

BIOTRAIN 720: Grant Writing for Biomedical Scientists

Course Directors:

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Teaching Assistant (TA):

Tenley Weil (Integrated Toxicology and Environmental Health Program [ITHEP])
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Day/Time:

MWF 8:30 – 9:30 AM

Format:

In person

Locations:

Lectures – 143 Jones
Study sections (SS) – various

Grading Basis:

Graded – 3 credit hours

SS Chairs:

1. Drs. Xiao-Fan Wang and Tso-Pang Yao (Cancer Biology and Pharmacology) (SS in LSRC C234)
2. Drs. Brigid Hogan (Cell and Molecular Biology) (SS in 384 Nanaline Duke)
3. Dr. Beth Hauser (Computational Biology and Bioinformatics) (Hock 11110 [11th floor])
4. Drs. Amy Gladfelter & Sarah Goetz (Developmental and Stem Cell Biology) (SS in LSRC B102)
5. Dr. Kate Hoffman (Environment and Toxicology) (SS in LSRC A336)
6. Dr. Doug Marchuk (Genetics & Genomics) (SS in CARL 408)
7. Drs. David Tobin & Raphael Valdivia (Immunology and Disease) (SS in 001 MSRB 1 (CARL 208 on Nov 3 only))
8. Drs. Dennis Ko & John Rawls (Microbial Pathogenesis) (SS in Jones 415)
9. Drs. Lindsey Glickfeld and Jeremy Kay (Neurobiology) (SS in Bryan Research Building 301)
10. Dr. Ling Cai (Pathology) (SS in 4002 GSRB 1)
11. Drs. Guido Ferrari, Micah Luftig, & Justin Pollara (Viral Pathogenesis and Immunity) (SS in 1125 MSRB 3)
12. Dr. Anne West (TBD) (SS TSCHE 3022)



Class Delivery:

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

Course Communications:

E-mail communication is welcome at any time. If you do not receive a reply from a Course Director or a SS chair within 24 hours, then assume that they did not receive it and re-send it. Please include an identifier in the "Subject" section of your email (e.g., BIOTRAIN 720) to assist the recipient in linking the email to the class. You may email the Course Directors or SS chairs directly or use the inbox/messaging function in Canvas.

Course Materials:

Course materials, including this syllabus, are available on the course Canvas site. You can find the syllabus and course schedule in the "**Syllabus & schedule**" module on the course Home page. Materials and information for each class meeting can be accessed through the corresponding date module on the course Home page.

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 for a funding agency, the content and format required by a specific agency or foundation may require considerable changes or additions to the document. 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 Scientific 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 weaknesses.

Course Requirements:

The students will:

1. attend synchronous lecture sessions and topical SS 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 SS (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 (SS)-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 SS, 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 12 SS that have:

- ~12 students per SS, plus a faculty SS Chair (or two faculty Co-Chairs).
- Guest faculty reviewers that participate in proposal review (oral and written comments), usually for two grants.
- All SS discussion sessions in **magenta font**, **blue font**, or **purple font** in the **Course Schedule** will be with your SS. Locations are listed on the first page of this syllabus and posted on the course Canvas site in the “**Study section information**” module).
- **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 (we've offered this course for nearly 15 years now and know how to properly place students in the appropriate SS).**

Assignment of Proposals to SS:

Before the first week of class, all students will complete an online survey to provide their name, PhD program, advisor/lab, grant proposal title, and a short description of 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 Directors will confer with SS chairs to confirm student assignments.

Office Hours and Writing Group:

We are fortunate to have Tenley Weil (tenley.weil@duke.edu) serving as a teaching assistant (TA) for this course. Tenley will hold weekly 3-hour office hours during which she will offer feedback on writing sections of the proposals, answer questions about the course, including best practices in time management for meeting multiple course deadlines throughout the semester, and host a writing group. Students may find these offerings particularly useful in October after large group class meetings end, and most of the month is devoted to writing complete, full proposals that are due October 20. Tenley will hold these office hours on Wednesdays 9:30 AM – 12:30 PM from September 3 – December 3 in MSRB-III room 1261 and by Zoom (<https://duke.zoom.us/j/96398439523>). This information is also available on the course Canvas site in the “**Office hours & writing group**” module. The course directors, Calla Telzrow and Beth Sullivan are also available for check-ins/office hours by appointment.

