

Interdisciplinary Life Science Graduate Program (PULSe)

Guide for Students

2019-2020

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This guidebook is neither a contract nor an offer of a contract.

The information it contain was accurate at the time of publication.

Fees, deadlines, appointments, academic requirements, courses, degree programs, and other matters described in the guidebook may change without notice.

PULSe

THE PURDUE UNIVERSITY LIFE SCIENCE INTERDISCIPLINARY GRADUATE TRAINING PROGRAM

GUIDE FOR STUDENTS

Curricular Requirements

The PULSe curriculum has been designed to provide students with the basic information they will need to succeed in the PULSe Training Groups (TGs) during their Ph.D. work. In addition, the curriculum provides a broad and interdisciplinary program of study with the maximum possible flexibility so that students may tailor their programs to their individual needs and explore several training areas before deciding on one for their thesis program. The core requirements are a combination of general courses, TG-specific survey courses and laboratory rotations.

Credit hours: The core requirements comprise 16-19 credits:*

- 7 credits of general course work, divided into four focus areas (described below);
- 4-7 credits of TG Introductory courses (two courses of 2-4 credits each);
- TGs may require additional, specialty course work, beyond the core requirements.
- 1 credit of a participatory seminar course;
- 4 rotation credits of GRAD 59000, performing lab rotations in the first year. Not to be listed on the Plan of Study

69900 research credits (number of 69900 hours taken are determined on an individual basis by the PULSe office each semester; note that a total of 90 credit hours are required for the Ph.D.)

The student's research progress will be monitored for its ability to meet demands for publication in a peer-reviewed journal. This is one component of the Advisory Committee evaluation performed each year.

*The Biotechnology and Computational and Systems Biology training groups have additional core and credit hour requirements. See pages 6-7 for details.

Focus Area Courses: There are four required focus areas. One course must be taken to satisfy each area. The core is designed to provide breadth to otherwise very specialized training; therefore, the same course may not be counted as satisfying multiple areas.

- Scientific Ethics: One of the following courses must be taken at any time during PULSe graduate training.
 - GRAD 61200 – Responsible Conduct in Research (1 credit) Lecture once per week for 50 minutes per meeting for 8 weeks. Offered: Fall, Spring. Overview of values, professional standards, and regulations that define responsible conduct in research. Students learn the values and standards of responsible research through readings and lecture/discussion and practice application of these values and standards to research situations through class discussion of case studies from life sciences research.
 - HORT 60100 – Plan & Research Plant Science Research (1 credit) Lecture once per week for 50 minutes per meeting for 16 weeks. Typically Offered Fall. The purpose of this course is to acquaint students with the culture of scientific research and the processes of scientific discovery and review. The course will: 1) acquaint students with techniques used in presenting short scientific talks, as e.g., at national meetings, 2) expose students to procedures used in preparing scientific papers, proposals, etc., 3) introduce students to the outcomes expected to be achieved by graduate education and the processes by which students are mentored and evaluated, 4) help students begin formulating their research project proposal, 5) acquaint students with guidelines for biosafety and responsible conduct of research and provide a forum for discussion of ethical issues confronting researchers.

