of the course grade and are completed individually or collaboratively as specified below. At the end of each unit, students choose one of two major assignments, completing three altogether by the end of the course. Instructions for major writing assignments are as follows.

**Audience “pu pu platter”** (individual). Choose a current topic that interests you in your field, and take a clear position. Compose the following four texts, considering the expectations of the various audiences, and submit all four together:

1. **Scholarly commentary** (400 words). Select an academic journal in your field that publishes commentaries. Then write a commentary on your topic that satisfies the journal’s requirements.
2. **Newspaper editorial** (400 words). Write a newspaper editorial for the *Charleston Post & Courier*. Note that while the topic is the same as in the scholarly commentary, the audience is not.
3. **Tweet** (140 characters or less). Tweet your topic to “the Twitterati,” using 140 characters or less.
4. **Cover letter** (400 words). Write a cover letter addressed to the course instructors. The cover letter should briefly overview the topic you chose, and then discuss how you tailored that topic persuasively to the three audiences.

**Interview with subject matter expert** (individual). Identify an expert in your field who has enjoyed high research productivity and/or effective public engagement. Develop interview questions that explore how the expert gained an understanding of, and persuasively writes for, different audiences in the field. After you conduct the interview, write what you learned in a 1,200-word research report.

**Corpus analysis** (team). As a team, assemble a corpus (20 artifacts minimum) of a specific genre. For instance, your genre might be introductions to empirical research articles in microbiology, biosketches on NIH R-series grants, or appeals for STEM funding on Kickstarter. Follow the “guidelines for analyzing genres” (Bawarshi & Reiff, 2010), to gain insights into the genre’s linguistic features and social contexts, as evidenced by your corpus. Write what you learn in a 1,500-word research report.

**Laboratory ethnography** (team). As a team, conduct “participant observations” in your respective laboratories, investigating how different genres are used. For instance, you might observe how lab notebooks are constructed and consulted, how student-researchers display markers of identity, or how whiteboards content may support particular experiments. Write a field note that describes what you observed. Compare your field note to those written by your team members, identify significant similarities and differences, and come to tentative conclusions about how the genres you observed function in the laboratory. Summarize what you learn in a 1,000-word research report (excluding field notes and references). Include all of your team’s field notes as appendices.

**Stylistic analysis** (individual). Identify a piece of science writing, academic or general audience, that you consider to be especially well written. Write a 1,000-word discussion of how particular stylistic devices or strategies contribute to the piece’s overall persuasiveness.

**Wiki entries** (team). Brainstorm a list of 12 common challenges in science writing related to style—for example, how to edit for clarity, how to write in plain language, or how to use a
particular stylistic device effectively. Create wiki entries that describe strategies to overcome each of the common challenges you brainstormed. The audience for the wiki entries is our class, so design the wiki entries so that they can be useful to you both now and in the future.

**Minor writing assignments** These allow students to internalize lecture content and practice key competencies. They account for 20% of the course grade, and at least one minor assignment will be due each class meeting. The assignments may be: Editing Quizzes, taken in the final minutes of each class meeting, allowing students to quickly apply content from the lecture and integrative activities; Memos, 500-word, double-spaced documents that prepare students for an upcoming class meeting, encouraging engagement with the course content and additional practice in writing; and Final Reflection, in which students summarize what they learned about audience, genre, and style, and then consider how they will continue to strengthen their competencies in persuasion as they move forward. Topic and instructions vary, and other minor assignments may be added, depending on instructor discretion.

**Attendance and class participation (20% of student grade)**
Class meetings allow students to develop the knowledge and competencies they need to complete the course writing assignments, both major and minor. For that reason, attendance at every class meeting is strongly encouraged. Students who cannot attend a class meeting should notify the course instructors in advance. Missed work must be remediated during the following week. Class participation involves discussions, integrative activities, team meetings, and reflections related to the lecture content. Attendance and class participation account for 20% of the course grade)
**FIRST YEAR PHD STUDENT ADVISORY COMMITTEE**

**Duties and Responsibilities** The goal of the Student Advisory Committee is to help incoming PhD students navigate the first year of graduate school, including selection of research rotations, with a broad perspective of all departments and programs available to the students. Members of the committee are personally responsible for offering support and guidance to first year PhD students. Exceptions are PhD students entering the Department of Public Health Sciences (DPHS), who do not do research rotations, and who have a first year advisor assigned to them through the DPHS. Members will be assigned advisees on a random basis. They meet with their advisees at least twice per semester during the first year on a schedule to be determined by the advisor and advisee. Such meetings are mandatory, and students are responsible for scheduling meetings with their advisors. In addition, committee members meet with each other at least once per semester to share information and best practices that will help to guide the members. The chairperson arranges the schedule of these meetings.

**Composition of the Committee** The Student Advisory Committee reports to the Graduate Council via the chairperson, who is appointed by the Dean. The chairperson selects six additional members of the committee from any department or program that has representation on graduate council. The total number of members may vary depending on the needs of the committee. Members serve from 2-3 years: in 2 years half of the committee rotate off and new members are appointed on a rotating 2-year basis thereafter.

**2018-2019 Membership of the Committee**
- Dr. Cynthia Wright, Chair, Department of Microbiology and Immunology
- Dr. Joe Blumer, Department of Cell and Molecular Pharmacology
- Dr. Judy Dubno, Department of Otolaryngology
- Dr. Colleen Hanlon, Department of Psychiatry and Behavioral Sciences
- Dr. Robert Gemmill, Department of Medicine
- Dr. Visu Palanisamy, Department of Biochemistry and Molecular Biology
- Dr. Victoria Findlay, Department of Pathology