

Course Syllabus
BIOTRAIN 720: Grant Writing for Biomedical Scientists
M-W-F 8:30-9:30AM 143 Jones (Lectures)
3 Credit Hours

Fall 2024

In Person

Course Director: Beth Sullivan, PhD
James B. Duke Professor of Molecular Genetics & Microbiology
Associate Dean for Research Training, Duke University School of Medicine
1266 MSRB III
beth.sullivan@duke.edu

Course Instructor: Doug Marchuk, PhD
James B. Duke Professor of Molecular Genetics and Microbiology
265 CARL
doug.marchuk@duke.edu

Course Instructors and/or Study Section Chairs:

1. Dr. Douglas Marchuk (Genetics & Genomics) (SS in 4002 GSRB I)
2. Drs. Lindsey Glickfeld and Jeremy Kay (Developmental & Stem Cell Biology and Neurobiology) (SS in Bryan 301)
3. Drs. Jon Campbell & Brigid Hogan (Cell and Molecular Biology) (SS in 384 Nanaline Duke)
4. Drs. Xiao-Fan Wang and Tso-Pang Yao (Cancer Biology and Pharmacology) (SS in C234 LSRC)
5. Drs. Jorn Coers & Matthias Gromeier (Immunology and Disease) (SS in 1125 MSRB 3)
6. Drs. Dennis Ko & John Rawls (Microbial Pathogenesis) (SS in 408 CARL)
7. Dr. Kate Hoffman (Environment and Toxicology) (SS in A336 LSRC)
8. Dr. Anne West (Clinical and Translational Research) (SS in TSCHE 3020)

Class Delivery: Classes will be held as in-person lectures and small groups/study sections. In-person lectures will be held in 143 Jones Research Building. The location of each study section is noted above.

Office Hours: Beth Sullivan will hold office hours in person every Tuesday 9:30-10:30AM in 1261 OBGE (Conference room).

Teaching Assistant: We are fortunate to have Guinevere Connelly (MGM) serving as a TA for this course. Guinevere will hold weekly 1-hour office hours during which she can offer feedback on writing sections of the proposals and answer questions about the course, including timelines and best practices in time management for meeting multiple course deadlines throughout the semester. She will hold office hours on Wednesdays at 2pm in CARL 0010 and/or by Zoom <https://duke.zoom.us/j/8081327296>. Guinevere may be reached by email at guinevere.connelly@duke.edu.

Instructor Communications: E-mail communication is welcome at any time. NOTE: If you do not receive a reply from the course director or a study section chair within 24 hours, then assume that they did not receive it and re-send it. Please include some type of identifier in the "Subject" section of your email (such as BIOTRAIN 720) to assist the recipient in linking the email to the class.

This course syllabus will remain posted in Canvas under the link on the left side of the page labeled “Syllabus” and under “Files”.

Course Overview

Scientific and grant writing is a foundational skill for biomedical scientists to communicate their research results and to acquire funding for their research programs. In this course, PhD students will learn basic concepts in critical thinking about scientific ideas and integrating them with grant writing and peer review, such as how to ask a scientific question, formulate a testable scientific hypothesis, and critique feasibility and scope of a scientific proposal. Students will participate in self-paced instructional lectures, learning the foundations of grant writing and how to craft the specific sections of an NIH-style proposal. By writing a grant application based on their research, students will become familiar with crucial written scientific communication skills necessary to craft a well-designed research plan, including significance of the research problem, gaps in current knowledge, experimental approaches, anticipated data outcomes, and alternative solutions. In addition, by reading and formally critiquing their colleagues’ proposals, students will develop broader critical thinking and analytical skills that will enable them to confidently and constructively evaluate the merits and feasibility of scientific proposals related to their field of study or general area of research.

Furthermore, while this course will help students prepare to submit a grant proposal to a funding agency, the content and format required by a specific agency or foundation may require considerable changes in the document. However, the principles students learn in this course will also prepare them for the written elements of their prelim examinations and with *any* grant proposal they may submit. For this course, students cannot alter the format or the content of the proposal to fit their specific program’s prelim requirements.

Course Objectives

The two major course objectives and their Student Learning Outcomes (SLOs) are as follows:

Objective 1: To prepare students for writing a robust Scientific Grant Proposal

SLOs: Students will be able to:

- conceive an exciting and scientifically sound research plan that would be responsive to funding agencies.
- translate these nascent ideas into a well-designed set of Specific Aims.
- build on these aims to create a well-reasoned and well-written grant proposal.
- write to the reviewers’ expectations and scientific caliber in the field.
- respond to reviewer critiques in a way that leads to a stronger revised proposal with fewer scientific and grantsmanship weaknesses

Objective 2: To prepare students for critically reviewing a Grant Proposal.

