



**SYSTEMS, SYNTHETIC, AND PHYSICAL  
BIOLOGY GRADUATE PROGRAM**

GRADUATE STUDENT HANDBOOK

2024-2025

*last updated July 29<sup>th</sup>, 2024*

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## I. PROGRAM OVERVIEW

### A. Systems, synthetic, and physical biology

Systems, Synthetic, and Physical Biology (SSPB) is a growing discipline that combines the approaches of Systems and Synthetic Biology with biophysical research to build a complete and quantitative approach for studying complex biological problems and the engineering of biological systems. There is a great deal of methodological and intellectual overlap between these research areas, an intellectual interface that is rapidly becoming one of the most important areas of life sciences of this century. Within the next 50 years, we will likely see a dramatic shift in manufacturing and medicine towards much more biological technologies and discoveries as the bioeconomy grows. While the recent period has been called the Information Age, the next period will be a biological one in which cells are engineered to produce new medicines, biofuels, and materials. Before we can reliably engineer cells, we must understand how to speak the language of life. While DNA is part of the language of all life, as scientists we struggle to read and write stories of any real sophistication. SSPB research is at the heart of reading, understanding, and using this elegant language to construct and deconstruct genetic circuits that will allow us to determine how cells operate, interact with each other, and adapt to their environment. Once we truly understand this language, we will be able to reprogram cells to make new tissues, biofuels, chemicals, materials, and medicines.

**Systems Biology** is the study of the emergence of functional properties in biological systems but not in their individual components. Systems Biology attempts to understand how a biological process in a cell, a group of cells, or a tissue works and how different components within that biological entity give rise to the complex phenotype observed. The topics include the studies of signaling, multicellular organization, and gene regulatory/biochemical networks. The field combines both science and engineering and uses mathematical, computational, and statistical tools for complex data analysis and model development.

**Synthetic Biology** is the purposeful construction of new cells to elicit engineered behaviors. By engineering genetic and metabolic networks, synthetic biologists simplify the complexity of biological networks in their experiments and thus elucidate the quantitative and qualitative behavior of network components. This knowledge is applied toward engineering goals such as the production of high-value chemicals, materials, and therapeutic agents. As with Systems Biology, Synthetic Biology is a highly interdisciplinary field, combining aspects of molecular biology, biochemistry, computational biology, and theoretical physics.

**Physical Biology** is the integration of biology with chemistry, physics, mathematics, and computer science to provide a quantitative approach to problems in biology, biomedicine, and biotechnology. Physical Biology unifies two approaches in science, including the study of diseases and organisms *in toto* (a holistic or "top down" systems approach) and the study of specific molecular mechanisms (a "bottom up" approach) to develop models. These models are used to anticipate the physicochemical properties of molecules, cellular and organisms, as well as the effects of changing environments on these properties.

The SSPB graduate program, which began matriculating students in the fall semester 2013, represents a cooperative effort by faculty in the Schools of Engineering and Natural Sciences to provide training in these rapidly growing research areas. The interdisciplinary nature of the SSPB program allows students to achieve their doctoral degree requirements by taking classes from the different participating departments and performing their dissertation research under supervision of faculty associated with the program who reside within a range of science and engineering departments.

## **B. Goals of the program**

The SSPB program provides advanced specialized training beyond baccalaureate programs and aims to guide students as they develop into doctoral recipients by training students to:

1. understand the state of cutting-edge research in Systems, Synthetic, and Physical Biology.
  - build foundational knowledge (research findings and techniques) in the disciplines that underlie Systems, Synthetic, and Physical Biology,
  - integrate knowledge from diverse fields to develop a solution plan for defined biological problems that currently exist (critical thinking),
  - apply knowledge from Biology, Mathematics, and Physics to open ended biological challenges (integrate biological and quantitative techniques), and
  - develop deep knowledge within the sub-area where students pursue their dissertation research (*i.e.*, find the edge of the wave so that they can ride it!).
2. perform independent research in Systems, Synthetic, and/or Physical Biology.
  - identify and pose a research problem and place that problem in context within the field's established literature,
  - develop a solution to an open-ended research question that has not yet been answered,
  - thoughtfully relate research achievements to others in the SSPB fields through peer-reviewed publications, and
  - assume responsibility for continued professional growth by striving to acquire new knowledge and skills (and display high professional standards).
3. develop professional skills in oral and written communication.
  - write well-organized, coherent technical prose that is at a level observed within peer-reviewed manuscripts and disseminate original results through peer-reviewed publications,
  - deliver oral presentations that are of the caliber that is expected at national conferences and disseminate original results and findings to the community, and
  - demonstrate critical thinking skills when confronted with unanticipated questions.

## **C. Developing as a leading researcher**

To get the most out of SSPB training, graduate students must:

- assume full responsibility in their research and scholarly activities,
- initiate and complete innovative and productive research activities,
- engage in active learning, such as participating in weekly seminars and attending relevant seminars outside of the program,
- develop advanced oral and written communication skills,
- accept and provide constructive scientific criticism, and
- exercise high professional standards in all aspects of work.

The SSPB training faculty are committed to mentoring graduate students to reach their full potential as scientists and engineers. These faculty seek to facilitate students' progression towards fulfilling and exciting careers (*e.g.*, in academia, industry, government, and non-profits) and to develop their creativity as innovators in science and society.

#### **D. Participating departments and faculty**

**Bioengineering:** Gang Bao, Caleb Bashor, Jessica Butts, Mingjie Dai, Michael Diehl, Isaac Hilton, Oleg Igoshin, George Lu, Robert Raphael, Cynthia Reinhart-King, Ka-Yiu San, Laura Segatori, Jerzy Szablowski, Jeffrey Tabor, Omid Veisheh, and Julea Vlassakis

**BioSciences:** Caroline Ajo-Franklin, Matthew Bennett, James Chappell, Jimmy Gollihar (*adjunct*), Theresa Loveless, Marcos de Moraes, Yang Gao, Harini Iyer, Natasha Kirienko, Laura Lavery, Edward Nikonowicz, George Phillips, Yousif Shamoo, Joff Silberg, Jane Tao, Rosa Uribe, and Aryeh Warmflash

**Chemical & Biomolecular Engineering:** Fred Mackintosh and Ross Thyer

**Chemistry:** Anna-Karin Gustavsson, Anatoly Kolomeisky, Quanbing Mou, Yuan Ma, Hans Renata, Peter Wolynes, and Han Xiao

**Civil and Environmental Engineering:** Pedro Alvarez and Lauren Stadler

**Computer Science:** Lydia Kavradi, Luay Nakhleh, Todd Treangen, and Vicky Yao

**Earth, Environmental, and Planetary Sciences:** Caroline Masiello

**Electrical and Computer Engineering:** Lei Li, Lan Luan, Jacob Robinson, Francois St-Pierre (*adjunct*), and Chong Xie

**Physics:** Ching-Hwa Kiang, Jose Onuchic, and Evelyn Tang

**Statistics:** Marek Kimmel

#### **E. University resources and tools that students frequently use**

**Canvas** (<http://www.rice.edu/canvas/>): course management system used to share information

**Center for Teaching Excellence** (<https://cte.rice.edu>): provides resources for graduate students who wish to build academic careers in which teaching will play a significant role

**Center for Academic and Professional Communication** (<https://pwc.rice.edu>): resource for feedback on written, oral, and visual communication

**Center for Career Development** (<https://ccd.rice.edu>): exists to help students find and navigate their unique career paths

**Doerr Institute for New Leaders** (<https://doerr.rice.edu>): offers a variety of programs for student leadership development needs

**Esther** (<https://esther.rice.edu>): used for registration, grades, and information

**Environmental Health and Safety** (<http://safety.rice.edu>): conducts safety training

**General Announcements** (<http://ga.rice.edu>): contains information about academic policies and procedures, student services and organizations, and rights and responsibilities

**Office of Graduate and Postdoctoral Studies (GPS)** (<http://graduate.rice.edu>): resource for processes and forms related to enrollment, candidacy, and thesis

**Office of the Registrar** (<http://registrar.rice.edu>): contains course schedules, academic calendars, and processes for registering

**Student Health** (<http://health.rice.edu>): has information about on campus preventive and outpatient clinical care

**Wellbeing and Counseling Center** (<https://wellbeing.rice.edu/>): provides resources and professional support for student wellbeing and mental health

## II. ADMINISTRATIVE INFORMATION

### A. Using this handbook

Students should use this handbook as a guide to the processes that will occur at the different stages of their studies. In addition to complying with the regulations outlined here, students must follow processes outlined in the Rice University General Announcements (<http://ga.rice.edu>) and Code of Conduct (<https://sjp.rice.edu/code-of-student-conduct>). In cases where there is conflicting information, university-wide regulations always take precedence over this handbook, which takes precedence over research group regulations. When in doubt, students should seek help from the SSPB program and then from the Office of Graduate and Postdoctoral Studies. Please contact the Program Director and Program Manager if you have suggestions for handbook refinement. These suggestions will be considered each spring for incorporation during the summer. Following annual revisions, updated versions of this handbook will be shared with students. A link to the most recent version of the handbook is maintained on the SSPB website.

### B. Graduate program organization

There are currently three administrators in the program:

Program Director (Dr. Joff Silberg, [joff@rice.edu](mailto:joff@rice.edu)). The Program Director is responsible for program leadership, oversight, planning, evaluation, and processes outlined in this handbook. They review student petitions, coordinate TAing, and approve rotation/advisor assignments. They also coordinate communication with the standing committees.

Program Manager (Dr. Jing Jin, [jj29@rice.edu](mailto:jj29@rice.edu)). The Program Manager is the first person who you should contact with questions. They share program information (deadlines, requirements, events), communicate about financial issues (stipends, travel awards), and are the GSA liaison. They also support program organization, oversight, planning, and evaluation.

