

BIOTRAIN 720: Grant Writing for Biomedical Scientists

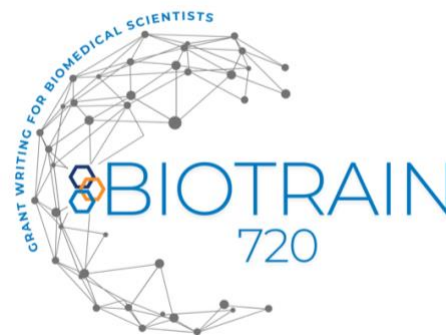
Course Director:

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Course Instructor:

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Teaching Assistant (TA):

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Day/Time:

MWF 8:30 – 9:30 AM

Format:

In person

Locations:

Lectures – 143 Jones Research Building

Study sections (SS) – various

Grading Basis:

Graded – 3 credit hours

SS Chairs:

1. Drs. Xiao-Fan Wang & Tso-Pang Yao (Cancer Biology and Pharmacology) (SS in LSRC C234)
2. Drs. Li Lan & David Virshup (Cell and Molecular Biology) (SS TSCHE 3024)
3. Dr. Beth Hauser (Computational Biology and Bioinformatics) (SS in Hock 11110 [11th floor])
4. Dr. Kate Hoffman (Environment and Toxicology) (SS in LSRC A336)
5. Drs. Hiro Matsunami & Anne West (Genetics and Genomics) (SS in TSCHE 4030)
6. Drs. David Tobin & Raphael Valdivia (Immunology and Disease) (SS in MSRB-3 4122)
7. Drs. Dennis Ko & John Rawls (Microbial Pathogenesis) (SS in Jones 415)
8. Drs. Lindsey Glickfeld & Jeremy Kay (Neurobiology) (SS in Bryan Research Building 301)

Class Delivery:

Classes will be held as a combination of in-person lectures and discussions, asynchronous recorded lectures, and small groups/study sections (SS). In-person lectures will be held in 143 Jones Research Building. Asynchronous recorded lectures will be available on the course Canvas site. 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 the 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 Director or SS chairs directly.

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 "**Class Meetings**" 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/discussion 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 Strategy).
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' proposals 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-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 8 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:

Prior to the official start of the course on August 24, students are expected to attend a virtual pre-course session via Zoom on August 3 from 11 AM – 12 PM. This session will provide a brief overview of the course and include a lecture on developing a strong research proposal idea. Following the Zoom session, students must complete a pre-course assignment in Canvas before the first day of class. As part of this assignment, students will develop a guiding research question, formulate a central hypothesis, and outline their Specific Aims. Students are expected to discuss their proposal idea with their advisor before submitting this assignment. This exercise is designed to help students begin developing the ideas and content needed for their Specific Aims pages early in the course. Additionally, this information will be used to assign students into the appropriate thematic SS 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.

Office Hours and Writing Group:

We are fortunate to have Newton PenkoffLidbeck serving as a teaching assistant (TA) for this course. Newton will hold office hours during which he will offer feedback on writing sections of proposals and answer questions about the course, including best practices in time management for meeting multiple course deadlines throughout the semester. 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 19. Newton will hold these office hours Mondays and Thursdays from 2-3:30 PM in MSRB-III 1261, beginning on Thursday, August 27. This information is also available on the course Canvas site in the "**Office hours**" module. The Course Director is 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. Students are expected to discuss their proposal idea with their advisor before submitting the pre-course assignment to ensure that the proposed project aligns with the broader goals of the research group. Students are also encouraged to seek feedback on their proposal/proposal sections from individuals outside the course, including their advisor, other lab members, and peers. Such feedback should remain at a high level (e.g., identifying sections that would benefit from clarification or experimental approaches that require further consideration or justification) and should not involve rewriting any portion of the student's grant proposal.

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 student to serve as an assigned proposal reviewer for two colleagues, and students are expected to participate verbally in the review of ALL the proposals in the 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 student proposal sections (Specific Aims, Significance and Innovation) and full proposals for the mock SS; students are responsible for emailing their proposal sections and full proposals directly to their SS, including the Chair(s) and faculty reviewer (when applicable).

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 8 in-person lectures that all have interactive components to some extent, 5 asynchronous lectures, and 18 SS meetings. Additionally, the Canvas Announcement function will be used by the Course Director frequently to post important information within the course-room to all students. These messages should come to your email but will also be accessible through the “**Announcements**” tab in Canvas.

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 the Course Director or your SS chair(s) if you have questions about attendance.

