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Course Description: This course introduces first-year Ph.D. students to the foundational skills, knowledge, and habits of mind required of successful, independent biological scientists:
1) Social dynamics in the scientific research enterprise 
2) Epistemology and ethics of bioresearch methods 
3) Development and communication of research questions and results 
4) Interdisciplinary scientific thinking

Class sessions and homework introduce these topics; major assignments prompt student to connect them with the broader scope of graduate training in lab rotations, course work, and interdisciplinary scientific seminars. The interactive, student-driven class structure facilitates autodidactic development while integrating small group activities and peer mentoring from advanced DBBS students. The course makes explicit the recursive relationship between classroom and lab-based training by requiring students to develop a question and set of specific aims related to their lab rotation and then deliver a presentation of the research to their peers. Prerequisite: Students must be enrolled in a graduate program through the Division of Biology & Biomedical Sciences.

Learning Objectives: After taking this course, students will be able to:
● Demonstrate professionalism and begin to navigate collaborations 
● Identify strengths and challenges of diversity in the scientific research enterprise 
● Apply principles of rigor and reproducibility in biological research 
● Explain basic ethical research practices and understand the causes of research misconduct 
● Develop a question or hypothesis in response to a knowledge gap 
● Begin to write and edit specific aims 
● Develop a presentation with collaborators 
● Engage with interdisciplinary research beyond their graduate program

Required Texts, Materials, Equipment:
● Science Careers myIDP 
● Canvas learning management system 
● Wifi-enabled device

Course Requirements:
The course meets synchronously for 1 hour every week, with additional asynchronous work before and after each class. Assignments include online discussions, a hypothesis/questions and specific aims on a rotation project, a short final presentation, and an individual development plan (IDP). Students will also attend three scientific seminars outside of their program and respond in writing to prompts in Canvas.
Course Schedule:

<table>
<thead>
<tr>
<th>DATE</th>
<th>CLASS TOPIC</th>
<th>INSTRUCTORS</th>
<th>ASSIGNMENTS DUE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unit 1: Social Dynamics in the Scientific Research Enterprise</strong>&lt;br&gt;Core Competencies: Career Readiness, Managing Self &amp; Others, Diversity, Equity, &amp; Inclusion</td>
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<tr>
<td><strong>Week 1</strong></td>
<td><strong>9/17</strong></td>
<td>Scientific Professionalism &amp; Career Readiness</td>
<td>Brian Kim, Jessica Hutchins</td>
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<tr>
<td><strong>Week 2</strong></td>
<td><strong>9/24</strong></td>
<td>Diversity in the Scientific Research Enterprise</td>
<td>Erin Stampp</td>
</tr>
<tr>
<td><strong>Week 3</strong></td>
<td><strong>10/1</strong></td>
<td>Small Group Discussion – Social Dynamics in Science</td>
<td>Student Mentors</td>
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<tr>
<td><strong>Unit 2: Epistemology &amp; Ethics of Bioresearch Methods</strong>&lt;br&gt;Core Competencies: Scientific Reasoning, Responsible Conduct of Research</td>
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<tr>
<td><strong>Week 4</strong></td>
<td><strong>10/8</strong></td>
<td>Scientific Epistemology &amp; Critical Thinking</td>
<td>Anya Plutynski, Steve Mennerick</td>
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<tr>
<td><strong>Week 5</strong></td>
<td><strong>10/15</strong></td>
<td>Statistical Thinking and Practice</td>
<td>Andrew Martin</td>
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<tr>
<td><strong>Week 6</strong></td>
<td><strong>10/22</strong></td>
<td>Introduction to Ethical Considerations in Bioscience Research</td>
<td>Tristan McIntosh</td>
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<tr>
<td><strong>Week 7</strong></td>
<td><strong>10/29</strong></td>
<td>Introduction to Principles of Rigor &amp; Reproducibility</td>
<td>Ben Major</td>
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<tr>
<td><strong>Week 8</strong></td>
<td><strong>11/5</strong></td>
<td>Small Group Discussion – Rigor &amp; Reproducibility</td>
<td>Student Mentors</td>
</tr>
<tr>
<td><strong>Unit 3: Developing &amp; Communicating Research Questions and Results</strong>&lt;br&gt;Core Competencies: Scientific Reasoning, Writing and Communication</td>
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<tr>
<td><strong>Week 9</strong></td>
<td><strong>11/12</strong></td>
<td>Developing a Research Question or Hypothesis</td>
<td>Petra Levin</td>
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<td><strong>Week 10</strong></td>
<td><strong>11/19</strong></td>
<td>Writing Rigorous Specific Aims</td>
<td>Debbie Frank, Sarah England</td>
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<tr>
<td><strong>Week 11</strong></td>
<td><strong>11/26</strong></td>
<td>Thanksgiving – No Class</td>
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<tr>
<td><strong>Week 12</strong></td>
<td><strong>12/3</strong></td>
<td>Small Group Discussion – Specific Aims Workshop</td>
<td>Student Mentors</td>
</tr>
<tr>
<td><strong>Week 13</strong></td>
<td><strong>12/10</strong></td>
<td>Giving Scientific Presentations</td>
<td>Jessica Hutchins, Jeff Gordon</td>
</tr>
<tr>
<td><strong>Week 14</strong></td>
<td><strong>12/17</strong></td>
<td>Small Groups – Final Presentations</td>
<td>Student Mentors</td>
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Assignments: See Canvas for more details
Canvas Online Discussions – Students will participate in asynchronous online Canvas discussions throughout the semester. See Canvas for discussion due dates.