The Program Director and Program Manager have open office hours and are always available to discuss questions in person or by email. The Program Director's office is in Keck Hall (room 209), while the Program Manager's office is in the BRC (room 177). To ensure they are in their office when you walk by, it is recommended that you email them in advance.

There are currently three standing committees in the program:

Graduate Advising Committee (Drs. Chappell - *chair*, Bennett, Loveless, and Jin). This committee advises students in coursework, coordinates rotations and thesis advisor assignments, and monitors timely progress in completing requirements (and submitting forms).

Graduate Curriculum Committee (Drs. Segatori - *chair*, Bashor, Hilton, and Thyer). This committee advises the director on curriculum changes, adjusts course and entry requirements, and reviews student petitions for course substitutions or waivers.

Steering Committee (Drs. Silberg - *chair*, Bennett, Igoshin, Treangen, Wolynes, and the RISB Director (*ad hoc*) – Ajo-Franklin). This committee advises the director on the academic policies of the program, appoints and removes training faculty, and monitors program success.

### C. Graduate stipends and health insurance

Stipend. The annual stipend for the 2024-25 academic year is \$38,500. The Rice University Controller's Office website has detailed information about the payroll schedule.

Health insurance. Rice University requires all degree-seeking students to have health insurance. Students electing to enroll in the Rice Student Health Plan may opt to be billed annually or semi-annually. Contact the Cashier's Office for payment options (713-348-4946). Students must complete an Insurance Waiver Form to waive enrollment in this health plan.

#### **D. Graduate student mail**

The SSPB Program Campus Mail Stop (MS) is MS-180. Student mailboxes are in BRC Suite 170.

#### **E. Employee and Student Tools, Help, and Electronic Resources**

The Registrar's website contains instructions for the electronic systems (Esther, iO) that students use to: (i) update contact information, (ii) register for classes and verify enrollment, (iii) view course schedules, (iv) access grades, (v) view past course evaluations, (vi) view unofficial transcripts, (vii) print degree applications, (viii) identify holds on accounts and pay account balances, (ix) view financial aid information, (x) view employment information, such as past pay stubs, (xi) review charges and payments, and (xii) review various forms (tax form and direct deposit information).

#### **F. Graduate studies forms**

Links to all forms related to candidacy, thesis defense and submission, and degree conferral can be found at the Office of Graduate and Postdoctoral Studies website (<http://graduate.rice.edu>).

#### **G. SSPB Graduate Student Association Board**

The SSPB Graduate Student Association (SSPB-GSA) is a student-run organization with a constitution that the students have collectively written. This governing body is elected annually by the current doctoral students and includes the following administrative positions: President, Vice President, Treasurer, GSA Representative, Recruitment Chairs, and Social Chairs. The names of these elected individuals should be shared with the Program Manager following each election. The Program Manager will then update the SSPB website to show their names.

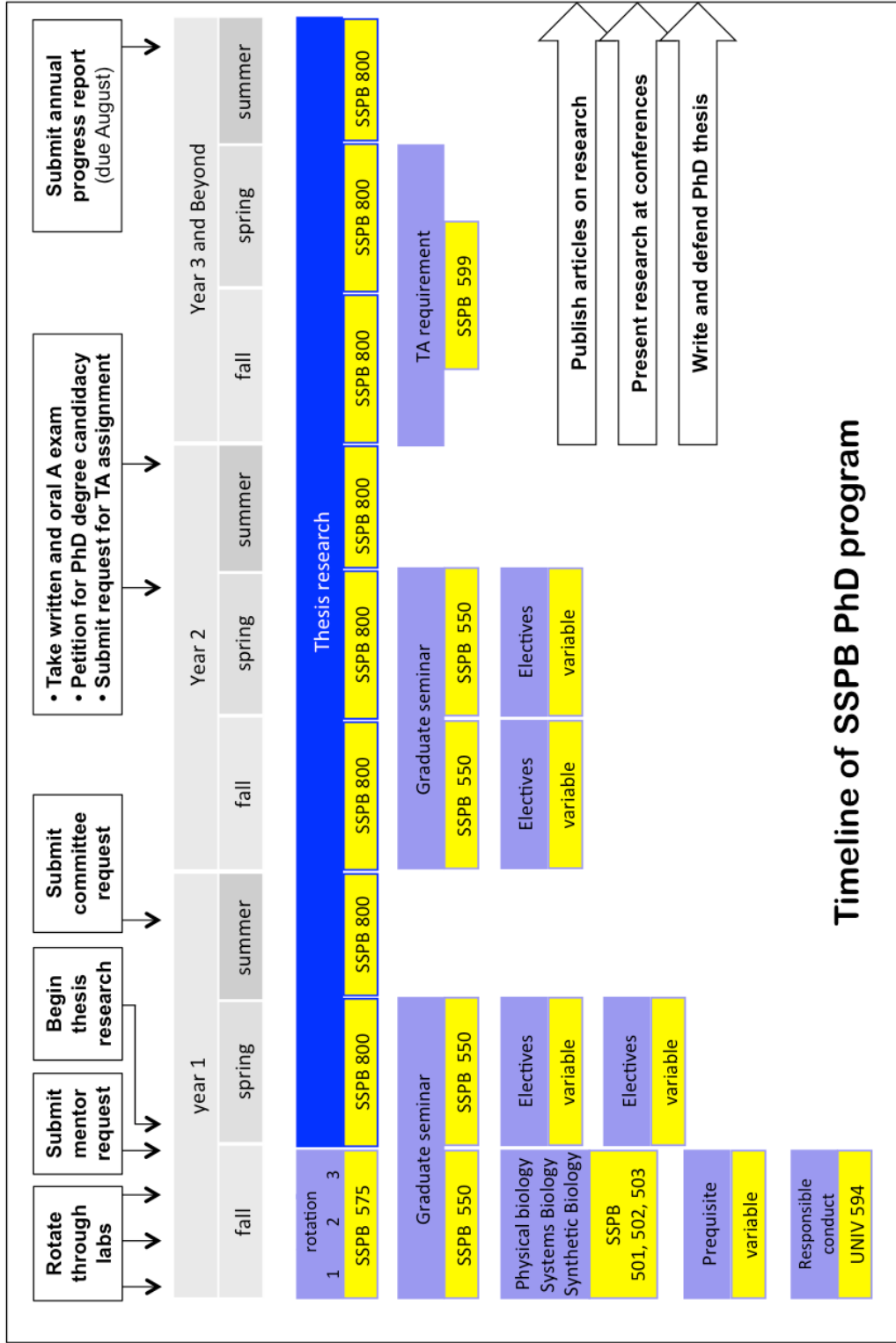
The SSPB program provides an annual budget for the SSPB-GSA each year. To obtain this funding, the SSPB-GSA President must submit a formal budget request to the Director by June 1 each year. The Program Director considers this request, determines the amount that the program can provide prior to the Fall semester, and communicates the approved budget once the full SSPB budget has been approved by the university. The goal is to provide an approved budget before August 1 each year.

#### **H. Office of Graduate and Postdoctoral Studies**

A wide range of resources is available in the Office of Graduate & Postdoctoral Studies, ranging from fellowship opportunities and coaching to professional development opportunities. In addition, this office has a Student Support Manager (currently Pia Byrd, [pia.byrd@rice.edu](mailto:pia.byrd@rice.edu)) who is available as a resource for graduate students who would like to discuss an issue or concern in a confidential setting that is outside of their graduate program.



### III. TYPICAL TIMELINE FOR A SSPB STUDENT



Timeline of SSPB PhD program

## IV. REQUIREMENTS AND COURSE REGISTRATION

### A. Prerequisite courses

Because of the interdisciplinary nature of SSPB training, students are required to have undergraduate training in the following foundational areas:

1. Biochemistry, Genetics, and Molecular Biology
2. Ordinary Differential Equations, and
3. Statistics.

If students are missing formal training in one or more of these subjects, they are required to take the equivalent background courses during their first year at Rice. The corresponding courses at Rice include the following:

1. Biochemistry (BIOS 301, BIOE 330), Cell Biology (BIOS 341), or Genetics (BIOS 344),
2. Ordinary Differential Equations (MATH 211 or CMOR 304), and
3. Applied Statistics for Bioengineering and Biotechnology (BIOE 439/539), Probability and Statistics (STAT 310), or Introduction to Statistics for the Biosciences (STAT 305).

While there is no formal computer programming requirement, many courses (e.g., Computational Systems Biology) utilize computational tools for modeling and machine learning and artificial intelligence are increasingly important for innovation. Thus, students with limited computer programming experience are encouraged to take short online introductory courses (e.g., Coursera) to gain basic coding skill in Matlab, Python, and R.

These classes *should be taken for a “pass/fail” grade*. Students taking these courses as pass/fail will receive a grade of “pass” if they make a grade of A, B, C, or D. If a student earns a grade of “F”, it will appear on their transcript. Students planning to take more than one course for a “pass/fail” grade in a single semester must seek SSPB program assistance to petition for approval from the Office of Graduate and Postdoctoral Studies. These courses do not count toward the required 24 semester hours for the degree program. Students must take Ordinary Differential Equations prior to Physical Biology.

### B. Lecture courses

Students are required to accumulate 24 semester hours of coursework by taking the following courses for a letter grade:

1. Physical Biology (SSPB 501)
2. Introduction to Systems Biology Modeling (SSPB 502)
3. Synthetic Biology (SSPB 503)
4. Advanced Topics in SSPB (at least 9 credit hours from approved list, ≥500-level)
5. Open elective courses (at least 6 credit hours that are 300-level or above)

At least one Advanced Topic courses should apply quantitative concepts from computer science, physics, and mathematics or statistics to biological problems, and at least one of the courses should focus on biology within the sub-area where each student is pursuing their dissertation research. Students may petition for a course to be added as an Advanced Topics requirement at any time during the year by writing the Program Director and Program Manager.