- Scientific Communication:
 - GRAD 60100 – PULSe Scientific Communications (1 credit/taken twice). Designed to develop the skills needed for effective scientific presentations. Students register for this course in the fall and spring semesters of Year 1 of study.
- Proposal Writing: One of the following courses must be completed before the end of Year 2 of PULSe graduate training; however, the proposal writing class should not be taken during the first year.
 - HORT 60300 – Grants and Grantsmanship (1 credit). Lecture once per week for 50 minutes per meeting for 16 weeks. Offered spring. Focuses on funding opportunities in agricultural research and techniques of writing successful scientific grant proposals. Students will write a proposal on a research topic of their choice during the course, and they will gain experience in the peer review process by preparing written reviews of proposals and participating in a panel meeting in which proposals are discussed and ranked.
 - MCMP 62500 – Grant Writing (1 credit). Offered Fall. Instructions for the preparation and submission of an NIH-style RO1 grant proposal will be covered. Each student will write and submit a complete proposal. The proposals will be student reviewed in a mock study section at the end of the course.
- Analysis of Data: This requirement is designed to train students from a variety of backgrounds in methods of acquiring and/or analyzing data in any of the various disciplines within PULSe. As such there is a menu of suggested courses from which students (and TGs) can choose depending on individual student or TG needs. These courses and their descriptions are listed below. Students must satisfy this requirement by the end of Year 2. Students in the Biotechnology TG take an additional 9 – 12 Math/Statistics credit hour requirements. See page 6 for a complete list of Biotechnology TG math/statistics courses.
 - BIOL 59500 – Methods and Measurements in Biophysical Chemistry (3 credits) Lecture 3 times per week for 50 minutes per meeting for 16 weeks. Offered: Fall. Introduction to physical methods in biochemistry and physical measurements of biological systems, such as UV/Vis spectroscopy, circular dichroism, IR and Raman spectroscopy, fluorescence, neutron diffraction, light scattering, scattering from ordered materials, x-ray crystallography, NMR and ESR spectroscopy, electron microscopy, mass spectroscopy. Application of these techniques to studies of structure and dynamic behavior of biological macromolecules, composition and orientation of structural elements and cofactors, ligand binding and conformational change in biological interactions and detailed probes of local changes in structure, solvent accessibility and specific bonds formed in biological reactions. Interpretation of the resulting data and analysis of strengths and limitations of each technique. Examples from research articles are discussed that illustrate how these methods are used in modern biochemistry. Prerequisite: Introductory Calculus and Physics or permission of the instructor.
 - STAT 50300 – Statistical Methods for Biology (3 credits) Lecture 3 times per week for 50 minutes per meeting for 16 weeks. Offered: Fall, Spring. Introductory statistical methods, with emphasis on applications in biology. Topics include descriptive statistics, binomial and normal distributions, confidence interval estimation, hypothesis testing, analysis of variance, introduction to nonparametric testing, linear regression and correlation, goodness-of-fit tests, and contingency tables. Credit allowed in either 50300 or 51100 but not both. Prerequisite: Calculus.
 - STAT 51100 – Statistical Methods (3 credits) Lecture 3 times per week for 50 minutes per meeting for 16 weeks. Offered: Fall, Spring. Descriptive statistics; elementary probability; sampling distributions; inference, testing hypotheses, and estimation; normal, binomial, Poisson, hypergeometric distributions; one-way analysis of variance; contingency tables; regression. Credit allowed in either 50300 or 51100 but not both. Prerequisite: MA 16200 or authorized equivalent courses or consent of instructor.

- STAT 51200 – Applied Regression Analysis (3credits) Lecture 3 times per week for 50 minutes per meeting for 16 weeks. Offered: Summer, Fall, Spring. Inference in simple and multiple linear regression, residual analysis, transformations, polynomial regression, model building with real data, nonlinear regression. One-way and two-way analysis of variance, multiple comparisons, fixed and random factors, analysis of covariance. Use existing statistical computer programs. Prerequisite: STAT 50300, STAT 51100, or STAT 51700 or consent of instructor.
- CS 59000 – Computing for Life Sciences (3 credits) Lecture 3 times per week for 50 minutes per meeting for 16 weeks. Offered: Fall. Basic bioinformatics algorithms and Python programming. Course topics include biological data bases, algorithms for biological sequence (DNA, protein) sequence alignment and database search, sequence motif search, protein tertiary (3D) structure comparison, protein-protein interaction and comparative genomics. This course is targeted at non-CS majors who are working or interested in the bioinformatics field. No programming experience is required.
- CS 66200 – Pattern Recognition and Decision-Making Processes (3 credits) Lecture 3 times per week for 50 minutes per meeting for 16 weeks. Offered: Spring. Introduction to the basic concepts and various approaches of pattern recognition and decision-making processes. Topics include various classifier designs, evaluation of classifiability, learning machines, feature extraction, and modeling. Prerequisite: ECE 30200 or authorized equivalent courses or consent of instructor.
- CS 53000 – Introduction to Scientific Visualization (3 credits) Lecture 3 times per week for 50 minutes per meeting for 16 weeks. Offered: Fall. Teaches the fundamentals of scientific visualization and prepares students to apply these techniques in fields such as astronomy, biology, chemistry, engineering, and physics. Emphasis is on the representation of scalar, vector, and tensor fields; data sampling and resampling; and reconstruction using multivariate finite elements (surfaces, volumes, and surfaces on surfaces). Prerequisite: CS 25100 or authorized equivalent courses or consent of instructor.