SLOs: Students will be able to:

- critically review a research proposal, including scientific premise, significance, and experimental plan.
- write a constructive review of a proposal, identifying strengths and weaknesses.
- participate in a group review of research proposals by offering clear, concise, and constructive scientific feedback.

- rank proposals on a broad range of topics and approaches by comparing the number of strengths and weakness.

Course Requirements

The students will:

1. attend synchronous lecture sessions and topical study section sessions, watch asynchronous lecture videos online, read sample proposals/chapters/notes (per class requirements).
2. participate in assigned activities, such as drafting a grant proposal in different successive phases (Specific Aims, Significance, Research Plan, Training Plan).
3. write a complete grant proposal, including incorporating revisions after review.
4. write a constructive review of a proposal, write to the reviewers' critics, evaluating colleagues' proposal following NIH Rubrics.
5. participate in study section (small group) discussions of grants, giving verbal constructive feedback on grants for which they are not officially assigned to review

Layout of the Course-Room

This is a lecture and discussion (study section)-based course that contains learning sessions that cover grant agencies, format and structure of grant applications, concepts in peer review, best practices in articulating study design and data outcomes, ethics in grant writing and grant review, and crafting biological significance and training statements. Content in synchronous sessions includes participating in live lectures and topical/thematic Study Sections, where students write an NIH-style fellowship proposal and provide oral and written evaluation and critique of other proposals presented in class. There will be 7 Study Sections (SS) that have:

- ~12 students per SS, plus a faculty SS Chair (or two co-Chairs).
- Guest faculty reviewers will participate in proposal review (oral and written comments), usually for two grants.
- All Breakout (study section discussion) sessions in **magenta font**, **blue font**, or **purple font** in the **Course Schedule** will be with your SS (locations to be communicated the first week of class and posted on Sakai course site)
- **No bartering to be in a different SS – you will be assigned to the SS that is most appropriate; it may not be a perfect fit but there will be the necessary expertise when your proposal is reviewed (trust us, we've offered this course for nearly 15 years now).**

Assignment of Proposals to Study Sections (SS): Before the first week of class, all students will complete an online survey to provide their name, PhD program, PI/lab, grant proposal title, and the top two study sections that most closely align with their proposal topic. This information will be used to distribute students into the appropriate thematic study sections and to identify faculty from among the SoM training faculty with the appropriate expertise to review individual proposals. The Course Director will confer with SS chairs to confirm student assignments within their SS.

Writing Check-ins: Weekly writing check-ins/office hours of ~1 hour with faculty and/or TAs will be available in person or by zoom. These optional meetings will provide students with feedback and guidance between large group classes and study section meetings. Students may find these check-ins particularly useful in October after large group class meetings end, and most of the month is devoted to writing complete, full proposals that due October 21st. *The schedule and zoom links of available weekly check-ins/office hours will be made available on Sakai during the first week of class.*

Course Expectations - Students

Writing: By writing your proposal along the lines of the expectations of reviewers, you will learn about *scientific grant writing* but also about *grant review*. Students are expected to meet writing deadlines specified in the syllabus schedule. Meeting the posted deadlines factor into the final grade.

Reading and Reviewing: By participating in the review process, especially group study sections, you will become a better grant reviewer, and by understanding reviewer expectations, you will become an even better and persuasive grant proposal writer. Students are expected to meet written review deadlines and come to mock study sections prepared to share comments on their assigned proposals. Comments on unassigned proposals are highly encouraged – the more feedback given, the more helpful it is for grant writers to revise their proposals. Completion of critiques factors into the final grade.

The two parts of the course (writing and review) inform and augment each other. *It is crucial therefore that you participate in the review process, not just the writing.* The course requires each of you to serve as an assigned proposal reviewer for two of your colleagues, and you are expected to participate verbally in the review of ALL the proposals in your SS.

The **Files** page lists the units/classes for the course, of which there are **10** in-person lectures that all have interactive components to some extent. Folders with sample proposals or sample sections of proposals are also located in the relevant areas under **Files**.

The **Announcement** function will be used frequently to post important information within the course room to all students. These will appear as pop-up messages and thus it is imperative that you have the capability of viewing pop-ups for this site (please check browser settings for this course).

Lecture Unit Assessments:

There are multiple classes sessions when writing assignments are due (see schedule). Attendance at lectures and participation in the in-class discussion and study section review is expected and contributes to the final grade. Attendance will be taken at both large and small group sessions. Please email Beth Sullivan (beth.sullivan@duke.edu) or your SS chair(s) if you have questions about attendance.

Assessment of Peers' Proposals

Each student will evaluate all specific aims and significance sections for their study section. Each student will be assigned two full proposals (and their revisions) to assess, and each proposal will receive three evaluations (two peers, one faculty). Written comments on the sections or full proposal are due on the day the section or full proposal is discussed (see course schedule).