Students must take at least 15 semester hours of lecture courses during their first year, including their prerequisite courses, two or more core courses (SSPB 501, 502, and 503), and additional approved lecture courses. All the core course requirements must be completed no

later than the end of the second year in residence. All the open and advanced electives must be completed before the end of the third year in residence.

### **C. Responsible Conduct of Research**

All students must take Responsible Conduct of Research (UNIV 594) in their first semester, which covers the practice of scientific investigation with integrity. This course reviews established professional norms and ethical principles in the performance of all activities related to scientific research. UNIV 594 does not count towards the 24 hours of coursework.

### **D. Seminars**

Seminar attendance is an integral part of our education as scientists during our formal studies and beyond. For this reason, students must enroll in the graduate seminar course (SSPB 550) each semester of their first two years to accumulate a total of four semesters of course credit.

Students enrolled in SSPB 550 are required to attend all the SSPB-sponsored seminars and the number of seminars outlined in the course syllabus. Student attendance at seminars is recorded by the submission of a Canvas assignment. Excessive unexcused absences will result in an Unsatisfactory.

Students that have a class conflict with the seminar can petition the Director to postpone their fulfillment of the seminar requirement to a subsequent semester. Students who have fulfilled their seminar requirement should continue attending the SSPB seminar series and other proximal seminars of relevance to their research and education.

Students who receive an Unsatisfactory in the seminar will be placed on academic probation. The Director will determine what the student must do to address deficiencies to be removed from probation. Clear expectations for resolving deficiencies will be communicated in writing. Failure to adequately address these deficiencies can result in dismissal from the program.

### **E. Research**

First semester. During their first semester in residence, all students must register for "Introduction to Research" (SSPB 575, 3 credit hours) and participate in three research rotations. The student performance in this research rotation course (SSPB 575) will be graded as Satisfactory/Unsatisfactory based on feedback from the rotation advisors.

Subsequent semesters. After joining a research group, students must register for the Graduate Research course (SSPB 800) taught by their thesis advisor. Each faculty member has a different CRN, so be mindful of the course that you register for. To be a full-time student and receive a stipend, students must register for a minimum of 9 credit hours. In semesters where students only take SSPB 800, they should register for 12 credit hours. In semesters where students take lecture courses, they should enroll in SSPB 800 for 9 credit hours. Students are expected to fulfill the research requirements as defined by their thesis advisor and earn a "satisfactory" grade in SSPB 800.

Summer semesters. To be a full-time student and receive a stipend during the summer session, students must be registered for SSPB 800 for 9 credit hours. During this time, students are expected to fulfill the research requirements as defined by their thesis advisor to earn a "satisfactory" grade in SSPB 800.

Grading. SSPB 575 and SSPB 800 are graded Satisfactory/Unsatisfactory based on research effort, research progress, and regular communication with the advisor. Students should consult

with their research advisor regarding expectations and grading. An Unsatisfactory grade will result in the student being placed on academic probation. Clear expectations for resolving deficiencies in coursework will be communicated and must be adequately addressed.

## **F. Teaching**

Each graduate student must complete SSPB 599 during their third year in residence to fulfill their teaching requirement. Students may also be asked to contribute to the development of a graduate laboratory for entering students. Students must submit a request for their teaching assignment to the Program Director before the end of the fourth semester in residence. At times, students may be invited to TA during their third or fourth semester.

Student requests for teaching assignments must include one of the core courses (Systems, Synthetic, or Physical Biology) and a second course. Assignments are ultimately determined by the Program Director after considering student requests and then consulting with the participating departments offering those courses and teaching support needs. The goal here is to match student expertise with teaching needs across the participating departments.

Students enrolled in SSPB 599 are expected to support the following activities for the course(s) in which they serve as a teaching assistant: (i) attend the regular class meetings, (ii) provide group and individual instruction during and/or outside of class time, (iii) evaluate student work, and (iv) perform additional duties outlined by the course instructor. Students in SSPB 599 must also complete an online training module and assignments in Canvas. Grading in SSPB 599 is Satisfactory/Unsatisfactory based on the fulfillment of duties and quality of work assigned by the instructor(s). The Canvas assignments will be considered when determining final grades. An Unsatisfactory grade will result in the student being placed on academic probation.

Students interested in future academic careers may at times wish to participate in additional teaching to develop their pedagogical skills. This activity is allowed but it must be approved by the thesis advisor and Program Director.

## **G. Requirements for the MS in SSPB**

Although students are not normally admitted to a Master of Science (MS) degree program, students who do not wish to continue their studies toward the PhD degree may choose to graduate with the MS degree. To do this, a student must:

- satisfy all university graduation requirement for thesis master's degrees as outlined in the General Announcements,
- complete all core courses: SSPB 501, SSPB 502, and SSPB 503 (9 credits total),
- complete the following Program-specific courses: UNIV 594, SSPB 575, and two semesters of SSPB 550 (6 credits total),
- complete three additional one-semester lecture courses (3 credit hours/course) that qualify as either Advanced or Open Electives (9 credits total),
- complete at least six credit hours of SSPB 800 (to reach 30 credits total),
- produce a Master's thesis that presents the results of original research approved by the graduate program, and
- pass a final oral Master's thesis defense and submitting the thesis to the Office of Graduate and Postdoctoral Studies.

Students must maintain a minimum overall GPA of 3.00 or higher in all Rice coursework to be a candidate for the MS degree. No other preliminary examination will be held prior to the final oral defense of the written thesis.

Master's degrees must be completed by the fifth year of residency and will not be awarded until all coursework requirements are completed. To attend commencement at the end of the academic year, the student must submit a petition for candidacy prior to deadlines listed each year in Rice's academic calendar.

Students seeking a Master's degree should complete and submit the Petition for Approval of MS Candidacy Form with the assistance of the Program Manager and the approval of the Program Director by no later than the end of the 4th semester of program enrollment. In the petition, one must list the thesis advisor, recommend a thesis committee, certify that the applicant has fulfilled the departmental requirements, and provide a course transcript.

## V. FIRST YEAR IN THE PROGRAM

### A. Early matriculation

Incoming students can request to arrive in Houston to work in a lab over the summer prior to their first semester in residence. This early research experience is a way to get a head start on selecting an advisor. Early matriculants are paid at the existing stipend rate during this time. To arrive early, the program requires that: (i) students find a faculty member who is willing to serve as a mentor during this time, and (ii) students obtain approval from the Program Director. Working for a faculty member during the summer does not constitute a commitment on the part of either the student or the faculty member to a long-term working relationship.

### B. Orientation week, advising, and course registration

Orientation Week. New students are required to arrive on campus prior to the start of their first semester to participate in the SSPB and university-wide orientation activities, during which students learn the basics about Rice and have a chance to socialize with more senior students. The latter orientation represents a mandatory university-wide orientation conducted by the Offices of Graduate & Postdoctoral Studies (<https://gps.rice.edu>) and International Students and Scholars (<https://oiss.rice.edu>). The SSPB Program also hosts a program-specific orientation, during which students are provided an overview of the program, meet with the Graduate Advising Committee, and attend presentations by SSPB faculty interested in recruiting students. New students also participate in activities that help them understand the foundational knowledge and quantitative skills that they will need to develop during their first year of study. These activities are organized by the SSPB GSA.

Advising. The Graduate Advising Committee helps students plan their coursework during their first semester in residence. New students meet with this committee during orientation to identify prerequisite courses that are required and to develop a plan for coursework during their first year in the program. After meeting, the advising committee will provide written communication indicating the coursework plan that students must take during their first year in residence. Once a student joins a lab, the student's faculty mentor may provide guidance on advanced elective coursework in addition to the Graduate Advising Committee.

Registering for courses. Students must register for courses using Esther. To be a full-time student and receive a stipend, students must be enrolled in a minimum of 9 credit hours each semester. Course requirements and registration are described in Section IV.

### C. Peer advising

An outstanding resource that all entering students should use is the knowledge base of their peers. New students are encouraged to engage more senior graduate students in the program for advice about various topics of interest, such as transitioning to graduate school life, navigating the city and the university, succeeding in lab rotations and courses, choosing an advisor, applying to fellowships, and more.

### D. Research rotations and joining a lab

Research rotations. To facilitate learning about the various thesis opportunities, students participate in three laboratory rotations during their first semester. The purpose of lab rotation is to assist students in choosing a faculty advisor and a lab for conducting thesis research. Rotation selection involves many steps, including:

1. Students attend faculty research presentations. These presentations occur before rotations and provide students an opportunity to hear about the diversity of research opportunities in the program.
2. Students coordinate one-on-one discussions with faculty. Students are responsible for setting up meetings with faculty to discuss possible rotations based on their interests after the presentations. These can be scheduled in advance of the faculty presentations.
3. Students submit a rank ordered list of rotation preferences to the Chair of the Graduate Advising Committee. Students have an opportunity to update this list before the second and third rotations begin.
4. Students enroll in SSPB 575 to receive course credit for rotations in the semesters where they rotate through labs. One semester of SSPB 575 is required of all students.
5. Rotations are assigned. The Graduate Advising Committee will work to match students with labs that match their research interests and ultimately make the decision on where students are placed for each rotation.
6. Students discuss rotation expectations with mentors. To ensure a good rotation experience, students should set up meetings with their advisors well in advance of the rotation to discuss expectations, goals, requirements, and lab guidelines.
7. Students rotate through three different labs. These laboratory rotations occur during the first semester and are typically a month in duration.
8. Students and faculty provide feedback on the rotation experience. The Graduate Advising Committee solicits for feedback from faculty members regarding their interactions with each student rotating in their lab and uses this information to assign grades for SSPB 575.