Assessment of Peers' Proposals: Each student will evaluate all Specific Aims and Significance/Innovation 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 full proposals are due to your SS via email on the day before the 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. Mock Study Section is NOT an open discussion with the student proposal writer – we now move to NIH-style review mode. When a student's proposal is being discussed, they should not be part of the conversation and can sit to the side/back of room, observing and taking notes on verbal feedback. Faculty reviewers and proposal writers may discuss feedback at the end of the class period.

Grading:

Students will learn how to write a grant and 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 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 in the Introduction to the Revision.

Student Participation in Proposal Scoring:

At the end of the semester, students will participate in ranking the proposals in their 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 Director 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 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. 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.

Use of Artificial Intelligence (AI) Tools:

Students may use Grammarly, as well as generative AI tools protected under Duke’s data security and licensing agreement, such as Microsoft Copilot, to refine and edit their proposal writing (e.g., to improve clarity, grammar, or style). Students who use AI tools for editing assistance are responsible for ensuring that all final content is accurate, original, and reflects their own work. Any use of AI tools must be disclosed in a footnote to the proposal, including the name of the tool and a brief description of how it was used. Students may **not** use these or any other AI tools to generate original ideas or write any portion of the proposal. Students may **not** use generative AI tools to review any portion of proposals or formulate critiques, consistent with NIH policy. 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:

Duke University is committed to providing equal access to students with documented disabilities. Students with disabilities may contact the Student Disability Access Office (SDAO) to ensure your access to this course and to the program. There you can engage in a confidential conversation about the process for requesting reasonable accommodations both in the classroom and in clinical settings. Students are encouraged to register with the SDAO as soon as they begin the program. Please note that accommodations are not provided retroactively. More information can be found online at access.duke.edu or by contacting SDAO at 919-668-1267, SDAO@duke.edu.

Absence Policy:

Students are expected to attend both large group classes and small group SS classes. The Course Director 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 28 & September 16), 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), the Course Director, and the TA before the next class meeting.

Class Schedule:

Date	Topics/ Units	Delivery Method	Resources and Assignments
Aug 3	Developing an Idea	<u>Zoom</u>	
Aug 24	Introduction to Course, Expectations, Timeline, and Grant Components	143 Jones	Assignment due: Developing an Idea homework due on Canvas at 5 PM Resources: Gantt Timeline for writing assignments and Proposal Formatting Requirements
Aug 26	Creating Specific Aims	143 Jones	
Aug 28	Sample Specific Aims Pages – class discussion	143 Jones	Assignment due: Read sample Specific Aims Pages on Canvas
Aug 31	Finding, Organizing, and Citing Literature for Grants	143 Jones	
Sept 2	<i>no class - writing</i>	no class	Assignment due: All Specific Aims Pages due by 12 noon to entire SS
Sept 4	SS Critiques of Specific Aims Page	in person SS	Group 1 discussion – 4 students Assignment due: Read Specific Aims Pages to be discussed in SS
Sept 7	<i>No class – Labor Day</i>	no class	
Sept 9	SS Critiques of Specific Aims Page	in person SS	Group 2 discussion – 4 students Assignment due: Read Specific Aims Pages to be discussed in SS
Sept 11	SS Critiques of Specific Aims Page	in person SS	Group 3 discussion – 4 students Assignment due: Read Specific Aims Pages to be discussed in SS
Sept 14	Significance and Innovation	143 Jones	
Sept 16	Sample Significance and Innovation – class discussion	143 Jones	Assignment due: Read sample Significance and Innovation Sections on Canvas
Sept 18	<i>Online lecture: Discovery-based Proposals</i>	Canvas	Assignment due: Watch lecture on Canvas
Sept 21	<i>no class - writing</i>	no class	Assignment due: All Significance/Innovation Sections and revised Specific Aims Pages due by 12 noon to entire SS
Sept 23	SS Critiques of Significance/Innovation Section	in person SS	Group 1 discussion – 4 students Assignment due: Read Significance/Innovation Sections and revised Specific Aims Pages to be discussed in SS
Sept 25	SS Critiques of Significance/Innovation Section	in person SS	Group 2 discussion – 4 students Assignment due: Read Significance/Innovation Sections and revised Specific Aims Pages to be discussed in SS
Sept 28	SS Critiques of Significance/Innovation Section	in person SS	Group 3 discussion – 4 students Assignment due: Read Significance/Innovation Sections and revised Specific Aims Pages to be discussed in SS
Sept 30	Approach Section I	143 Jones	Resource: Sample proposals from previous years Resource: Weekly office hours
Oct 2	Approach Section II	143 Jones	Resource: Weekly office hours
Oct 5	<i>Online lecture: RCR in Grant Writing</i>	Canvas	Assignment due: Watch lecture on Canvas Resources: OBGE RCR & R&R Fellowship Application Narrative and