Training Group Introductory Courses: (4-7 credits) The TG Introductory courses generally involve two classes of two to four (2-4) credits each. PULSe students must enroll in at least two of these courses in addition to the core courses. One introductory course must be within a student's TG, and the second introductory class must be taken outside of a student's TG. These courses are to be completed by the end of Year 2. Some TGs require more than one introductory course within the group.

- Biomolecular Structure and Biophysics
 - BIOL 59500 Methods and Measurement in Biophysical Chemistry (3 credits) Offered Fall
 - BCHM 60501 Macromolecules (3 credits) Offered in Fall
- Biotechnology* - For students in this TG, both courses below must be taken. Course availability is dependent on enrollments. For this reason, appropriate courses may be substituted. Contact the Office of Interdisciplinary Graduate Programs for course advice and approval.
 - ABE 56000/BME 52100 Biosensors: Applications and Fundamentals (3 credits) Typically Offered Every Other Fall
 - ABE 62700 Colloidal Phenomena in Bioprocessing (3 credits) Typically Offered Every Other Fall
 - Additional Biotechnology Requirements listed below
- Chemical Biology
 - MCMP 57000 Basic Principles of Chemical Action and Biological Systems (3 credits) Typically Offered Fall
- Chromatin and Regulation of Gene Expression
 - BCHM 61000 Regulation of Eukaryotic Gene Expression (3 credits) Typically Offered Spring
 - BCHM 61100 Chromatin Biology and Chromosome Dynamics (2 credits) Typically Offered Fall
- Computational and Systems Biology*-either course will suffice, both courses do not have to be taken
 - CS 59000 Computing in Life Science (3 credits)
 - CS 50100 Computing for Science and Engineering (3 credits)
 - Additional Computational and Systems Biology Requirements listed below

- Integrative Neuroscience
 - BIOL 53800 Molecular, Cellular & Developmental Neurobiology (3 credits) Typically Offered Spring
 - BIOL 56200 Neural Systems (3 credits) Typically Offered Spring
 - BIOL 60200 Cellular Neurobiology (3 credits) Typically Offered Fall
- Plant Biology
 - BTNY 59000 Plant Development Genetics
- Membrane Biology - For students in this TG, both of the following courses must be taken.
 - BIOL 64700 Membrane Protein Structural Biology (2 credits) Typically Offered Spring
 - CHM 63200 Membranes: Structure and Function, Control (3 credits) Typically Offered Fall
- Microbiology, Immunology and Infectious Diseases
 - AGRY 64900 Molecular Microbial Ecology (3 credits) Typically Offered Fall
 - BIOL 53300 Medical Microbiology (3 credits) Typically Offered Fall
 - BIOL 54900 Microbial Ecology (2 credits) Typically Offered Every Other Spring
- Molecular Signaling and Cancer Biology - For students in this TG, both of the following courses must be taken.
 - BIOL 51600 Molecular Biology of Cancer (3 credits) Typically Offered Spring
 - BCHM 69500 Pathways (3credits) Typically Offered Fall