While students are expected to spend  $\geq 6$  hours in the lab per week for each rotation, it is critical to have sufficient interactions with the rotation advisor and laboratory to ensure that they learn how the students are a good match for the laboratory goals. One way to do this is to set up a weekly meeting with the rotation advisors, attend weekly lab meetings, and discuss the various projects that others in the laboratory are pursuing.

Submitting advisor preferences. Upon completing the lab rotations, students submit a *ranked list* of their preferred thesis advisors to the Chair of the Graduate Advising Committee near the end of their first fall semester. Students must provide *a minimum of three different possible advisors*. Students may include laboratories that were not among the three approved rotation labs. However, *they should not include an advisor on their ranked list unless they have discussed research opportunities with that faculty member.*

Advisor assignments. The Graduate Advising Committee works with the Program Director to match student interests to those of the SSPB faculty and available funded research projects. This process occurs after all students have submitted their thesis advisor preferences and after consultation with the requested faculty advisors. Several factors are considered during the matching process, including funding, available space, academic standing, rotation performances, and the relationship between the student and the potential advisor.

Historically, students have been granted their primary choice for a thesis advisor. In rare cases where a match with the top choice is not possible, the student will be matched with one of their alternative choices. In rare circumstances where a student cannot be placed with an advisor by the beginning of the spring semester, the student will be notified of the delay and efforts to assign an advisor will be handled on a case-by-case basis. The Program Director may require additional rotations during the second semester in residence to support a good match, which will require enrolling in a second semester of SSPB 575.

Texas Medical Center (TMC) faculty. A handful of SSPB training faculty have primary appointments at institutions within the TMC. These faculty are affiliated with SSPB because of their unique scholarly alignment. Students can request to do their thesis research with these faculty. Like other SSPB faculty, this matching is dependent upon space and availability of financial support. However, the program does not guarantee stipend support for students who enter these laboratories if the faculty run out of grant support for the students. Prior to joining a TMC lab, the SSPB program requires that students and their advisors sign an agreement form acknowledging that they understand the constraints of thesis work at a nearby institution. Prior to start dates in any TMC laboratories, international students must complete all required OISS paperwork to ensure compliance with visa regulations.

In extraordinary cases, students may submit a petition to request that a Rice-affiliated faculty member outside of the SSPB program be considered as their research advisor. To do this, the student must submit a formal written petition to the Program Director that indicates:

- (i) the name of faculty member they would like considered as their thesis advisor,
- (ii) the reasons that they would like that faculty member considered as a thesis advisor,
- (iii) how that group is aligned with their scholarly pursuits, and
- (iv) additional factors that are relevant to their request.

Students should only make this request if they have had previous discussions with the faculty member who they are proposing as a thesis advisor, and if that faculty member is amenable to serving as their thesis advisor. Students who wish to consider research advisors with a primary appointment outside of Rice University must speak to the Program Director to discuss the academic and financial considerations of such an arrangement.

In the very rare case when no match satisfactory to both the student and a faculty member is made, the Program Director may recommend that the student transfer to another graduate program at Rice or to another institution that is more in line with the student's interests.

## **E. Evaluation of progress**

At the end of each semester, the program reviews each student's coursework, research progress, and motivation. Students must maintain at least a B average (GPA = 3.0), obtain satisfactory marks in all coursework (including SSPB 550, SSPB 575, SSPB 599, and SSPB 800), and demonstrate potential for research to continue in the program. Additionally, students must take courses that have been approved by the program.

Students who do not meet the above requirements will be placed on academic probation. For example, students will be placed on academic probation for one semester after which their GPA falls below 3.0, their cumulative GPA falls below 3.0, and/or they receive a "Unsatisfactory" in SSPB 550, SSPB 575, SSPB 599, SSPB 800, or other courses taken S/U.

The Program Director, often in consultation with the Chair of the Graduate Advising Committee, will determine what the student must do to address deficiencies to be removed from academic probation. Clear expectations for resolving deficiencies will be communicated in writing.

Failure to adequately address deficiencies during the indicated period will result in immediate dismissal from the program.



## VI. SECOND YEAR IN THE PROGRAM

### A. Research and coursework

Students are expected to devote a majority of their time to research activities during their second year in the program, although some additional coursework will be required during this time. When students are not enrolled in lecture-type courses, they are expected to be working normal business hours in their laboratory. In each semester, including the summer, students should register for Graduate Research (SSPB 800) taught by their thesis advisor. Students are expected to fulfill the research requirements as defined by their advisor to earn a “satisfactory” grade in SSPB 800, and they are expected to continue maintaining a B average (GPA = 3.0) in their coursework.

### B. Research Progress Committee

Students are responsible for forming their Research Progress Committee before the start of their second year. A committee list must be emailed to [sspb@rice.edu](mailto:sspb@rice.edu). The Research Progress Committee is different from the thesis committee; however, students commonly request that their Research Progress Committee members serve on their Thesis Committees.

Committee role. The purpose of the committee is to evaluate the student’s research progress by administering the Admission to Candidacy Exam (A-exam). The A exam must occur prior to the end of their fifth semester in residence. This committee will also read, critique, and provide feedback on the student’s annual progress reports, and the committee administers the student’s final oral defense and evaluates the formal written proposal.

Committee structure. In consultation with their thesis advisor, students should determine the composition of their Research Progress Committee, which must include their thesis advisor and a minimum of three Rice tenured or tenure-track faculty members affiliated with the SSPB Program with primary appointments within at least two different departments. Additional members are allowed.

Committee formation. Once the student has organized a Research Progress Committee, they must email the names of these individuals to [sspb@rice.edu](mailto:sspb@rice.edu) and their thesis advisor prior to the start of the second year in residence. Any deviation from these rules and this timeline must be approved by the Program Director and must follow university rules.

Getting the most out of the Research Progress Committee. It is important that the student and committee maintain an effective working relationship. Committee members can supply scientific and technical advice, assist the student in achieving career goals, and may provide references for a student when they search for professional positions. The committee also can help resolve disputes (if any) between student and thesis advisor.

### C. Advancement to candidacy examination

Timing. The candidacy examination (A-exam) must: (i) be scheduled before the fifth semester in residence, and (ii) occur before the end of the fifth semester in residence. The student is responsible for scheduling the A-exam and informing participants of the date well in advance of the deadline. The Program Manager must be made aware of the exam date and location at least two weeks in advance of the A-exam.

If students experience challenges with scheduling their A-exam in this timeframe, they must submit a petition for an extension in writing to the Program Director. To remain in good standing

in the program, this petition must be received before the fifth semester in residence, and it must include the following:

- (i) current time boundary,
- (ii) requested time boundary (should not be >1 semester from the time boundary),
- (iii) reasons that resulted in the need for an extension,
- (iv) list of milestones to be completed to meet the requested time boundary,
- (v) additional factors that are relevant, and
- (vi) the thesis advisor's signature indicating approval of the request.

The Program Director will consider petitions on a case-by-base basis. Failure to submit a petition or rejection of a petition will lead to program dismissal.

Overview. The A-exam includes a *formal written proposal* and an *oral examination* conducted by the student's Research Progress Committee. This committee will determine the suitability of the student's candidacy for further pursuit of the doctoral degree based on their performance on the written and oral portions of the A-exam. The student's overall academic record and research progress also are considered in determining the outcome of this exam.

Written Exam. The written proposal contains a summary of research progress up to that point and future research plans. This document must be submitted to the Research Progress Committee and the Program Manager at least 2 weeks before the scheduled Oral Exam. The Program Manager requires only a digital copy of the exam.

The format of the proposal must be of a quality that could be submitted to a federal funding agency (e.g., NIH NRSA). To ensure that the written document is clear, students are encouraged to request feedback from their advisor, lab members, and the Center for Academic and Professional Communication. This document should contain the following sections:

1. Abstract. This should not exceed 250 words.
2. Background with extensive literature survey. Provide a historical background of the proposed research including major relevant findings by others.
3. Problem statement. Concisely and clearly describe the point of departure for the proposed research project.
4. Research plan. Describe in detail the rationale, hypotheses, methodology, controls, expected outcomes, interpretations, and possible alternative approaches.
5. Preliminary results. Present data from initial experiments that support the research plan. This section can be integrated into the research plan.
6. References.
7. Proposed time-line for completion of thesis research.

The advisor may, within reason, require additional information be included. Portions of manuscripts or reports to sponsors (if available) can be incorporated in the written proposal.

Note that preliminary data should be presented in publication-quality figures, diagrams should include rigorous statistical analysis, and there should be no typographical or spelling errors. The proposal length can vary. However, it should not exceed 10 pages (single-spaced, font Times 12 or Arial 11), excluding the reference and title pages.

Oral Exam. The goal of the oral exam is to test both the student's understanding of the proposed thesis project and their understanding of fundamental science and engineering principles. The oral exam involves a formal presentation of the student's proposed research plan, which if uninterrupted would last about 30 to 45 minutes. The student should be prepared for substantial questioning by their committee, whose charge is to assess: (i) the depth of the student's

knowledge, (ii) the student's familiarity and overall understanding of their research topic, and (iii) the novelty of the proposed thesis. The oral exam should be scheduled for a 2-hour duration. Detailed instructions are provided in the Student A-exam Checklist in the Appendix.

At the conclusion of the oral exam, the committee will decide among one of the following three possible outcomes. This decision is made using the rubric outlined in the Thesis Proposal Guidelines for Evaluation, which is provided in the Appendix.