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 **Course Schedule**. Meeting the posted deadlines factors into the final grade.

Reading and Reviewing: By participating in the review process, especially group SS, 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 SS 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 reviewing) 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.

Course Canvas Site: The Canvas Home page is organized into modules that contain all materials and information needed for each class session. The only exceptions are the proposal sections (Specific Aims, Significance and Innovation) and full proposals for the mock SS – students are responsible for emailing those directly to their SS, including the Chair(s).

The “**Course Resources**” modules contain resources that you will use throughout the course, such as this syllabus and sample proposals. The “**Class Meetings**” modules are organized by class meeting date. You can find details about each class meeting, including the topic, materials, and assignments by clicking on the respective date module. There are 9 in-person lectures that all have interactive components to some extent, 2 asynchronous lectures, and 18 SS meetings. Additionally, the Canvas Announcement function will be used frequently to post important information within the course-room to all students. These messages should come to your email but will also appear as pop-up messages in Canvas, thus it is imperative that you have the capability of viewing pop-ups for this site (please check your browser settings for this course).

Lecture Unit Assessments: There are multiple class sessions when writing assignments are due (see **Course Schedule**). Attendance at lectures and participation in the in-class discussion and SS review is expected and contributes to the final grade. Attendance will be taken at both large and small group sessions. Please email Calla Telzrow (calla.telzrow@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 SS. 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 to your SS via email on the day the section or full proposal is discussed (see **Course Schedule**).

Guidance and policies for SS and class critiques can be found on the course Canvas site in the “**Expectations for study section chairs & faculty reviewers**” module. Please note that each student is required to leave the SS room when their proposal is being critiqued to simulate the procedures used in NIH SS. Students can elect to record the verbal critiques of their proposals if desired, but it is not required. Each student will receive the written critiques of their proposal from their assigned proposal reviewers.

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 Directors in collaboration with SS Chairs.

Final grades will depend on several factors, including:

1. **Attendance and participation in class (both large group and small SS meetings).**
2. **Completion of assignments (i.e., meeting deadlines and turning in Specific Aims, Significance/Innovation pages, and full and revised proposals on time).**
3. **Participation in 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 cases 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 SS. The final ranking does not solely determine the final grade that will be determined by the Course Directors in consultation with SS Chairs, based on the

factors listed above.

Course Expectations – SS Chairs and Faculty Reviewers:

Student proposals will be assigned to one thematic SS. Each SS will be chaired by the same faculty member(s) throughout the semester and be associated with up to 6 faculty reviewers (depending on number of students in SS). The SS Chair(s) is responsible identifying Faculty Reviewers, assigning proposals to student and Faculty Reviewers, and for guiding the class critiques of the Specific Aims and Significance/Innovation sections. The Course Directors are 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. Faculty Reviewers 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 SS date.

Expectations for SS Chairs and Faculty Reviewers can be found on the course Canvas site in the “**Expectations for study section chairs & faculty reviewers**” module, available to both faculty and students enrolled in the course.

Academic Misconduct:

Be sure to read the [Duke Community Standard on Academic Dishonesty](#), specifically cheating and plagiarism.

Students may use Grammarly or Microsoft Copilot, a generative AI tool available for free to all Duke students and protected under Duke’s data security and licensing agreement, to refine and edit their writing (e.g., to improve clarity, grammar, or style). Students may **not** use these or any other AI tools to generate original ideas or write any portion of the proposal. If a student chooses to use these AI tools for editing, they are responsible for ensuring that the content remains accurate and original. The main goal of this course is to strengthen independent grant writing and reviewing skills, so student work must reflect their own ideas and understanding. Any unauthorized use of AI tools will be considered a violation of the Duke Community Standard.