Date	Topics/ Units	Delivery Method	Resources and Assignments
			Types of NIH Grants Resource: Weekly office hours
Oct 7	no class - writing	no class	Resource: Weekly office hours
Oct 9	Online lecture: Components of an NIH F31	Canvas	Assignment due: Watch lecture on Canvas Resource: Weekly office hours
Oct 12	no class - writing	no class	Resource: Weekly office hours
Oct 14	Online lecture: Candidate Section of NIH F31	Canvas	Assignment due: Watch lecture on Canvas Resource: Weekly office hours
Oct 16	no class - writing	no class	Resource: Weekly office hours
Oct 19	Online lecture: Writing and Responding to Critiques – Full proposals due	Canvas	Assignment due: All complete/full proposals due by 12 noon to entire SS Assignment due: Watch lecture on Canvas (due Oct 20) Resource: Critique Templates and Resources Resource: Fellowship Critique Template
Oct 21	no class - read SS proposals, prepare written critiques	no class	
Oct 23	no class - read SS proposals, prepare written critiques	no class	
Oct 26	Mock Study Section: A0 Original (Students 1-2)	in person SS	Assignment due: Submit written comments for assigned proposals to SS day before Resources: Weekly office hours
Oct 28	Mock Study Section: A0 Original (Students 3-4)	in person SS	Assignment due: Submit written comments for assigned proposals to SS day before Resources: Weekly office hours
Oct 30	Mock Study Section: A0 Original (Students 5-6)	in person SS	Assignment due: Submit written comments for assigned proposals to SS day before Resources: Weekly office hours
Nov 2	Mock Study Section: A0 Original (Students 7-8)	in person SS	Assignment due: Submit written comments for assigned proposals to SS day before Resources: Weekly office hours
Nov 4	Mock Study Section: A0 Original (Students 9-10)	in person SS	Assignment due: Submit written comments for assigned proposals to SS day before Resources: Weekly office hours
Nov 6	Mock Study Section: A0 Original (Students 11-12)	in person SS	Assignment due: Submit written comments for assigned proposals to SS day before Resources: Weekly office hours
Nov 9	no class - writing/reading revisions, writing critiques	no class	Assignment due: Revised A1 Proposal due by 12 noon for Students 1-2 Resources: Weekly office hours
Nov 11	Mock Study Section: A1 Revisions (Students 1-2)	in person SS	Assignment due: Submit written comments for assigned proposals

Date	Topics/ Units	Delivery Method	Resources and Assignments
			<i>to SS day before</i> <i>Assignment due: Revised A1 Proposal due by 12 noon for Students 3-4</i> <i>Resources: Weekly office hours</i>
Nov 13	Mock Study Section: A1 Revisions (Students 3–4)	in person SS	<i>Assignment due: Submit written comments for assigned proposals to SS day before</i> <i>Assignment due: Revised A1 Proposal due by 12 noon for Students 5-6</i> <i>Resources: Weekly office hours</i>
Nov 16	Mock Study Section: A1 Revisions (Students 5–6)	in person SS	<i>Assignment due: Submit written comments for assigned proposals to SS day before</i> <i>Assignment due: Revised A1 Proposal due by 12 noon for Students 7-8</i> <i>Resources: Weekly office hours</i>
Nov 18	Mock Study Section: A1 Revisions (Students 7–8)	in person SS	<i>Assignment due: Submit written comments for assigned proposals to SS day before</i> <i>Assignment due: Revised A1 Proposal due by 12 noon for Students 9-10</i> <i>Resources: Weekly office hours</i>
Nov 20	Mock Study Section: A1 Revisions (Students 9-10)	in person SS	<i>Assignment due: Submit written comments for assigned proposals to SS day before</i> <i>Assignment due: Revised A1 Proposal due by 12 noon for Students 11-12</i> <i>Resources: Weekly office hours</i>
Nov 23	Mock Study Section: A1 Revisions (Students 11-12)	in person SS	<i>Assignment due: Submit written comments for assigned proposals to SS day before</i> <i>Resource: Review rubric</i>
Dec 4	Scores for each A1 revision grant in SS Due at Noon	Canvas	<i>Assignment due: 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 oversees review of 2 revised grants/class – 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**” 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.
 - The TA, Newton PenkoffLidbeck, holds weekly office hours to offer guidance on writing and revision. The Course Director is also available by appointment.