1. *Pass*. The written proposal was judged to be well-written and logical, and the thesis project was viewed as feasible. In addition, the student demonstrated exemplary knowledge in all areas covered during the exam. The completed and signed forms (Faculty Evaluation + Approval forms) must be submitted to [sspb@rice.edu](mailto:sspb@rice.edu) within 1 week of passing the oral exam.
2. *Conditional pass*. The student effectively communicated knowledge in most areas covered during the exam but displayed incomplete knowledge or communication of some aspect of the project or the underlying science. In this case, the committee may assign the student additional reading, writing, or coursework on specific topics to improve the student's basic science foundation and to facilitate thesis completion. The committee will communicate a deadline for this additional material and then determine if that work addresses the deficiencies; if so, then the student will formally "pass" the oral examination.
3. *Fail*. If the committee decides that the student has failed the written or oral exam, the student may be dismissed from the program. Alternatively, a make-up exam may be required. If the student fails the second exam, the student will be dismissed from the program. Students who fail the candidacy exam can request permission to complete a Master's degree. The thesis advisor, the progress review committee, and the Program Director must approve this request. A primary consideration in granting this request will depend upon the state of the student's research progress and whether it is sufficient to write up a MA thesis. Once approved to complete a Master's degree, students must submit an original research thesis and defend the thesis in a public oral examination as outlined in the General Announcements.

#### **D. Petition for PhD degree candidacy**

Following successful completion of the A-exam, students must coordinate with the Program Manager to submit a Petition for Approval of Candidacy for a Doctoral Degree Form. According to university policy, students must identify an "outside" member of their thesis committee. This outside member must be a Rice tenure-track faculty member who is outside of the department where their thesis advisor has a primary appointment. For example, if a student's thesis mentor is in Bioengineering, then their outside faculty member cannot have a primary appointment in that department. However, the outside member can be from Biosciences even if they are a member of the SSPB training faculty. For students who are co-advised, only one of their advisors can be selected as the Committee Chair.

SSPB requires that the petition for candidacy be filed after completing all the curricular requirements of the program and passing the A-exam. This must occur no later than the start of their ninth semester in residence. On the petition form, the thesis advisor should be listed as the Thesis Director, the chair of the Research Progress Committee (if different from the thesis advisor) should be listed as the committee member from within the SSPB program, and the outside committee member must be a Rice tenured or tenure-track faculty member from outside the SSPB program and from outside the thesis advisor's primary department. All other committee members should be listed as additional members.

The student must work with the SSPB Program Manager to submit the petition to the Office of Graduate & Postdoctoral Studies for approval. All questions about the petition process should be directed to the Program Manager.

## VII. ADVANCEMENT TO CANDIDACY TO GRADUATION

### A. Research and teaching responsibilities

Research. Students are expected to immerse themselves in full-time research after completing their A-exam. They are also expected to publish their research findings in peer-reviewed journals. To advance as a scientist, it is essential that students publish most or all their dissertation research in peer-reviewed journals. The publication record is used by many potential employers to assess the future research potential of students as they defend their thesis. Students should not plan to defend their dissertation until the bulk of their research has been accepted for publication.

Teaching. Students must fulfill their teaching (SSPB 599) requirements to graduate. Students must submit a written request for their teaching assignment to the Program Director before at the end of the fourth semester. This request should include: (i) one of the SSPB core courses, and (ii) a second course outside of the core. Additional core and non-core courses can be requested. Students must fulfill this requirement before the end of their third year in residence. At times, the SSPB Director will ask department chairs to assist with student TA assignments to courses, as chairs understand the teaching needs that departments are supporting.

Students may submit a petition to request to delay their teaching requirement. To do so, the student must submit a formal petition to the Program Director indicating: (i) the rationale for the request, and (ii) the course and semester when they wish to fulfill their teaching requirement. The Program Director will consider requests on a case-by-case basis.

Scientific Conferences. The program encourages students to participate in local, national and international scientific conferences. This participation enables students to present their work to a broad audience, listen to research presentations from a range of speakers, and meet with individuals sharing common research interests. Students should also use these meetings to network with future collaborators and employers. The Program Manager can help students with travel guidelines related to scientific conferences, and they can make sure that students understand costs that are reimbursable versus costs that are considered personal.

If students are planning to present at a meeting, they can request a small travel subsidy from the SSPB program (e.g., up to \$400) once a year. To do so, students should email information about the conference (title, date, relationship to thesis), their presentation (type, title, abstract), and anticipated expenses to [sspb@rice.edu](mailto:sspb@rice.edu). These requests will be considered by the Program Director and funding will be provided within SSPB budgetary constraints.

### B. Annual evaluation of progress

Student Progress Review Reports. Following the A-exam, students are required to complete annual reports that will be reviewed by the program each year. The Student Progress Review Report form, which can be found on the SSPB website, requires reporting on the following:

- (i) research progress,
- (ii) research plan and goals for the upcoming year,
- (iii) articles published, submitted, or in preparation,
- (iv) oral and poster presentations,
- (v) professional development experiences and goals, and
- (vi) self-evaluation.

Additionally, a current curriculum vitae (CV) must be provided as an attachment. It is important to develop a CV that contains details about career development and experience, and students are advised to continually refine and maintain a CV to support their professional advancement.

Students may also request a meeting with their Research Progress Committee if they have faced any challenges that they would like to discuss. The Program Manager will schedule these meetings. If the student plans to defend within 1 semester of the annual report due date, then they should submit an outline of their thesis for approval rather than a report.

Review of Research Progress. Following the A-exam, the research advisor must provide written evaluation of each student's progress to the program each summer. Any concerns raised by the research advisor about a student's progress will be provided to the Program Director for review, who may consult the student's Research Progress Committee. If they find that the student is not making satisfactory progress, then there will be further communication to identify a plan to support research progress. If the student continues to have challenges with research progress, then they may be placed on research probation or dismissed from the program.

### **C. PhD thesis defense**

When students are within one semester of defending their thesis, they must go to the website for Graduate and Postdoctoral Studies and review the "Last Semester Timeline," which contains a checklist for everything that a student must do to complete their thesis and graduate.

The Thesis Committee. The Thesis Committee for the final oral examination (defense of thesis exam) must be approved by the Office of Graduate and Postdoctoral Studies at the same time as the candidacy is approved. At the minimum, the committee must be comprised of the following three members who must all be tenured or tenure-track faculty members of Rice University: (1) the chair of the thesis committee can either be the research advisor or a faculty member affiliated with the SSPB Program; (2) the second committee member must be currently affiliated with the SSPB Program; and (3) the third committee member must not be affiliated with either the SSPB Program or the department where the student's advisor has their primary appointment. Oftentimes, this committee includes additional faculty members, such as additional members of the student's Research Progress Committee or faculty outside of Rice whose expertise is aligned with the thesis research.

A student may elect to have an "external examiner" from another university also serve on the committee. In such cases, the Program Director must secure the approval of the Office of Graduate Studies for the addition of an "external examiner" to the committee. The formal structure of thesis committees is described in the Rice University General Announcements and regularly reviewed by the Office of Graduate and Postdoctoral Studies.

Scheduling the Defense. After a student's candidacy has been approved and upon completion of their research project, the student must schedule, in coordination with their thesis committee, a public oral examination of the defense. The student is responsible for scheduling and reserving a room for the thesis defense. Generally, a 2-hour block of time is sufficient for the lecture and subsequent examination.

The final thesis defense seminar is public, and the student must arrange to have it announced on the Rice University Event Calendar at least two weeks before the scheduled date, and the student must notify the Program Manager to publicize the defense to the SSPB community. Oral examination announcements must be submitted to the Office of Graduate and Postdoctoral Studies by entering the information into the online Graduate Students Thesis Defense Announcement form. Students should refer to the Graduate and Postdoctoral Studies website

for specific information regarding scheduling requirements. Exceptions to this policy are granted only in very rare circumstances and must be approved by Graduate and Postdoctoral Studies.

Written Thesis Requirements. Graduate students must conclude an original investigation that is formalized in an approved written thesis. The requirements and format of the written dissertation are set forth by the Office of Graduate Studies. It is to the student's advantage to be fully aware of these requirements before undertaking the writing process. The title page should list the thesis advisor first, then the remaining committee members should be listed in alphabetical order. The thesis advisor should read preliminary drafts of the thesis and must approve the final copy before its distribution to the other committee members.

For the examination, the final copy should be submitted to the thesis committee members and to the program (and to [sspb@rice.edu](mailto:sspb@rice.edu)) at least two weeks before the final oral examination. During the examination, the thesis committee members may recommend revisions or additions, which must be incorporated in the final thesis, which is then signed by all committee members.

The student should note that, to participate in the commencement ceremonies at the end of the academic year, the committee members must approve the final copy of the thesis before the deadlines imposed by the Office of Graduate Studies.

Thesis Examination. The final thesis examination consists of two parts. (1) Initially, the student presents an hour-long public lecture that is handled like a departmental seminar. (2) The official examination by the thesis committee follows the seminar. The student is expected to defend in detail their research work and the text of the written thesis. The committee members will consider both the student's research work and the final copy of the thesis. Detailed instructions for the thesis defense process can be found on the Graduate and Postdoctoral Studies website.

If the committee members approve the student's performance and the text of the thesis, they sign the required forms, which must be brought to the examination by the student. The student should receive this from the Office of Graduate and Postdoctoral Studies prior to the defense. If alterations in the written text of the thesis are requested, the student must submit a revised copy of the thesis to the dissenting members for their approval and signatures on the title page. In the case of an unsatisfactory performance, a second examination can be scheduled. A second unsatisfactory performance will result in dismissal from the program.

Acceptance of Thesis. No later than six months from the date of the examination, candidates who successfully passed the oral examination in defense of their thesis must submit their thesis to the Office of Graduate and Postdoctoral Studies. A student's thesis must be submitted electronically. The Graduate and Postdoctoral Studies website contains specific instructions regarding how to submit the thesis. If the thesis is not ready for final signatures by the end of the six-month period, the "pass" may be revoked and an additional oral defense must be scheduled.