Interdisciplinary Scientific Seminars (3) – Attend 3 scientific seminars outside of your program or area of interest, preferably featuring a speaker from outside Washington University. (Student work-in-progress seminars do not count.) Afterward, write a response to the seminar using the prompts below. You must use at least 3 of these prompts in your 3 responses.
1) Explain what you learned by attending this seminar.
2) Critique the seminar. Analyze the question, methods, results, and data interpretation.
3) Ask the presenter a question. Write up the rationale for your question and the presenter’s response.
4) Look up the presenter’s funding mechanisms in NIH Reporter or NSF Award Search. How does this presentation fit into the broader scope of their research?

Specific Aims Writing Workshop – During weeks 12 and 13, students will write specific aims related to a rotation project, workshop, and revise their aims through Canvas and a small group meeting. See Canvas for instructions and due dates

Final Presentation – At the final small group meeting during week 14, you will deliver a short, 3-minute oral presentation on one of your rotations using 1-3 slides. Explain your research question, at least one specific aim, and any results you found. Explain the significance of the project to your interdisciplinary small group of peers. This presentation builds on weeks 9-13 in which you defined a research question, wrote and refined specific aims, and learned about effective scientific presentation practices. Be sure to rehearse your presentation in front of an audience to meet the time limit and communication goals.

Individual Development Plan – Complete an IDP and upload it to Canvas as a PDF at the end of the semester. See Canvas for details and due date.

Attendance and Participation – Attendance at all class meetings is required. Students are expected to complete all preparatory assignments prior to class, attend all class and group meetings, participate with thoughtful questions and constructive comments, and meet all course deadlines.

Course Evaluation/Grading:
Students will receive either a Satisfactory (S) or Unsatisfactory (U) grade for this course. To receive a Satisfactory grade, students must receive 85% or more for the course based on evaluation of participation and completion of required assignments as weighted below.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Canvas Discussions</td>
<td>20 %</td>
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<tr>
<td>Interdisciplinary Scientific Seminars</td>
<td>20 %</td>
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<tr>
<td>Specific Aims Writing Workshop</td>
<td>20%</td>
</tr>
<tr>
<td>Final Presentation</td>
<td>10 %</td>
</tr>
<tr>
<td>Individual Development Plan</td>
<td>10%</td>
</tr>
<tr>
<td>Attendance &amp; Participation</td>
<td>20 %</td>
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</table>
### Course Policies and Information for Students:

#### INCLUSIVE LEARNING ENVIRONMENT STATEMENT

The best learning environment is one in which all members feel respected while being productively challenged. At Washington University in St. Louis, we are dedicated to fostering an inclusive atmosphere, in which all participants can contribute, explore, and challenge their own ideas as well as those of others. Every participant has an active responsibility to foster a climate of intellectual stimulation, openness, and respect for diverse perspectives, questions, personal backgrounds, abilities, and experiences, although instructors bear primary responsibility for its maintenance. A range of resources is available to those who perceive a learning environment as lacking inclusivity, as defined in the preceding paragraph. If possible, we encourage students to speak directly with their instructor about any suggestions or concerns they have regarding a particular instructional space or situation. Alternatively, students may bring concerns to another trusted advisor or administrator (such as an academic advisor, mentor, department chair, or dean). All classroom participants—including faculty, staff, and students—who observe a bias incident affecting a student may also file a report (whether personally or anonymously) utilizing the online Bias Report and Support System.