Additional Requirements

- Biotechnology TG Additional Requirements (9-12 credits of math/statistics):
 - ABE 65100 Environmental Informatics (3 credits)
 - CHE 63000 Applied Mathematics for Chemical Engineers (3 credits)
 - CS 50100 Computing for Science and Engineering (3 credits)
 - CS 51500 Numerical Linear Algebra (3 credits)
 - CS 52500 Parallel Computing (3 credits)
 - CS 53000 Introduction to Scientific Visualization (3 credits)
 - CS 59000 Computing for Life Sciences (3 credits)
 - ECE 60200 Lumped System Theory (3 credits)
 - FNR 64700 Quantitative Methods for Ecologists (3 credits)
 - IE 58000 Systems Simulation (3 credits)
 - MA 51100 Linear Algebra with Applications (3credits)
 - MA 51400 Numerical Analysis (3 credits)
 - MA 52300 Introduction to Partial Differential Equations (3 credits)
 - MA 52700 Advanced Mathematics for Engineers and Physicists (3 credits)
 - ME 58100 Numerical Methods in Mechanical Engineering (3 credits)
 - STAT 50300 Statistical Methods for Biology (3 credits)
 - STAT 51100 Statistical Methods (3 credits)
 - STAT 51200 Applied Regression Analysis (3 credits)
 - STAT 51300 Statistical Quality Control (3 credits)
 - STAT 51400 Design of Experiments (3 credits)
 - STAT 51600 Basic Probability and Applications (3 credits)
 - STAT 51700 Statistical Inference (3 credits)
 - For introductory course outside of a student's TG, select one of the following:
 - ABE 56000/BME 52100 Biosensors: Applications and Fundamentals (3 credits) Typically Offered Every Other Fall
 - 1 credit of ABE/BME seminar: ABE 69700 Doctoral Professional Development (1 credit) or other pending TG approval
- Computational and Systems Biology - Additional Requirements (9-12 credits of math/statistics/ computational courses):
 - AGRY 55300 Introduction to SAS for Statistical Analysis (3 credits)
 - BCHM 69500 Intro to R and Bioconductor (3credits)
 - BIOL 56310 Protein Bioinformatics (3 credits)
 - BIOL 59500 Introduction to Bioinformatics (3 credits)
 - BIOL 59500 Practical Biocomputing
 - BME 69500 Multi-scale Modeling in Biological Systems (new in Spring 2019)
 - BME 69900/ABE 69100 Quantitative Systems Biology

- CHM 57900 Molecular Modeling and Simulations
- CS 53000 Introduction to Scientific Visualization (3credits)
- CS 54100 Database System (3credits)
- CS 57300 Data Mining (3credits)
- CS 57900 Bioinformatics Algorithms (3credits)
- ECE 56200 Introduction to Data Management (3 credits)
- FS 59100 Microbial Genomics and Metabolism
- STAT 50300 Statistical Methods for Biology (3 credits)
- STAT 51200 Applied Regression Analysis (3 credits)
- STAT 51300 Statistical Quality Control (3 credits)
- STAT 51400 Design of Experiments (3 credits)
- STAT 51600 Basic Probability and Applications (3 credits)
- STAT 51700 Statistical Inference (3 credits)
- STAT 52500/52600 Intermediate/Advanced Statistical Methodology (3 credits)
- STAT 52900 Applied Decision Theory and Bayesian Statistics (3 credits)
- STAT 54500 Introduction to Computational Statistics (3 credits)
- STAT 54600 Computational Statistics (3credits)

Seminar Course: (1 credit) PULSe students are required to take one additional participatory seminar course offered by a department or a training group. In this course, the students are required to attend weekly seminars and to give a presentation during one of the class periods.

For students in the Integrative Neuroscience TG, the seminar presented must be on a neuroscience-related topic and not a presentation of one's own research or something closely related to it. Therefore, the seminar topic will need to be approved by the curriculum chair of the PULSe Integrative Neuroscience TG to fulfill this TG requirement. It is recommended this requirement be completed by the end of the third year.

CURRICULUM Note

Note that course names, numbers and offerings are subject to change throughout the year. Refer to the PULSe website (<http://www.gradschol.purdue.edu/PULSe>) Academics/Curriculum page for current course listings and requirements.

Recommended Classes for First-Year Students by Training Groups August 2019

Below is a menu of suggested courses (not all of the listed classes need to be taken).

Individual student needs, backgrounds and interests will vary.

Some of the STAT classes are listed in both fall and spring semesters. These classes are generally offered in both semesters, and the appropriate STAT class may be taken either semester.

Course offerings and availability are subject to change. Refer to the Schedule of Classes for each semester.