Degree Conferral. Students who wish to have their degree conferred in the same semester in which they defend must file their applications for degree conferral before October 1 for the fall semester, March 1 for the spring semester, and July 1 for the summer semester. These dates are subject to change; therefore, students should consult the Registrar's academic calendar to confirm these deadlines.

Deadlines. SSPB requires the thesis to be defended before the end of the 16th semester of residency at Rice. However, the normal limit of financial support for graduate students is ten semesters (excluding summers). Students who anticipate taking longer than 10 semesters for completion of their PhD degree must consult with their advisor to verify that funding is available.

## **D. MS thesis defense**

Overview. MS degree candidates are required to submit a formal written thesis and complete an oral examination that is consistent with the format and requirements set by the Office of Graduate and Postdoctoral Studies. The thesis document and oral defense are to be evaluated by the student's Thesis Committee.

The Committee. The Thesis Committee administers the oral examination for the student's thesis defense and has final approval/disapproval authority and responsibility for the written thesis. The committee includes the thesis advisor and all members of the student's Research Progress Committee. Any adjustments to the committee composition must be approved by the Program Director and the Office of Graduate and Postdoctoral Studies at the same time as the candidacy is approved. More detailed guidelines regarding committee composition can be found in the General Announcements.

Scheduling the Defense. After a student's candidacy has been approved, the student must schedule, in coordination with their research advisor, a public oral examination of the defense of their thesis. The student is responsible for reserving a room for the thesis defense, in consultation with the Program Manager. Generally, a 2-hour block of time is sufficient for the lecture and subsequent examination. The final thesis defense seminar is public, and the student must arrange to have it formally announced with the Office of Graduate and Postdoctoral Studies and on the SSPB website at least one week before the scheduled date. After this announcement is submitted, the Program Manager automatically obtains the Approval of Master's Candidacy Form from the Office of Graduate and Postdoctoral Studies. The student must bring this form to the defense.

Written Thesis. Graduate students must conclude an original investigation that is formalized in an approved written thesis. The requirements and format of the written dissertation are set forth by the Office of Graduate and Postdoctoral Studies. It is to the student's advantage to be fully aware of these requirements before undertaking the writing process. The title page should list the thesis advisor first, then the remaining committee members should be listed in alphabetical order. The thesis advisor should read preliminary drafts of the thesis and must approve the final copy before its distribution to the other committee members.

For the examination, the final copy shall consist of a printed document, which, if accepted, could be bound and submitted without editing to the Office of Graduate Studies. The final copies must be submitted to the thesis committee members, along with a copy to the program ([sspb@rice.edu](mailto:sspb@rice.edu)), at least one week before the final oral defense.

Oral Defense. The final thesis examination consists of two parts: (1) Initially, the student presents an hour-long public lecture that is handled like a departmental seminar. (2) Following the public lecture, the official examination by the thesis committee follows. The student is expected to defend in detail their research work and the text of the written thesis. The committee members will consider both the student's research work and the final copy of the thesis. Detailed instructions for the thesis defense process can be found on the Office of Graduate and Postdoctoral Studies website.

If the committee members approve the student's performance and the text of the thesis, they sign the required forms, which must be brought to the examination by the student. During the examination, the thesis committee members may recommend revisions or additions, which must be incorporated in the submission of a revised final thesis, which must then be approved and signed by all committee members. The student should note that, to participate in the commencement ceremonies at the end of the academic year, the committee members must

approve the final copy of the thesis before the deadlines set by the Office of Graduate and Postdoctoral Studies.

In the case of an unsatisfactory performance, a second examination can be scheduled. A second unsatisfactory performance will result in dismissal from the program.

Following their defense, students must submit a copy of their approval of candidacy form, signed by the thesis committee signifying successful defense of the thesis, to the Office of Graduate and Postdoctoral Studies within one week after the oral examination. Instructions to submit this form are located on the Office of Graduate and Postdoctoral Studies website. The original approval of candidacy form must be turned in when the thesis is submitted.

Acceptance of Thesis. No later than six months from the date of the examination, candidates who successfully passed the oral examination in defense of their thesis must submit their thesis to the Office of Graduate and Postdoctoral Studies. A student's thesis must be submitted electronically. The Graduate and Postdoctoral Studies website contains instructions regarding how to submit the thesis. If the thesis is not ready for final signatures by the end of the six-month period, the "pass" may be revoked and an additional oral defense must be scheduled.

Degree Conferral. Students who wish to have their degree conferred in the same semester in which they defend must meet the submission deadline for that degree conferral per the Academic Calendar.

Deadlines. All master's students are required to complete their program within five years of initial enrollment. This time boundary includes any period in which the student was not enrolled or enrolled part-time, for whatever reason. Failure to meet any university time to degree deadline may result in the student not being able to continue in their degree program.



## VIII. ADDITIONAL PROGRAM PROTOCOLS

### A. Vacation

Full time SSPB graduate students are entitled to ten weekdays of paid annual leave based on a 12-month appointment, for any reason, in addition to University Staff holidays when the university is closed. Unused days may not be carried forward year to year and do not accrue payable time upon departure.

Students must coordinate their vacation plans with their advisers sufficiently far in advance to avoid last-minute conflicts. These absences from the laboratory must be approved by the thesis advisor. Students who are teaching must also coordinate their plans with their teaching supervisor or instructor.

Students may sometimes be required to work on University Staff holidays to support ongoing projects and operations; students who work on a University Staff holiday will be able to use this paid day off at another time. Medical leaves and other types of interruptions of study should be handled according to the guidelines in the General Announcements.

### B. Internships

To explore career paths during their studies, some students may wish to gain hands on experience through an internship at a company, government laboratory, or non-profit. Students must consult with their thesis advisor about the timing of such fellowships and compatibility with their current research. Ideally, such conversations and planning should occur at least a year in advance of the potential internships to support seamless planning with research. If the plan is approved by the advisor, then students are encouraged to apply and coordinate an internship. At least one semester in advance of the internship, students must report their plans to the SSPB program, such as internship organization, location, internship dates, registration status, and funding mechanism. If funding changes will be required at Rice, the student must notify the SSPB program at least one month prior to the internship start date. International students must complete all required paperwork with Rice OISS to ensure compliance with visa regulations.

### C. Conflict Resolution

Problems or conflicts can arise during graduate school, and students must take responsibility for informing faculty. Depending on the problem, students should feel free to ask for advice from their advisor, the SSPB Director, members of their Research Progress Committee, the Program Manager, or any faculty member with whom they feel comfortable discussing the challenge.

It is best to move to resolve conflicts quickly and amicably. If informal attempts to resolve a problem are unsuccessful, then students should do the following:

1. The student should submit the grievance in writing to the SSPB Director, who will attempt to resolve the problem. Prior to submitting this grievance, the students are welcome to schedule a one-on-one meeting with the Director to discuss.
2. If the student remains unsatisfied, the problem should be presented for resolution to the SSPB Graduate Advising Committee. If a member of this committee serves as the student's advisor, then the student may ask the Director to appoint an alternate *pro tem* committee member. Both the student and the SSPB Director should submit a written record of their view of the conflict to this committee, who will attempt to resolve the problem.
3. If the student remains unsatisfied, the problem can be referred to the Office of Graduate and

Postdoctoral Studies as outlined in the Graduate Announcements. Formal guidelines are provided in the Graduate Announcements outlining processes for Petitions, Appeals, Grievances, and Problem Resolution. The decision determined by the processes outlined in the Graduate Announcements will be final.

University resources. As students navigate conflict resolution, they can also contact the Student Support Manager at Graduate and Postdoctoral Studies (currently Pia Byrd; [pia.byrd@rice.edu](mailto:pia.byrd@rice.edu)). This resource, which is available to students in all graduate programs, is designed to provide students a perspective from outside of their graduate program, which can often be valuable.

#### **D. Financial support**

Students who receive a stipend in support of their graduate work are expected to devote full time to their studies and are not allowed to take outside employment. During their first semester of study, full-time participation will typically consist of ~12 credit hours. The Graduate Advising Committee will provide the required coursework as part of their first-semester advising. Financial support is dependent upon satisfactory performance in required coursework and research, reasonable progress toward degree requirements, the availability of funds, and placement in a lab by the end of the second semester in residence. Student stipends are subject to all the usual federal taxes.

The program will fund students during the first semester of study. Advisors become responsible for financially supporting students beginning the second semester in residence. Advisors are expected to pay 100% of the student's stipend unless that stipend is funded by an external fellowship, scholarship, training grant, or other source of external funding which covers all or a portion of the student's stipend. If alternative sources of funding only cover a portion of the student's stipend, such as a Fulbright Fellowship, then the advisor is responsible for the remaining portion to ensure that the students received the full stipend amount.

The normal limit of financial support for graduate students is ten semesters excluding summers, as the program's goal is to support student completion of their doctoral studies in a reasonable period. Students who anticipate taking longer than 10 semesters to complete their PhD degree must consult with their thesis advisor about the availability of financial support. The thesis advisor, in consultation with the Program Director, shall consider the student's progress, circumstances that justify continued funding, and the availability of funding when making a decision regarding whether the student's funding should be continued for a specific period. Continued support will be reevaluated annually or more often as appropriate. Students whose funding has been terminated may continue to register and work on research projects if they continue to make acceptable progress toward the degree requirements.

The program does not guarantee support for students who choose a faculty member with a primary appointment outside of Rice University, *e.g.*, thesis advisors within the Texas Medical Center who are affiliated with the program but are only adjunct faculty at Rice. To ensure that students are aware of these special constraints, the SSPB program requires that students and their advisors sign an agreement form acknowledging that they understand the constraints of thesis work at a nearby institution in advance of joining that laboratory.