1. **COVID-19 HEALTH AND SAFETY PROTOCOLS FOR FALL 2020:** Exceptions to course policies, expectations, and requirements (including attendance and assignment deadlines) because of a COVID-19 diagnosis, symptoms consistent with COVID-19, or exposure to a person with a confirmed or suspected COVID-19 diagnosis will be made in collaboration between the student and instructor.

2. **ATTENDANCE POLICY:** Class attendance is required. You are expected to attend all class meetings and 3 scientific seminars outside of class. As a graduate student, it is your responsibility to manage your schedule of academic, professional, and personal commitments.
   - If an illness of emergency prevents you from attending a synchronous class session, contact your small group mentor as soon as possible.
   - Schedule conflicts with timed experiments, lab meetings, or other academic and personal commitments are not considered excused absences and will affect your grade.

3. **TECHNOLOGY POLICIES:**
   - **In-Class Technology:** You are invited to use laptop computers and electronic devices for normal and appropriate classroom activities. These include attending synchronous class sessions, writing, note-taking, reading, and instructor-directed active-learning activities. Inappropriate uses include texting, social media, shopping, keeping up with the Kardashians, and anything that distracts from class content and objectives. Inappropriate use of technology in class can hinder learning for both the technology user and other students in the class (Sana, Weston, & Cepeda, 2013).
   - **Digital Etiquette:** You are expected to uphold the highest standards of professionalism and collegiality both in-person and in digital interactions through Canvas, email, in-class polling, and all other forms of communication with classmates, peer mentors, and instructors. All DBBS students are expected to understand and adhere to the Graduate School’s professional integrity policy: https://graduateschool.wustl.edu/policies-procedures.

4. **ETHICS/VIOLATIONS OF ACADEMIC INTEGRITY:** Ethical behavior is an essential component of learning and scholarship. Students are expected to understand, and adhere to, the Graduate School’s academic integrity policy: https://graduateschool.wustl.edu/policies-procedures. Penalties for violating the policy will administered according to the Graduate School guidelines. If you have any doubts about what constitutes a violation of the Academic Integrity policy, or any other issue related to academic integrity, please ask your instructor. Academic integrity guidelines for this course:
• Always cite your sources when you present ideas and/or language that you have not developed yourself, including materials from class lectures and discussions.
• Violation of this policy includes collaborating on assignments where collaboration is not allowed, and/or utilizing notes, texts, etc. on any assignment where use of such materials is not allowed.

Resources for Students

1. THE WRITING CENTER: For additional help on your writing or giving a talk, consult the expert staff of The Writing Center & Speaking Studio in Olin Library (first floor). Our one-on-one writing and public-speaking support will take place virtually using an online video conferencing platform, which is built-in to our online scheduling system. Go to writingcenter.wustl.edu/ to make an appointment. The Writing Center staff can assist by providing feedback on the strength of an argument, clarity, and organization. Contact them at 935-4981 or writing@wustl.edu.

2. ENGLISH LANGUAGE SUPPORT: The English as a Second Language (ESL) Program offers courses, seminars, and support in academic and professional English language. To find out if you qualify for these English language supports or learn more about ESL Programs, contact our Coordinator for the ESL Program, Haley Dolosic, at DOLOSICHN@WUSTL.EDU or (314) 935-2651.

3. PREFERRED NAME AND GENDER INCLUSIVE PRONOUNS: In order to affirm each person’s gender identity and lived experiences, it is important that we ask and check in with others about pronouns. This simple effort can make a profound difference in a person’s experience of safety, respect, and support. See: https://students.wustl.edu/gender-pronouns-information/, https://registrar.wustl.edu/student-records/ssn-name-changes/preferred-name/.

4. CENTER FOR DIVERSITY AND INCLUSION (CDI): The Center for Diversity and Inclusion (CDI) supports and advocates for undergraduate, graduate, and professional school students from underrepresented and/or marginalized populations, collaborates with campus and community partners, and promotes dialogue and social change to cultivate and foster a supportive campus climate for students of all backgrounds, cultures, and identities. See: https://diversityinclusion.wustl.edu/.