Advisement Procedures:

Fall

Each summer, the PULSe office will survey the new students on their Training Group (TG) of interest. After this information is gathered, each TG's Executive Committee representatives will meet with the Student Services Coordinator to give course recommendations for each incoming first-year student. The assessment will be based on student TG interest and academic background. If further information is needed, the student will be asked by the PULSe Office to contact the TG's Committee Representative.

Spring

The PULSe office will inform students in October that in order to register for spring classes, they need to contact an advisor from their primary training group of interest and obtain the advisor's assistance in selecting courses for spring. The student will initiate the registration process through the PULSe office.

BIOMOLECULAR STRUCTURE AND BIOPHYSICS

<u>FALL</u>	<u>SPRING</u>
BCHM 56100 General Biochemistry 1 (3) – depending on review of student's transcript	BCHM 56200 General Biochemistry 2 – upon advisement
BCHM 60501 Macromolecules (3) – <i>Do not take with BCHM 56100.</i>	BIOL 59500 Introduction to X-Ray Crystallography (3)
BIOL 47800/BIOL 595000 Introduction to Bioinformatics (4)	BIOL 59500 Practical Biocomputing (3)
BIOL 60000 Bioenergetics (2)	BIOL 59500 CryoEM 3D Reconstruction (2)
BIOL 59500 Methods and Measurements in Biophysical Chemistry (3)	BIOL 59500 Membrane Protein Structural Biology (2)
CHM 63800 Biophysical Chemistry (3)	BIOL 51700 Molecular Biology: Proteins (2)
CHM 61500 Principles of NMR Spectroscopy (3)	BIOL/BCHM 536 Biological and Structural Aspects of Drug Design and Action (3)
CHM 63100 Magnetic Resonance Spectroscopy (2)	BIOL 56310 Protein Bioinformatics (3)
CHM 63200 Membranes: Structure and Function (3)	
CHM 63400 Biochemistry: Structural Aspects (3)	
CS 59000 Computing for Life Sciences (3)	

BIOTECHNOLOGY

<u>FALL</u>	<u>SPRING</u>
ABE 56000/BME52100 Biosensors: Applications and Fundamentals (3)	BCHM 56200 General Biochemistry 2 – upon advisement
ABE 62700 Colloidal Phenomena in Bioprocessing (3)	BMS 52400 Introduction to Confocal Microscopy and Image Analysis (1)
BCHM 56100 General Biochemistry 1 (3) – depending on review of student's transcript	FNR 64700 Quantitative Methods for Ecologists (3)
BCHM 60501 Macromolecules (3) – <i>Do not take with BCHM 56100.</i>	MA 51400 Numerical Analysis (3)
CS 50100 Computing for Science and Engineering (3)	STAT 50300 Statistic Methods for Biology (3)
MA 51400 Numerical Analysis (3)	STAT 51100 Statistical Methods (3)

STAT 50300 Statistic Methods for Biology (3)	STAT 51200 Applied Regression Analysis (3)
STAT 51100 Statistical Methods (3)	STAT 51400 Design of Experiments (3)
STAT 51200 Applied Regression Analysis (3)	
STAT 51300 Statistical Quality Control (3)	
STAT 51400 Design of Experiments (3)	

CHEMICAL BIOLOGY

<u>FALL</u>	<u>SPRING</u>
BCHM 56100 General Biochemistry 1 (3) – depending on review of student's transcript	BCHM 56200 General Biochemistry 2 – upon advisement
BCHM 60501 Macromolecules (3) – <i>Do not take with BCHM 56100.</i>	BCHM 61000 Regulation of Eukaryotic Gene Expression (3)
BCHM 61100 Chromatin Biology and Chromosome Dynamics (2)	BIOL 51600 Molecular Biology of Cancer (3)
BIOL 60000 Bioenergetics (2)	BIOL 62000 Advanced Topics in Eukaryotic Cell Biology (3)
CHM 63200 Membranes: Structure and Function (3)	BIOL 64700 Membrane Protein Structural Biology (2)
CHM 63400 Biochemistry: Structural Aspects (3)	CHM 63500 Biochemistry: Dynamic Aspects (3)
CHM 65100 Advanced Organic Chemistry (3)	CHM 63500 Biochemistry: Dynamic Aspects (3)
MCMP 57000 Basic Principles of Chemical Action of Biological Systems (3)	STAT 50300 Statistic Methods for Biology (3)
STAT 50300 Statistic Methods for Biology (3)	STAT 51400 Design of Experiments (3)
	MCMP 544 Drug Classes and Mechanisms (3)