#### **E. Changing laboratories**

Because switching advisors affects progress toward the degree and/or any financial support arranged by the previous advisor, students should not consider switching advisors except in exceptional circumstances. However, the program recognizes that in rare circumstances a student may feel their interests could be better served by working with a different advisor.

Requests to switch advisors will be handled on a case-by-case basis by the Program Director. In such cases, the program will make every effort to assist the student. However, the student bears the ultimate responsibility of finding a new advisor.

Procedure for requesting a change in advisor. If considering a change in advisors, students should first schedule a conversation with the SSPB Director to request guidance. Students will typically be advised to discuss any concerns or issues with their current thesis advisor to resolve those issues. If this does not lead to a satisfactory outcome, then the student will need to work with the program to find a new thesis advisor. This will involve speaking to potential advisors whose research interests are in line with their interests, who is willing to serve as the student's advisor, and who has funding to support the student. If the student finds another faculty member willing to serve as their advisor, then the student should submit a written petition to the Program Director for approval to switch advisors. This petition *must* have the endorsement of the new advisor. The Director will consider petitions on a case-by-case basis. Students may not initiate the process to change advisors more than twice nor have a total of more than three advisors, including their initial advisor, during their time in the program.

Procedure if a student is dismissed for advisor's laboratory. If a student is dismissed from their thesis advisor's research group, then they must immediately meet with the Director to discuss and resolve the situation. Students will be financially supported by the program for up to one semester as they work to find a new advisor, provided they are in good standing in the program, and they did not receive an "unsatisfactory" in either SSPB 575 or SSPB 800 prior to their dismissal. In cases where students are eligible for financial support, they will be required to enroll in SSPB 575 and to find a new research mentor with financial support during the semester where they are supported by the program.

University resources. When a student encounters a challenge that could lead to a change in thesis advisors, they can speak with the Student Support Manager at Graduate and Postdoctoral Studies (currently Pia Byrd; [pia.byrd@rice.edu](mailto:pia.byrd@rice.edu)). Students are strongly encouraged to consult this individual as a resource if they anticipate a need for a change in thesis advisors for any reason. This Support Manager is available for graduate students who are navigating such issues and wish to obtain feedback on their situation in a confidential environment.

## **F. Probation and dismissal**

Grades. Students *must* maintain a GPA of 3.0 or higher and receive satisfactory marks in their coursework. *A student will be placed on probation if their GPA falls below 3.0 in any given semester, if their cumulative GPA is below 3.0, and/or if they receive an unsatisfactory grade in any of their coursework.* The Program Director will determine what the student must do to address deficiencies and be removed from probation. Clear expectations for resolving any academic deficiency will be communicated to the student in writing, with a defined timeline and an opportunity to demonstrate acceptable academic performance. Failure to address deficiencies in the timeline provided by the Program Director will result in dismissal from the program.

If the student's GPA falls below 2.67 for two consecutive semesters (including the summer semester), the student will be immediately dismissed without further warning in accordance with University policy. Students will be notified of their dismissal once final grades have been received and posted to their records.

Research Progress. Students must make adequate progress on research. Progress includes receiving satisfactory grades for SSPB 575 and SSPB 800, passing the advancement to candidacy exam, and submitting annual progress review reports that demonstrate progress

towards the thesis. A lack of progress will lead to placement of the student on probation. Upon consulting with the thesis advisor, the Program Director will determine what the student must do to address deficiencies and be removed from probation. Clear expectations for resolving any research progress deficiency will be communicated in writing by the program to the student and the thesis advisor. A failure to rectify the problems would be grounds for dismissal under the terms of the “satisfactory progress” rule in the graduate requirements.

### **G. Guidelines for petitions and appeals**

As outlined in the General Announcements, graduate students may petition for exceptions to academic requirements, regulations, and judgments. A course requirement is an example of an academic requirement. Allowed time to degree is an example of an academic regulation. Course grades and dismissals from programs are examples of academic judgments. If a petition is denied, one level of appeal is allowed. Detailed information on the university policies related to these protocols can be found within the General Announcements.

### **H. Assault, Harassment, and Discrimination**

Rice encourages any student who has experienced an incident of sexual, relationship, or other interpersonal violence, harassment, or gender discrimination to seek support. There are many options available both on and off campus for all graduate students, regardless of whether the perpetrator was a fellow student, a staff or faculty member, or someone not affiliated with the university.

Students should be aware when seeking support on campus that most employees are required by Title IX to disclose all incidents of non-consensual interpersonal behaviors to Title IX professionals on campus who can act to support that student and meet their needs. The therapists at the Rice Counseling Center and the medical providers at Student Health Services are confidential, meaning that Rice will not be informed about the incident if a student discloses to one of these Rice staff members. Rice prioritizes student privacy and safety, and only shares disclosed information on a need-to-know basis.

Students in need of assistance should contact the Counseling Center (<https://wellbeing.rice.edu>) or the SAFE Office (713-348-3311).

Policies, including Sexual Misconduct Policy and Student Code of Conduct, and more information regarding Title IX can be found online (<https://safe.rice.edu>).

## APPENDIX A. Approved advanced elective courses

BIOE 505: Macromolecular Assemblies BIOE 518: Introduction to Computation Biology BIOE 521: Microcontroller applications BIOE 522: Gene Therapy BIOE 523: Control Theory/Synthetic Biology BIOE 525: Nanobiology and Nanomedicine BIOE 526: Precision Gene Editing BIOE 532: Biomanufacturing, Sustainability and Bioeconomy BIOE 535: Cell Based Therapeutic BIOE 536: Immunoengineering BIOE 537: Genetic and Epigenetic Control BIOE 539: Applied Statistics for Bioengineering and Biotechnology BIOE 542: Macromolecular Systems Bioengineering BIOE 543: DNA Biotech, Biophysics, Modeling BIOE 561: Principles of Bioengineering I BIOE 562: Principles of Bioengineering II BIOE 577: Foundations of Biotechnology BIOE 580: Protein Engineering BIOE 587: Optic Imaging/Nanobiophotonics BIOE 589: Computational Molecular Bioengineering BIOE 610: Methods of Molecular Simulation
BIOS 524: Microbiology & Biotechnology BIOS 551: Molecular Biophysics BIOS 552: Structural Biology BIOS 555: Computational Synthetic Biology BIOS 561: Topics in Evolution BIOS 569: Core Course in Ecology and Evolutionary Biology BIOS 570: Computation with Biological Data BIOS 572: Immunology
CEVE 544: Environmental Microbiology
CHBE 540: Statistical Physics for Nanoscience and Nanoengineering CHBE 545: Principles of Biomolecular Engineering, Design and Selection CHBE 557: Discovery and Engineering of Bioactive Natural Products CHBE 580: Protein Engineering CHBE 588: Advances in Genome Engineering CHBE 640: Metabolic Engineering
CHEM 515: Chemical Kinetics and Reactions Mechanisms CHEM 523: Advanced Analysis for Molecular Dynamics CHEM 537: Biophysical Chemistry CHEM 551: Biomolecular Concepts CHEM 552: Chemical Biology CHEM 554: Drug Discovery CHEM 559: Spectroscopy at the Single Molecule/Particle Limit CHEM 560: Advanced Optical Microscopy CHEM 650: Chemical Physics of Biological Matter
COMP 504: Graduate Object-Oriented Programming and Design COMP 540: Statistical Machine Learning COMP 543: Graduate Tools and Models - Data Science COMP 547: Computational Genomics For Microbial Forensics COMP 570: Bioinformatics: Sequence to Structure COMP 571: Bioinformatics: Sequence Analysis COMP 572: Bioinformatics: Network Analysis COMP 576: Introduction to Deep Learning COMP 650: Physical Computing Seminar
ELEC 588: Theoretical Neuroscience ELEC 589: Neural Computation ELEC 680: Nano-Neurotechnology
PHYS 526: Statistical Physics PHYS 551: Biological Physics PHYS 622: Quantum Field Theory
STAT 581: Mathematical Probability STAT 623: Probability in Bioinformatics/Genetics STAT 650: Stochastic Differential Equations STAT 673: High-Dimensional Data STAT 699: Statistical Learning

## APPENDIX B. List of important deadlines

### FIRST YEAR IN PROGRAM

August	<ul style="list-style-type: none"> <li>• meet with Graduate Advising Committee to determine coursework plan for first year</li> <li>• first rotation requests submitted to the Chair of Graduate Advising Committee</li> </ul>
September	<ul style="list-style-type: none"> <li>• second rotation requests submitted to the Chair of Graduate Advising Committee</li> </ul>
October	<ul style="list-style-type: none"> <li>• third rotation requests submitted to the Chair of Graduate Advising Committee</li> </ul>
November	<ul style="list-style-type: none"> <li>• register for Spring semester using Esther (a minimum of 9 credits)</li> </ul>
December	<ul style="list-style-type: none"> <li>• thesis advisor requests submitted to the Chair of Graduate Advising Committee</li> <li>• see payroll to process I-9 forms</li> </ul>
January	<ul style="list-style-type: none"> <li>• begin thesis research in mentor's laboratory</li> </ul>
February	
March	
April	<ul style="list-style-type: none"> <li>• register for Summer and Fall semester using Esther (a minimum of 9 credits)</li> </ul>
May	
June	<ul style="list-style-type: none"> <li>• make coursework plan for upcoming year (consult advisor and Chair of Advising)</li> </ul>
July	<ul style="list-style-type: none"> <li>• submit Research Progress Review committee request to <a href="mailto:sspb@rice.edu">sspb@rice.edu</a></li> <li>• review Coursework Progress form and confirm with <a href="mailto:sspb@rice.edu">sspb@rice.edu</a></li> </ul>