5. EMERGENCY PREPAREDNESS: Before an emergency, familiarize yourself with the building(s) that you frequent. Know the layout, including exit locations, stairwells and the Emergency Assembly Point (EAP). Review the “Quick Guide for Emergencies” that is found near the door in many classrooms for specific emergency information and instructions. For additional Information and EAP maps, visit emergency.wustl.edu. To ensure that you receive emergency notifications, make sure your information and cell phone number is updated in SIS, and/or download. The WUSTL app and enable notifications.
   To report an emergency:
   • Danforth Campus: (314) 935-5555
   • School of Medicine Campus: (314) 362-4357
   • North/West/South and Off Campus: 911 then (314) 935-5555

6. BIAS REPORTING: The University has a process through which students, faculty, staff and community members who have experienced or witnessed incidents of bias, prejudice or discrimination against a student can report their experiences to the University’s Bias Report and Support System (BRSS) team. See: brss.wustl.edu
7. MENTAL HEALTH: Mental Health Services’ professional staff members work with students to resolve personal and interpersonal difficulties, many of which can affect the academic experience. These include conflicts with or worry about friends or family, concerns about eating or drinking patterns, and feelings of anxiety and depression. See: wusmhealth.wustl.edu/students/mental-health-information/

8. FALL 2020 ELECTION: There is a federal election happening on November 3, 2020. If you would like to register to vote prior to the election, you can do so at wustl.turbovote.org. If you are ineligible to vote, you can still participate by referring your friends who are eligible to the TurboVote link to register. Additionally, everyone can contribute to the campus energy surrounding voting by starting dialogue with your peers about the importance of voting, educating yourself on American democracy and the ways certain policies affect you and others, and participating in year-round forms of civic engagement beyond voting. If you have any questions about the voting process, please reach out to washuvotes@wustl.edu for assistance.

9. ACCOMMODATIONS FOR DISABLED STUDENTS: Washington University in St. Louis supports the rights of enrolled students to a full and equal educational opportunity and, in compliance with federal, state, and local requirements, is committed to reasonable accommodations for individuals with documented disabilities. Disabled students for whom accommodations may be necessary must be registered with, and provide their instructors official notification through, WUSTL’s Disability Resources (https://students.wustl.edu/disability-resources/). Once established, responsibility for disability-related accommodations and access is shared by DR, faculty, and the student. Please contact Disability Resources at 314.935.5970 or disabilityresources@wustl.edu.

10. REPORTING SEXUAL ASSAULT: If a student discusses or discloses an instance of sexual assault, sexual discrimination, sexual harassment, dating violence, domestic violence or stalking, or if a faculty member otherwise observes or becomes aware of such an allegation, they will keep the information as private as possible, but as a faculty member of Washington University, they are required to immediately report it to the Department Chair or Dean or directly to Ms. Jessica Kennedy, the University’s Title IX Director, at (314) 935-3118, jwkennedy@wustl.edu. Additionally, you can report incidents or complaints to the Office of Student Conduct and Community Standards or by contacting WUPD at (314) 935-5555. Students who wish to speak with a confidential resource may wish to reach out to the Relationship and Sexual Violence Prevention Center (RSVP) at 935-8761 or by visiting the 4th floor of Seigle Hall.

11. ACCOMMODATIONS FOR SEXUAL ASSAULT: The University is committed to offering reasonable academic accommodations (e.g., a no-contact order, course changes) to students who are victims of relationship or sexual violence, regardless of whether they seek criminal or disciplinary action. If you a student needs to request such accommodations, please have them contact the Relationship and Sexual Violence Prevention Center (RSVP) at rsvpcenter@wustl.edu or (314) 935-3445 to schedule an appointment with an RSVP confidential and licensed counselor. Information shared with counselors is confidential. However, requests for accommodations will be coordinated with the appropriate University administrators and faculty.

12. STATEMENT ON MILITARY SERVICE LEAVE: Washington University recognizes that students serving in the U.S. Armed Forces and their family members may encounter situations where military service forces them to withdraw from a course of study, sometimes with little notice. Students may contact the Office of Military and Veteran Services at (314) 935-2609 or veterans@wustl.edu and their academic dean for guidance and assistance. See: https://veterans.wustl.edu/policies/policy-for-military-students/.

Disclaimer: The instructors reserve the right to make modifications to this syllabus throughout the semester.