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 Course Directors 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 SS classes. The Course Directors and SS Chair(s) should be notified of excused absences (e.g., illness, emergencies, unavoidable travel).

Attendance will be taken at all large group classes. If you are unable to attend a large group lecture class, you are required to watch the lecture recording in its entirety on the course Canvas site within three weekdays to receive attendance credit. If you are unable to attend a large group discussion class (August 29 & September 5), you are required to watch the recording in its entirety on the course Canvas site and upload your written critiques of two of the example proposal sections to Canvas within three weekdays to receive attendance credit.

If absence occurs during a SS class, such as during feedback sessions on Specific Aims, Significance/Innovation sections, or the full proposal review, written feedback for the students whose grants were discussed that class should be emailed to the proposal writer(s), SS Chair(s), Calla Telzrow, and Tenley Weil before the next class meeting.

Class Schedule:

Date	Topics/ Units	Delivery Method	Resources and Assignments
Aug 25	Introduction to Course, Expectations, Timeline, and Grant Components (Sullivan & Telzrow)	143 Jones	Resources: Gantt timeline for writing assignments and proposal formatting guidelines
Aug 27	Developing an Idea and Creating Specific Aims (Marchuk)	143 Jones	Assignment: Read sample Specific Aims Pages
Aug 29	Sample Specific Aims Pages (Marchuk) - class discussion	143 Jones	
Sept 1	<i>no class – Labor Day</i>	no class	
Sept 3	Significance and Innovation (Marchuk)	143 Jones	Assignment: Read sample Significance and Innovation Sections
Sept 5	Sample Significance and Innovation Sections (Marchuk and Sullivan) – class discussion	143 Jones	Assignment: All Specific Aims Pages due by 12 noon to entire SS Assignment: Prepare written comments for Specific Aims Pages
Sept 8	SS Critiques of Specific Aims Page	in person SS	Group 1 discussion – 4 students
Sept 10	SS Critiques of Specific Aims Page	in person SS	Group 2 discussion – 4 students
Sept 12	SS Critiques of Specific Aims Page	in person SS	Group 3 discussion – 4 students
Sept 15	Approach/Research Design & Methods/Preliminary Data (Marchuk and Sullivan)	143 Jones	Resource: Sample proposals from previous years
Sept 17	Responding to Critiques & Writing Helpful Reviews (Marchuk)	143 Jones	Resource: Critique templates and resources
Sept 19	Fellowship Training Activities & Timeline (Weil)	143 Jones	
Sept 22	NIH Grant Types & Demystifying Study Sections (Marchuk)	143 Jones	
Sept 24	<i>Online lecture:</i> RCR, R&R, & Ethics in Grant Writing and Review (Telzrow)	Canvas	Assignment: Watch online lecture
Sept 26	<i>Writing on your own:</i> Revised Specific Aims & Significance/Innovation Drafts	no class	Assignment: All Significance/Innovation Sections due by 12 noon to entire SS Assignment: Prepare written comments for Significance/Innovation Sections
Sept 29	SS Critiques of Significance/Innovation Section	in person SS	Group 1 discussion – 4 students
Oct 1	SS Critiques of Significance/Innovation Section	in person SS	Group 2 discussion – 4 students
Oct 3	SS Critiques of Significance/Innovation Section	in person SS	Group 3 discussion – 4 students
Oct 6	<i>no class - writing</i>	no class	Resource: Weekly office hours/writing group
Oct 8	<i>no class - writing</i>	no class	Resource: Weekly office hours/writing group
Oct 10	<i>Online lecture:</i> Personal & sponsor statements (Weil)	Canvas	Assignment: Watch online lecture Resource: Weekly office hours/writing group
Oct 13	<i>no class - writing</i>	no class	Resource: Weekly office hours/writing group
Oct 15	<i>no class - writing</i>	no class	Resource: Weekly office hours/writing group
Oct 17	<i>no class - writing</i>	no class	Resource: Weekly office hours/writing group
Oct 20	<i>no class - writing</i>	no class	Assignment: All complete/full proposals due by 12 noon to entire SS
Oct 22	<i>no class - read SS proposals, prepare written critiques</i>	no class	Assignment: Prepare written comments for proposals Resource: F31 critique template
Oct 24	<i>no class - read SS proposals, prepare written critiques</i>	no class	Assignment: Prepare written comments for proposals Resource: F31 critique template