Guidance and policies for Class Critiques and Study Sections can be found in Canvas under “Files”.

Grading:

Students will learn how to write a grant and how to review and critique grants, often outside of their direct area of expertise. This represents the ability to think and communicate critically and broadly, skills required in many disciplines and careers, not just in academia. Final grades will be determined by the Course Director in collaboration with study section chairs.

Final grades will depend on several factors, including:

- 1) Attendance and participation in class (both large group and small study section meetings)**
- 2) Completion of assignments (i.e. meeting deadlines and turning in Specific Aims, Significance**

- and Innovation pages, and full and revised proposals on time)
- 3) Participation in study section (SS) review (i.e. completing written critiques and sharing them with the proposal writer)
 - 4) Quality of proposal and improvement from Specific Aims to revised proposal, including incorporating suggestions and/or making persuasive case for not including some suggestions in the Introduction to the Revision

Student Participation in Proposal Scoring: At the end of the semester, you will be asked to participate in ranking the proposals in your SS. *Completion of this simplified scoring exercise helps you understand how grants are ranked at study section. The final ranking does not solely determine the final grade that will be determined by Lead Course Director in consultation with SS Chairs, based on the factors listed above.*

Course Expectations for SS Chairs and Faculty Reviewers

Student proposals will be assigned to one thematic study section. Each study section will be chaired by the same faculty member throughout the semester and be associated with up to 6 faculty reviewers (depending on number of students in SS). The SS Chair is responsible identifying faculty reviewers, assigning proposals to faculty and student reviewers, and for guiding the class critiques of the Specific Aims and Significance/Innovation sections. The Course Director is available to help SS chairs find and assign faculty to review two full proposals and revisions of the same two proposals.

Full proposal reviewers will be drawn from SoM, NSOE, A&S, and Pratt training faculty with relevant expertise. BIOTRAIN 720 participating faculty are expected to read two Full Proposals and provide constructive feedback both verbally and in written form. Written critiques should be shared with applicants no later than the end of the day of the assigned study section date.

Expectations for SS Chairs and Faculty Reviewers can be found under “**Files**”, in a folder available to both faculty and students enrolled in the course.

Academic Misconduct:

Be sure to read the Duke policy on Academic Misconduct, specifically Student Cheating and Plagiarism (<https://studentaffairs.duke.edu/conduct/z-policies/academic-dishonesty>).

Accommodation of Student Needs:

Students needing special arrangements for note taking, special print, or other considerations for successful completion of the course should contact the instructors before or within the first week of class so reasonable accommodations can be made.

Absence Policy:

Students are expected to attend both large group classes and small group study sections. Attendance will be taken at all large group classes. The Course Director (Beth Sullivan) and Study Section chair(s) should be notified of excused absences (illness, emergencies, unavoidable travel). If absence occurs during study section meetings, such as during feedback sessions on Specific Aims, S&I sections, full proposal review, written feedback for the students whose grants are discussed that day should be emailed to the proposal writer(s), study section chair, and Course Director before the next class meeting.

BIOTRAIN 720 Class Schedule for Fall 2024:

Date	Topics/ Units	Delivery Method	Comments and Assignments Due
Aug 26	Introduction to Course, Expectations, Timeline, and Grant Components (Sullivan)	143 Jones	<i>Canvas Folder "Course Resources": Gantt timeline for writing assignments, format of proposals</i>
Aug 28	Developing an Idea and Creating Specific Aims (Marchuk)	143 Jones	
Aug 30	Sample Specific Aims Pages (Marchuk)- class discussion	143 Jones	<i>Assignment: Pre-read Sample Specific Aims Pages</i>
Sept 2	<i>no class – Labor Day</i>	no class	
Sept 4	Significance and Innovation (Marchuk)	143 Jones	
Sept 6	Significance and Innovation samples (Marchuk and Sullivan) – class discussion	143 Jones	<i>Assignment: Pre-read Sample Significance & Innovation Sections</i> All SPECIFIC AIMS Pages due by 12 noon to entire SS
Sept 9	SS Critiques of Specific Aims Page	in person SS	Group 1 discussion – 4 students
Sept 11	SS Critiques of Specific Aims Page	in person SS	Group 2 discussion – 4 students
Sept 13	SS Critiques of Specific Aims Page	in person SS	Group 3 discussion – 4 students
Sept 16	Approach / Research Design & Methods / Preliminary Data (Marchuk and Sullivan)	143 Jones	<i>Canvas Folder: Sample Grants from Previous Years</i>
Sept 18	Responding to Critiques, Writing Helpful Reviews (Marchuk)	143 Jones	<i>Canvas Folder: Sample Critiques, Responses to Critiques</i>
Sept 20	<i>Online lecture: RCR, R&R, and Ethics in Grant Writing and Review (Sullivan)</i>	online	<i>verify completion of online lecture</i> <i>writing on your own: Revised Specific Aims, Significance & Innovation Drafts</i>
Sept 23	Fellowship Training Activities and Timeline (Marchuk)	143 Jones	
Sept 25	NIH Grant Types, Demystifying Study Section (Marchuk)	143 Jones	
Sept 27	<i>Writing on your own: Revised Specific Aims, Significance & Innovation Drafts</i>	no class	All SIGNIFICANCE and INNOVATION sections due by 12 noon to entire SS
Sept 30	SS Critiques of Significance/Innovation Section	in person SS	Group 1 discussion – 4 students
Oct 2	SS Critiques of Significance/Innovation Section	in person SS	Group 2 discussion – 4 students
Oct 4	SS Critiques of Significance/Innovation Section	in person SS	Group 3 discussion – 4 students
Oct 7	<i>no class - writing</i>		<i>Weekly check-ins with faculty or TA course advisor</i>
Oct 9	<i>no class - writing</i>		<i>Weekly check-ins with faculty or TA course advisor</i>
Oct 11	<i>no class – writing</i>		<i>Weekly check-ins with faculty or TA course advisor</i>
Oct 14	<i>no class – writing</i>		<i>Weekly check-ins with faculty or TA advisor</i>

