DOCTOR OF PHILOSOPHY (PHD) DEGREE IN THE FIELD OF SYSTEMS, SYNTHETIC, AND PHYSICAL BIOLOGY

Program Learning Outcomes for MS and PhD Degrees in the field of Systems, Synthetic, and Physical Biology

Upon completing the MS and PhD degrees in the field of Systems, Synthetic, and Physical Biology, students will be able to:

1. Develop knowledge of the breadth of topics within Science, Technology, Engineering, and Mathematics (STEM) disciplines that underlie the foundations of Systems, Synthetic, and Physical Biology.
2. Demonstrate the critical thinking skills and ability to integrate knowledge from diverse STEM fields to solve biological problems.
3. Demonstrate the written communication skills required for a thesis describing independent research, published research, and external research proposals.
4. Demonstrate the effective oral and visual communication skills necessary for articulating scientific findings and significance to diverse audiences.

Requirements for the MS and PhD Degrees in the field of Systems, Synthetic, and Physical Biology

MS Degree Program

The MS degree is a thesis master's degree. For general university requirements, please see Thesis Master's Degrees (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-thesis-masters-degrees/). For additional requirements, regulations, and procedures for all graduate programs, please see All Graduate Students (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/). All students involved in research must complete the Collaborative Institutional Training Initiative (CITI) Responsible Conduct of Research online course. Candidates for the MS degree also must:

- Choose an advisor (PI) by the end of the first semester
- Submit an original research thesis
- Complete 30 semester hours of program-approved courses (including thesis research hours)
- Defend the thesis in a public oral examination.

The requirements listed in the General Announcements (GA) satisfy the minimum requirements for this degree program. In certain instances, courses (or requirements) not officially listed here may be substituted upon approval of the program's academic advisor or, where applicable, the department or program's Director of Graduate Studies. Course substitutions or any exceptions to the stated official curricular requirements must be approved by the Office of Graduate and Postdoctoral Studies (https://graduate.rice.edu/). Students and their academic advisors should identify and clearly document the courses to be taken.

Summary

Code	Title	Credit Hours
Total Credit Hours Required for the MS Degree in the field of Systems, Synthetic, and Physical Biology		30

Requirements for the PhD Degree in the field of Systems, Synthetic, and Physical Biology

PhD Degree Program

For general university requirements, please see Doctoral Degrees (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-doctoral-degrees/). For additional requirements, regulations, and procedures for all graduate programs, please see All Graduate Students (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/). The Graduate Program in SSPB offers Master's and Doctoral degrees. However, students will be directly admitted only to the Doctoral program. For each degree, students must fulfill the university requirements set forth in the General Announcements under which they entered. The semester credit hour requirements may be fulfilled both by classroom hours and research hours. Students are required to accumulate at least 30 semester hours of graduate-approved courses while maintaining a GPA of 3.00 or higher.

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Summary

Code	Title	Credit Hours
Total Credit Hours Required for the PhD Degree in the field of Systems, Synthetic, and Physical Biology		90

Degree Requirements

Code	Title	Credit Hours
Required Courses for the PhD in the field of Systems, Synthetic, and Physical Biology		
SSPB 501 / BIOE 502 / BIOS 505	PHYSICAL BIOLOGY	3
or PHYS 551	BIOLOGICAL PHYSICS	
SSPB 502 / BIOE 552	INTRO COMPUTATIONAL SYSTEMS BIOLOGY: MODELING & DESIGN PRINCIPLES OF BIOCHEM NETWORKS	3
or BIOE 518	INTRODUCTION TO COMPUTATIONAL BIOLOGY	
or BIOS 570	COMPUTATION WITH BIOLOGICAL DATA	
SSPB 503 / BIOE 508	SYNTHETIC BIOLOGY	3

SSPB 575	INTRODUCTION TO RESEARCH	3
UNIV 594	RESPONSIBLE CONDUCT OF RESEARCH	1
SSPB 599	GRADUATE TEACHING IN SSPB	1
Seminars		
SSPB 550	GRADUATE SEMINAR (4 semesters required, 1st semester) [1]	1
SSPB 550	GRADUATE SEMINAR (4 semesters required, 2nd semester) [1]	1
SSPB 550	GRADUATE SEMINAR (4 semesters required, 3rd semester) [1]	1
SSPB 550	GRADUATE SEMINAR (4 semesters required, 4th semester) [1]	1
Elective Requirements		
Select at least 3 courses from Approved Advanced Topics in the SSPB field		*9*
Select at least 2 additional courses at the 300-level or above from any department [2]		*6*
Thesis Research		
SSPB 800	GRADUATE RESEARCH (each semester of residency after the first semester) [3]	1-15
Additional Coursework as Approved by the Program		**55**
Total Credit Hours		**90**

Footnotes and Additional Information

1. All students are required to enroll in SSPB 550 each semester in the first two years.
2. Courses numbered 500-and-above are considered to be at the post-baccalaureate or graduate-level. Undergraduate and graduate students may, with departmental approval, take certain courses outside their designated level. Doctoral students are required to complete a minimum of 90 graduate semester credit hours of study at the 500-level and above (including thesis credit hours).
3. Students are required to enroll in SSPB 800 during all semesters of residency after the first semester. Students may adjust their credit hours for SSPB 800 to ensure that they maintain full-time status and that they achieve the total number of hours required to fulfill the degree. Nine (9) hours of SSPB 800 is the standard expectation in most semesters.