### SECOND YEAR IN PROGRAM

August	
September	
October	
November	<ul style="list-style-type: none"> <li>• register for Spring semester using Esther (a minimum of 9 credits)</li> </ul>
December	
January	
February	
March	
April	<ul style="list-style-type: none"> <li>• register for Summer and Fall semester using Esther (a minimum of 9 credits)</li> </ul>
May	
June	<ul style="list-style-type: none"> <li>• submit teaching assignment requests</li> </ul>
July	<ul style="list-style-type: none"> <li>• review Coursework Progress form and confirm with <a href="mailto:sspb@rice.edu">sspb@rice.edu</a></li> <li>• schedule Advancement to Candidacy Exam</li> </ul>

### THIRD YEAR IN PROGRAM

August	
September	
October	
November	• register for Spring semester using Esther (a minimum of 9 credits)
December	• deadline for completing Advancement to Candidacy Exam
January	
February	
March	
April	• register for Summer and Fall semester using Esther (a minimum of 9 credits)
May	
June	
July	• submit annual student progress report • submit petition for PhD degree candidacy

### FOURTH YEAR AND BEYOND

November	• register for Spring semester using Esther (a minimum of 9 credits)
April	• register for Summer and Fall semester using Esther (a minimum of 9 credits)
July	• submit annual student progress report

# APPENDIX C. Student Coursework Checklist to Candidacy



## Systems, Synthetic and Physical Biology

### Student Tracking and Checklist to Candidacy

Student: \_\_\_\_\_ Student ID: \_\_\_\_\_ Start Semester: \_\_\_\_\_  
*Last, First, Middle Initial*

Advisor: \_\_\_\_\_

Notes:

Other \_\_\_\_\_  
*(...Committee Chair within department)*  
 Committee \_\_\_\_\_  
*(... Member within department)*  
 Members: \_\_\_\_\_  
*(... Member outside department)*  
 \_\_\_\_\_  
*(... Additional members within department)*

Requirement	Course Name	Course Number	Sem / Year	Total Credit	Grade	Transfer Credit	Course Waived	Notes
Prerequisite courses	Biochem, Cell, Mol Biol							Options = BIOS 301, BIOE330, BIOS 341
	ODEs							Options = MATH 211; CAAM 336.
	Statistics							Options = STAT 305, 310; BIOE 439.
Program Specific	Responsib Conduct Res	UNIV 594						Must take first semester.
	Intro to Research	SSPB 575						Must take four semester before end of second year.
	Graduate Seminar	SSPB 550						
	Graduate Seminar	SSPB 550						
	Graduate Seminar	SSPB 550						
	Graduate Teaching	SSPB 599						Must complete before end of third year.
Core Courses	Physical Biology	SSPB 501						Must take during first two years.
	Intro Systems Biology	SSPB 502						
	Synthetic Biology	SSPB 503						
Advanced Electives								At least 9 credit hours from: BIOE518, 521, 522, 523, 525, 526, 535, 537, 539, 542, 543, 561, 562, 577, 580, 587, 589, 610; BIOS 524, 551, 552, 555, 561, 569, 570, 572; CEVE 544; CHBE 540, 545, 557, 580, 588, 640; CHEM 515, 523, 537, 551, 552, 554, 559, 650; COMP 540, 543, 547, 570, 571, 572, 576, 650, 670; ELEC 588, 589, 680; PHYS 526, 551, 622; STAT 581, 623, 650, 673, 699.
Open Electives								Must be 300-level or above; taken for a letter grade
Additional Courses								Includes BIOS 611 or any course with S/U or P/F grade designation

SSPB 800 Total Research Credit Hours: 0.00

Sem/Yr	Credit Hr	Grade	Sem/Yr	Credit Hr	Grade

Prerequisite Total:	0.00
Program Specific Total:	0.00
Core Courses Total (9 credits required):	0.00
Advanced Electives Total (9 credits required):	0.00
Open Electives Total (6 credits required):	0.00
Additional Courses Total:	0.00
Research Credit Total (SSPB 800):	0.00
Course Credit Hours:	0.00
<b>TOTAL CREDIT HOURS:</b>	<b>0.00</b>
PROGRAM GPA:	

This form is intended to be a checklist to Candidacy only. It is the responsibility of the student to read and fulfill all of the requirements detailed in General Announcements, the SSPB Graduate Program Student Handbook, and on the GPS website. Last updated, July 26, 2024.



## APPENDIX D. Advancement to Candidacy Exam Checklist

- 1. Write your proposal.** Follow instructions in graduate handbook.
- 2. Schedule your Oral Exam.** You must: (i) identify a time that your committee can attend, and (ii) reserve a room for a two-hour block of time. You are welcome to ask the Program Manager for assistance with room reservations.
- 3. Communicate the location and time.** Email the time and location of your A-exam to [sspb@rice.edu](mailto:sspb@rice.edu) and to the members of your Research Progress Committee.
- 4. Submit the written proposal.** Submit the written proposal to: (i) your Progress Review Committee, and (ii) the program at [sspb@rice.edu](mailto:sspb@rice.edu) at least two weeks before the Oral Exam.
- 5. Print out copies of the Evaluation Form.** Print out a copy of the “A-Exam Evaluation Form” and “Guidelines for A-Exam Evaluation” for each committee member, fill out the student section, and bring the forms to your Oral Exam along with pens for each of your committee members. Each committee member must complete a separate form.
- 6. Print out a copy of the Approval Form and Faculty Instructions.** Print out the “A-Exam Approval Form,” fill out the student section of this form, and provide this form to the Chair of your Research Progress Committee at the beginning of your A-exam meeting. You should also give them a printed copy of the “Faculty Instructions” page.
- 7. Present your proposed plan.** Give an oral presentation (30-40 min) describing the proposed research plan and answer committee questions. The committee will assess the depth of your general knowledge and determine your familiarity and overall understanding of their thesis topic. At the end of the exam, you will be asked to step out of the room so that the committee can discuss their evaluation in private. At this time, each committee member completes the “Evaluation Form” with their final recommendation, and the Chair must fill out the “Approval Form” which summarizes the committee’s evaluation. Some committee members may request for more time after the A-exam meeting to complete these forms. If this occurs, the student is responsible for collecting these forms from each committee member as soon as possible.
- 8. Submit the completed forms.** Immediately after the exam, the student collects all forms (Evaluation and Approval Forms) from the committee members. The student must electronically submit all forms to the Program Manager and copy all committee members on the email.
- 9. Filing a petition for PhD degree candidacy.** Upon passing the exam, students must coordinate with the Program Manager to complete a Petition to Candidacy Form. This form requires students to identify the members of their thesis committee. Please refer to Section VI of the SSPB Graduate Student Handbook for more information.

All forms and instructions can be found in the SSPB Graduate Student Handbook.  
Contact the SSPB Program Manager if you have any questions.

## APPENDIX E. Advancement to Candidacy Faculty Evaluation Form

Student name: \_\_\_\_\_ Date of Exam: \_\_\_\_\_

**Faculty.** Each faculty committee member fills out this form separately. Guidelines are on the next page

**Students.** The student collects and submits all committee member forms to [sspb@rice.edu](mailto:sspb@rice.edu)

*Excellent*      *Satisfactory*      *Unsatisfactory*

**PLO 1. Depth of knowledge in area of thesis proposal**

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<i>Excellent:</i>	Identifies all relevant results/techniques from literature, and synthesizes them in a thoughtful discussion.
<i>Satisfactory:</i>	Discusses major previous works and places them in context for the present project.
<i>Unsatisfactory:</i>	Fails to cite or assimilate previous work of relevance to topic.

**PLO 2. Ability to integrate knowledge and critical thinking**

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<i>Excellent:</i>	Original research that demonstrates distinct creativity in the question or experimental design. Complete answers that show a deep understanding of the discipline that extends beyond the contents of the document.
<i>Satisfactory:</i>	Describes a novel problem appropriate for a doctoral thesis. Competent answers that illustrate a facility with the issues and techniques immediately relevant to the thesis project.
<i>Unsatisfactory:</i>	Incremental approach unlikely to yield publishable findings. Answers reveal a limited familiarity with the thesis project or its context.

**PLO 3. Written communication skills**

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<i>Excellent:</i>	Good organization, fluent prose, and few grammatical errors. Full compliance with formatting guidelines.
<i>Satisfactory:</i>	Decent organization, coherent prose, and limited grammatical errors. Full compliance with formatting guidelines.
<i>Unsatisfactory:</i>	Poor organization, incoherent prose, and/or numerous grammatical errors. Not in compliance with formatting guidelines.

**PLO 4. Visual and oral communication skills**

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<i>Excellent:</i>	Engaging, highly polished presentation with well crafted slides that illustrate key results in the project and clearly describe future directions.
<i>Satisfactory:</i>	Professional presentation on par with a solid conference talk, includes a coherent project narrative and future plans.
<i>Unsatisfactory:</i>	Too much or too little detail, unclear about project goals and direction, incoherent or illegible slides, read from slides.

**APPENDIX F. Advancement to Candidacy Committee Approval Form**

**Student:** Fill out the box and submit the form to your Committee Chair prior to your defense

**Faculty:** The Chair should complete this form and submit to [sspb@rice.edu](mailto:sspb@rice.edu)

A preliminary oral examination for the approval of the student's thesis proposal in the major field of Systems, Synthetic, and Physical Biology:			
Student's Name: _____			
	Last Name	First Name	Middle Initial
Date: _____			
	Month	Day	Year
Title of Thesis Proposal: _____			

**Committee Chair:** Indicate the outcome of the exam below.

**Committee Decision:**