CHROMATIN AND REGULATION OF GENE EXPRESSION

<u>FALL</u>	<u>SPRING</u>
BCHM 56100 General Biochemistry 1 (3) – depending on review of student's transcript	BCHM 56200 General Biochemistry 2 – upon advisement
BCHM 60501 Macromolecules (3) – <i>Do not take with BCHM 56100.</i>	BCHM 61000 Regulation of Eukaryotic Gene Expression (3)
BCHM 61100 Chromatin Biology and Chromosome Dynamics (2)	BIOL 59500 Practical Biocomputing (3)
BIOL 47800/BIOL 595000 Introduction to Bioinformatics	STAT 50300 Statistic Methods for Biology (3)
BIOL 55001 Eukaryotic Molecular Biology (3)	
BIOL 59500 Theory of Molecular Methods (3)	
CHM 63400 Biochemistry: Structural Aspects (3)	
CS 59000 Computing for Life Sciences (3)	
ILS 59500 Data Management at the Bench (elective)	

COMPUTATIONAL AND SYSTEMS BIOLOGY

<u>FALL</u>	<u>SPRING</u>
BCHM 56100 General Biochemistry 1 (3) – depending on review of student's transcript	BCHM 56200 General Biochemistry 2 – upon advisement
BCHM 60501 Macromolecules (3) – <i>Do not take with BCHM 56100.</i>	BCHM 61000 Regulation of Eukaryotic Gene Expression (3)
BCHM 61100 Chromatin Biology and Chromosome Dynamics (2)	BIOL 51700 Molecular Biology of Proteins (3)
BIOL 59500 Introduction to Bioinformatics (4)	BIOL 59500 Practical Biocomputing (3)
BIOL 59500 Methods and Measurement in Biophysical Chemistry (3)	BIOL 62000 Advanced Topics in Eukaryotic Cell Biology (3)
BIOL 59500 Theory of Molecular Methods (3)	BIOL 69500 Advanced Molecular Virology (3)
CHM 63400 Biochemistry: Structural Aspects (3)	BME 69500 Multi-Scale Modeling in Biological Systems (3)
CS 50100 Computing for Science and Engineering (3)	CHM 57900 Computational Chemistry (3)

CS 59000 Computing for Life Sciences (3)	MA 51400 Numerical Methods (3)CHM 57900 Computational Chemistry (3)
CPB 62000 Advanced Immunology (2)	STAT 50300 Statistic Methods for Biology (3)
MA 51400 Numerical Methods (3)	STAT 51400 Design of Experiments (3)
STAT 50300 Statistic Methods for Biology (3)	
STAT 51400 Design of Experiments (3)	

Summer Course: BCHM 61200 Bioinformatic Analysis of Genome-Scale Data (1)

INTEGRATIVE NEUROSCIENCE

<u>FALL</u>	<u>SPRING</u>
BCHM 56100 General Biochemistry 1 (3) – depending on review of student's transcript	BCHM 56200 General Biochemistry 2 – upon advisement
BCHM 60501 Macromolecules (3) – <i>Do not take with BCHM 56100.</i>	BIOL 53800 Molecular, Cellular and Developmental Neurobiology (3)
BIOL 59500 Neurobiology of Learning and Memory (3)	BIOL 56200/PSY 51200 Neural Systems (3)
BIOL 60200 Cellular Neurobiology (3)	
CHM 63400 Biochemistry: Structural Aspects (3)	
STAT 50300 Statistic Methods For Biology (3)	
STAT 51400 Design of Experiments (3)	
Other Advanced Courses:	
SLHS 50100 Neural Bases of Speech and Hearing (3)	
SLHS 50300 Auditory Perception (3)	
SLHS 51900 Introduction to Developmental Cognitive Neuroscience (2)	

