

## **Syllabus for iBiology's Planning Your Scientific Journey Self-Paced Course**

### *Overall Course Goals and Mission Statement*

Being successful as a science graduate student or postdoc involves more than acquiring knowledge, reading the literature, and doing experiments. It also requires important skills in picking a good question, planning a strategy to answer the question, seeking advice, and communicating your results. Unfortunately, many of these skills are not formally taught in universities, and you have to learn them “on the job.” At iBiology, we thought that it is important to address all of these topics in a series of courses which we will roll out sequentially. The first course, “Planning Your Scientific Journey,” addresses how to ask a scientific question and plan your research project. It is aimed primarily at biology graduate and undergraduate students but is also useful for postdocs, staff scientists, faculty, and anyone else who could benefit from reviewing these topics.

This course will equip you with concrete tools and practical advice to navigate the most challenging aspects of developing and planning a research project. Our innovative curriculum is unlike any other online science course. Instruction is led by a diverse group of leading scientists, such as Nobel Laureates, accomplished faculty, and junior scientists, who think deeply about mentorship and scientific training.

At the end of this course you will have:

1. Criteria to evaluate your scientific question(s) and experimental approach.
2. A plan for your research goals.
3. An agenda for a meeting with your mentor to discuss your plan.

### *Course Format*

There are no prerequisites to take this course. The course is composed of videos, instructional text, relevant journal articles, related videos, forum discussion questions, and open response assessments. The majority of the instructional materials are contained within the videos and text.

“Planning Your Scientific Journey” is an on-demand, self-paced course. This means that, as soon as you enroll, all course content is available to you and may be consumed at your own pace. To ensure that you meet your own goals for this course, we strongly recommend you develop a plan for taking the course - preferably one that is time-bound and realistic to your schedule. For your reference, it took students 6 -7 weeks to complete the whole course when we ran it in a hosted, synchronized format. They spent on average 2-3.5 hours on the course per week. This includes time spent watching videos, reading text, doing assessments, and engaging in the forum.

This is a pass/fail course, and your grade will be based solely on the completion of the open response assessments. These assessments are designed to help you gain a more complete understanding of your scientific interests, skills, and goals in order for you to devise a scientific question, a concrete plan for your research, and an agenda for a meeting with your mentor to discuss your plan.

### *Course Schedule*

#### **Module 1: Develop a Framework**

*About This Course* - This is where you will find all the basic information on this course, such as course navigation instruction (Platform Information lesson), the course syllabus, the grading policy, and the discussion forum guidelines (Course Information lesson).

*Lesson 0: Introduction* - This lesson introduces you to the course goals and the discussion forums. If you haven't had a chance to take the pre-course survey, a link is provided in this lesson.

*Lesson 1: Find Your Niche* - We start off the course by discussing how science is an act of self-expression, and why having different perspectives is critical to the progress of science. We examine the need for choosing a scientific question that you find interesting, motivating, and appropriately challenging. You will conclude this lesson by reflecting on your research interests, the techniques you have mastered, and the techniques you will be most interested in applying to your scientific question.

*Lesson 2: A Process to Develop a Research Project* - We emphasize in this lesson how developing a scientific question doesn't happen without concerted effort. A person needs to dedicate space and time to work on it. This lesson takes you through an example process of how one advisor has her trainees develop a scientific question and experimental approach. You will define your own process for developing a research project, and identify the resources you need to explore a research topic.

#### **Module 2: Identify a Scientific Question**

*Lesson 3: Criteria to Evaluate Your Scientific Question, Part 1* - We move on to discuss why developing a good scientific question is a key aspect of your training and an important transferable skill. We outline the basics of what makes a scientific question "good" and ask you to identify at least one problem you are interested in pursuing. As you continue through this lesson, you will answer a series of questions, each designed to help you evaluate your research question based on a specific set of criteria.

#### **Module 3: Evaluate Your Experimental Approach**

*Lesson 4: Criteria to Evaluate Your Scientific Question, Part 2* - This lesson is a continuation of Lesson 3. In this lesson, you will identify and evaluate an experimental approach to your question and examine the feasibility and interest of your research project. By the end, you will have an analysis of the merits and pitfalls of a research project that you may use to weigh the decision to pursue a project or, if you've already started one, the next steps you should take.

#### **Module 4: Plan Your Research**

*Lesson 5: Direct Your Scientific Journey with a Plan* - In this lesson, we introduce you to the importance of planning in science, and how the Individual Development Plan (IDP) tool can be extremely useful in creating and organizing your training experience. By the end of this lesson, you will formulate short and long-term goals for your research project. You will also identify skills you want to develop based on your project, training requirements, and personal goals over the next year.

#### **Module 5: Bring Your Plan to Life**

*Lesson 6: Bring Your Plan to Life* - We introduce you to the SMART principle and how it's applied toward making goals that are achievable. You will adapt your project and skills development goals from Module 4 into SMART goals. Combined, these SMART goals will be the basis for your concrete and executable research plan. Finally, we address the importance of holding yourself accountable to your plan, as well as being flexible and adaptable to evolving circumstances. By the end of this lesson, you will have strategies to help you follow through and get feedback on your research plan. You will also schedule a meeting with your mentor to discuss your "My Research Plan."

#### **Module 6: Develop a Growth Mindset & Seek Feedback**

*Lesson 7: Anticipate Success, Embrace Failure* - We concentrate on the importance of developing a "growth mindset" as you move forward with your research project. Science is a non-linear process, where setbacks are inevitable. You will hear expert advice for how to navigate this ever-changing environment successfully. You will also have time to review your "My Research Plan," a document that is a compilation of most assessments from the course, and make revisions.

*Lesson 8: Prepare for a Meeting with your Mentor* - In this final lesson, you will get tips from mentoring experts on how to prepare for a meeting with your mentor. By the end of this lesson, you will draft an agenda for this meeting and have finished reviewing and revising your "My Research Plan."