Oct 16	<i>no class - writing</i>		<i>Weekly check-ins with faculty or TA advisor</i>
Oct 18	<i>no class - writing</i>		<i>Weekly check-ins with faculty or TA advisor</i>
Oct 21	<i>no class - writing</i>		<i>All complete/full proposals due to entire SS by 12 noon</i>
Oct 23	<i>no class- read SS proposals, prepare written critiques</i>		<i>prepare written comments for proposals</i>
Oct 25	<i>no class- read SS proposals, prepare written critiques</i>		<i>prepare written comments for proposals</i>
Oct 28	Mock Study Section: A0 Original (Students 1-2)	in person SS	<i>Weekly check-ins with faculty or TA course advisors</i>
Oct 30	Mock Study Section: A0 Original (Students 3-4)	in person SS	<i>Weekly check-ins with faculty or TA course advisors</i>
Nov 1	Mock Study Section: A0 Original (Students 5-6)	in person SS	<i>Weekly check-ins with faculty or TA course advisors</i>
Nov 4	Mock Study Section: A0 Original (Students 7-8)	in person SS	<i>Weekly check-ins with faculty or TA advisors</i>
Nov 6	Mock Study Section: A0 Original (Students 9-10)	in person SS	<i>Weekly check-ins with faculty or TA advisors</i>
Nov 8	Mock Study Section: A0 Original (Students 11-12)	in person SS	<i>Weekly check-ins with faculty or TA advisors</i>
Nov 11	<i>no class – writing/reading revisions, writing critiques</i>		<i>Revised A1 Proposal Due Students 1-2</i>
Nov 13	Mock Study Section: A1 Revisions (Students 1-2)	in person SS	<i>Revised A1 Proposal Due Students 3-4</i>
Nov 15	Mock Study Section: A1 Revisions (Students 3-4)	in person SS	<i>Revised A1 Proposal Due Students 5-6</i>
Nov 18	Mock Study Section: A1 Revisions (Students 5-6)	in person SS	<i>Revised A1 Proposal Due Students 7-8</i>
Nov 20	Mock Study Section: A1 Revisions (Students 7-8)	in person SS	<i>Revised A1 Proposal Due Students 9-10</i>
Nov 22	Mock Study Section: A1 Revisions (Students 9-10)	in person SS	<i>Revised A1 Proposal Due Students 11-12</i>
Nov 25	Mock Study Section: A1 Revisions (Students 7-8)	in person SS	
Dec 6	Scores for each A1 revision grant in SS Due at Noon	action item	Rank order list submitted to Dr. Sullivan

study section chair responsibility

study section chair, student reviewers, and faculty reviewer responsibility (SS chair oversees review of 2 grants/class – 30 mins/grant; 1 faculty and 2 student reviewers for 2 grants)

study section chair, student reviewers, and faculty reviewer responsibility (SS chair lead review of 2 revised grants – 30 mins/grant; same faculty and student reviewers assigned to review revision of same A0 original proposals)

important points to remember:

- students submit original (A0) proposals on same day so that students whose proposals are reviewed later do not have an “unfair advantage”.
- please submit proposals by email to your study section; see Sakai for a list of email addresses for each study section.
- every student has the same amount of time (~2 weeks) to revise (A1) proposals.
- submission dates give faculty reviewers 4-5 days to review first set of original (A0) proposals and all revised (A1) proposals.
- TAs and 2 faculty course advisors will hold extra sessions weekly to offer guidance on writing, revision.