MEMBRANE BIOLOGY

<u>FALL</u>	<u>SPRING</u>
BCHM 56100 General Biochemistry 1 (3) – depending on review of student's transcript	BCHM 56200 General Biochemistry 2 (3) – upon advisement
BCHM 60501 Macromolecules (3) – <i>Do not take with BCHM 56100.</i>	BCHM 61000 Regulation of Eukaryotic Gene Expression (3)
BCHM 61100 Chromatin Biology and Chromosome Dynamics (2)	BIOL 59500 Introduction to X-Ray Crystallography (3)
BIOL 59500 Methods and Measurement in Biophysical Chemistry (3)	BIOL 51600 Molecular Biology of Cancer (3)
BIOL 60000 Bioenergetics (2)	BIOL 64700 Membrane Protein Structural Biology (2)
CHM 53300 Introductory Biochemistry (3)	CHM 63500 Biochemistry: Dynamic Aspects (3)
CHM 63200 Membranes: Structure and Function (3)	CHM 63800 Biophysical Chemistry (3)
CHM 63400 Biochemistry: Structural Aspects (3)	STAT 50300 Statistical Methods for Biology (3)
MCMP 57000 Basic Principles of Chemical Action on Biological Systems (3)	

MICROBIOLOGY, IMMUNOLOGY AND INFECTIOUS DISEASES

<u>FALL</u>	<u>SPRING</u>
AGRY 64900 Molecular Microbial Ecology (3)	BCHM 56200 General Biochemistry 2 (3) – upon advisement
BCHM 56100 General Biochemistry 1 (3) – depending on review of student's transcript	BCHM 61000 Regulation of Eukaryotic Gene Expression (3)
BCHM 60501 Macromolecules (3) – <i>Do not take with BCHM 56100.</i>	BIOL 51600 Molecular Biology of Cancer (3)
BCHM 61100 Chromatin Biology and Chromosome Dynamics (2)	BIOL 52900 Bacterial Physiology (3)
BIOL 60000 Bioenergetics (2)	BIOL 53700 Immunobiology (3)
CHM 53300 Introductory Biochemistry (3)	BIOL 54900 Microbial Ecology (2)
BIOL 54100 Molecular Genetics of Bacteria (3)	FS 56500 Microbial Food Borne Pathogens (3)

BIOL 59500 Theory of Molecular Methods (3)	STAT 50300 Statistical Methods for Biology (3)
CHM 63400 Biochemistry: Structural Aspects (3)	BIOL 51700 Molecular Biology of Proteins (3)
STAT 50300 Statistical Methods for Biology (3)	BIOL 62000 Advanced Topics in Eukaryotic Cell Biology (3)
BIOL 53300 Medical Microbiology	BIOL 69500 Advanced Molecular Virology (3)
CPB 62000 Advanced Immunology (2)	

MOLECULAR SIGNALING AND CANCER BIOLOGY

<u>FALL</u>	<u>SPRING</u>
BCHM 56100 General Biochemistry 1 (3) – depending on review of student's transcript	BCHM 56200 General Biochemistry 2 (3) – upon advisement
BCHM 60501 Macromolecules (3) – <i>Do not take with BCHM 56100.</i>	BCHM 61000 Regulation of Eukaryotic Gene Expression (3)
BCHM 61100 Chromatin Biology and Chromosome Dynamics (2)	BIOL 51600 Molecular Biology of Cancer (3)
BIOL 59500 Theory of Molecular Methods (3)	BIOL 62000 Advanced Topics in Eukaryotic Cell Biology (3)
CHM 63400 Biochemistry: Structural Aspects (3)	BIOL 69500 Advanced Molecular Virology (3)
MCMP 57000 Basic Principles of Chemical Action on Biological Systems (3)	STAT 50300 Statistical Methods for Biology (3)
STAT 50300 Statistical Methods for Biology (3)	
BIOL 60000 Bioenergetics (2)	
CS 59000 Computing for Life Sciences (3)	
Year 2 or later:	
BCHM 69500 Pathways (3)	