Other Program Requirements (PhD students)

All students involved in research must complete the Collaborative Institutional Training Initiative (CITI) Responsible Conduct of Research online course. Candidates for the PhD degree also must:

- Choose an advisor (PI) by the end of the first semester or equivalent
- Fulfill a teaching requirement
- Submit a thesis proposal that provides evidence of their ability to carry out original research in a specialized area of Systems, Synthetic, and Physical Biology before the beginning of their fifth semester in residence
- Complete 90 semester hours of program-approved courses (including thesis research hours)
- Pass their qualifying exam which includes thesis proposal defense
- Defend the PhD thesis in a public oral examination.

Qualifying Exam (PhD students)

Students are expected to pass their qualifying exam before the beginning of their fifth semester in residence unless an extension has been granted by the Program Director. Students may retake the exam up to two times if granted permission to do so by the Program Director. Students who do not pass the Qualifying Exam may exit the program with a MS degree if the appropriate requirements have been met.

Thesis Proposal Defense

Students are required to submit their written proposal to their Research Progress Committee no later than two weeks before the scheduled exam. The proposal is expected to be in NIH NRSA-like format - limited to 10 pages (not including References) and include the following sections: Abstract, Background, Problem Statement, Research Plan, Preliminary Results, References, and Proposed Timeline. Students whose research area may not be suitable for this format may seek approval of an alternative format by their Research Progress Committee. On the day of the defense, students are expected to give an oral presentation of their proposal and answer technical questions. The student should expect to give a presentation, which if uninterrupted would last about 45 minutes, and be prepared for substantial questioning by the Research Progress Committee.

Policies for the PhD Degree in the field of Systems, Synthetic, and Physical Biology

Systems, Synthetic, and Physical Biology Graduate Program Handbook

The General Announcements (GA) is the official Rice curriculum. As an additional resource for students, Systems, Synthetic, and Physical Biology publishes a graduate program handbook, which can be found here: https://gradhandbooks.rice.edu/2024_25/Systems_Synthetic_Physical_Biology_Graduate_Handbook.pdf.

Admission

Applicants for graduate study in Systems, Synthetic, and Physical Biology must have:

- BA or BS degree in natural sciences, engineering, or related field (or some equivalent)
- Strong ability and motivation for research as indicated by academic record, relevant research experience, and recommendations

Although the program offers an MS degree, only students who intend to pursue the PhD degree are admitted into the program. In rare instances, students who fulfilled the MS degree requirements and who do not wish to continue their studies toward their PhD degree may choose to graduate with MS degree. Information on admission to the program is available on the SSPB website (https://sspb.rice.edu/phd-program/).

Prerequisite Requirements

Students are required to have training in the following three foundation areas:

1. Biochemistry or Molecular Biology
2. Ordinary Differential Equations
3. Statistics

If students are missing formal training in these subjects, they are required to take the equivalent background courses during their first year at

Rice. (These courses should be taken as Pass/Fail). The corresponding courses at Rice include the following:

Code	Title	Credit Hours
Required Prerequisites		
Select 1 course from the following:		*3*
BIOS 301	BIOCHEMISTRY I	
BIOS 341	CELL BIOLOGY	
Select 1 course from the following:		*3*
MATH 211	ORDINARY DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA	
CMOR 304	DIFFERENTIAL EQUATIONS IN SCIENCE AND ENGINEERING	
Select 1 course from the following:		*3-4*
BIOE 439	APPLIED STATISTICS FOR BIOENGINEERING AND BIOTECHNOLOGY	
STAT 305	INTRODUCTION TO STATISTICS FOR BIOSCIENCES	
STAT 310	PROBABILITY AND STATISTICS	

Transfer Credit

For Rice University's policy regarding transfer credit, see Transfer Credit (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/#transfer). Some departments and programs have additional restrictions on transfer credit. Requests for transfer credit must be approved for Rice equivalency by the appropriate academic department offering the Rice equivalent course (corresponding to the subject code of the course content) and by the Office of Graduate and Postdoctoral Studies (GPS). Students are encouraged to meet with their academic program's advisor when considering transfer credit possibilities.

Additional Information

For additional information, please see the Systems, Synthetic, and Physical Biology website: https://sspb.rice.edu/.

Opportunities for the PhD Degree in the field of Systems, Synthetic, and Physical Biology

Additional Information

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