Date	Topics/ Units	Delivery Method	Resources and Assignments
Oct 27	Mock Study Section: A0 Original (Students 1-2)	in person SS	<i>Resources: Weekly office hours/writing group and F31 critique template</i>
Oct 29	Mock Study Section: A0 Original (Students 3-4)	in person SS	<i>Resources: Weekly office hours/writing group and F31 critique template</i>
Oct 31	Mock Study Section: A0 Original (Students 5-6)	in person SS	<i>Resources: Weekly office hours/writing group and F31 critique template</i>
Nov 3	Mock Study Section: A0 Original (Students 7-8)	in person SS	<i>Resources: Weekly office hours/writing group and F31 critique template</i>
Nov 5	Mock Study Section: A0 Original (Students 9-10)	in person SS	<i>Resources: Weekly office hours/writing group and F31 critique template</i>
Nov 7	Mock Study Section: A0 Original (Students 11-12)	in person SS	<i>Resource: Weekly office hours/writing group</i>
Nov 10	<i>no class - writing/reading revisions, writing critiques</i>	no class	<i>Assignment: Revised A1 Proposal Due Students 1-2</i> <i>Assignment: Prepare written comments for proposals</i> <i>Resources: Weekly office hours/writing group and F31 critique template</i>
Nov 12	Mock Study Section: A1 Revisions (Students 1-2)	in person SS	<i>Assignment: Revised A1 Proposal Due Students 3-4</i> <i>Assignment: Prepare written comments for proposals</i> <i>Resources: Weekly office hours/writing group and F31 critique template</i>
Nov 14	Mock Study Section: A1 Revisions (Students 3-4)	in person SS	<i>Assignment: Revised A1 Proposal Due Students 5-6</i> <i>Assignment: Prepare written comments for proposals</i> <i>Resources: Weekly office hours/writing group and F31 critique template</i>
Nov 17	Mock Study Section: A1 Revisions (Students 5-6)	in person SS	<i>Assignment: Revised A1 Proposal Due Students 7-8</i> <i>Assignment: Prepare written comments for proposals</i> <i>Resources: Weekly office hours/writing group and F31 critique template</i>
Nov 19	Mock Study Section: A1 Revisions (Students 7-8)	in person SS	<i>Assignment: Revised A1 Proposal Due Students 9-10</i> <i>Assignment: Prepare written comments for proposals</i> <i>Resources: Weekly office hours/writing group and F31 critique template</i>
Nov 21	Mock Study Section: A1 Revisions (Students 9-10)	in person SS	<i>Assignment: Revised A1 Proposal Due Students 11-12</i> <i>Assignment: Prepare written comments for proposals</i> <i>Resources: Weekly office hours/writing group and F31 critique template</i>
Nov 24	Mock Study Section: A1 Revisions (Students 11-12)	in person SS	<i>Resource: Review rubric</i>
Dec 5	Scores for each A1 revision grant in SS Due at Noon	Canvas	<i>Assignment: Rank order list of SS proposals uploaded to Canvas by 5 PM</i>

- **SS Chair(s) responsibility**
- **SS Chair(s), 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)**
- **SS Chair(s), 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 A0 original proposals)**
- Important points to remember:
 - All 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 SS; see the “**Study section information and guidelines**” Canvas module for a list of email addresses for each SS.
 - 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.
 - The TA, Tenley, holds weekly office hours to offer guidance on writing and revision. The Course Directors are also available for check-ins/office hours by appointment.