PLANT BIOLOGY

<u>FALL</u>	<u>SPRING</u>
AGRY 53000 Advanced Plant Genetics (3)	BIOL 62000 Advanced Topics in Eukaryotic Cell Biology (3)
AGRY 59800/BIOL 59500 Cell Biology of Plants (3)	BTNY 55300 Plant Growth and Development (3)
AGRY 60000 Genomics (3) alternative years	CHM 63800 Biophysical Chemistry (3)
HORT 55100 Plant responses to the environment (3)	STAT 50300 Statistical Methods for Biology (3)
BCHM 64000 Metabolic Plant Physiology (3) – Do not take with BCHM 56100/56200	
BCHM 60501 Macromolecules (3) – <i>Do not take with BCHM 56100.</i>	
BCHM 56100 General Biochemistry 1 (3) – depending on review of student's transcript	
BIOL 59500 Theory of Molecular Methods (3)	
CHM 63400 Biochemistry: Structural Aspects (3)	
STAT 50300 Statistical Methods for Biology (3)	
STAT 51400 Design of Experiments (3)	
<i>Specialty Courses:</i>	<i>Specialty Courses:</i>
BTNY 59000 Current Topics in Molecular Plant Pathology (1)	BCHM 61000 Regulation of Eukaryotic Gene Expression (2)
BTNY 56000 Survey of Mathematical Biology (3)	BTNY 61300 Advanced Plant Pathology (3)
HORT 59000 Applied Plant Genomics (2)	HORT 59000 Introduction to Data Analysis for Biology (3)
BCHM 61100 Chromatin Biology and Chromosome Dynamics (2) <i>offered in alternate years</i>	BCHM 695 R and Bioconductor (Maymester short course)

CHRONOLOGICAL CHECKLIST FOR PULSe STUDENTS

Year and Semester	Activity
Orientation Week	Submit official transcripts for all previous course work and degrees
	Discuss fall course selections with PULSe Graduate Program Specialist and finalize fall registration
	Take Oral English Proficiency Program Test if required (for non-native English speakers).
	Obtain radiation, biological, and chemical safety training.
	Attend PULSe retreat.
Every Semester	Interview faculty with lab openings and submit choices for first two lab rotations.
	Complete and submit class registration form to the Office of Interdisciplinary Graduate Programs
1st Year – Fall	Participate in lab rotations.
	Discuss spring course selections and submit choices for next two lab rotations.
1st Year – Spring	Participate in lab rotations.
	Submit major professor preference to the Office of Interdisciplinary Graduate Programs
	Receive a permanent laboratory assignment.
1st Year – Summer	Select an Advisory Committee and finalize Plan of Study
2nd Year – Fall	Hold an Advisory Committee meeting. Advisory Committee meetings are to be held once or twice a year.
	Submit Preliminary Examination topic.
2nd Year – Spring	Submit Preliminary Examination written proposal and take the oral exam.
Last Semester	Declare candidacy.
	Complete all course work and clear incomplete grades.
	Follow the Thesis/Dissertation Office guidelines regarding the University format items (See Thesis Preparation, Approval and Distribution section).
	Pay diploma fee and Ph.D. thesis fee to the Bursar.
	Request the Final Examination at least 3 weeks prior to the exam (electronic form 8).
	Hold and complete the Final Examination before the last week of classes of the semester.
	Prepare the <i>Deposit Copy</i> of the thesis. The <i>Deposit Copy</i> must incorporate all changes and modifications requested by the final examining committee and must adhere to both departmental and University format requirements.
	Submit the <i>Deposit Copy</i> electronically to the Thesis/Dissertation Office before the last day of classes of the semester.
	Complete the required online exit surveys in order to receive the thesis deposit receipt.

PULSE REQUIREMENTS

1. **Official Transcripts:** Official copies of transcripts from each university previously attended are required by the Graduate School. An official copy of the final transcript showing the date of graduation (with the title of the degree listed) is required by the end of the first semester of residence. Students will not be allowed to register for subsequent semesters until this requirement has been met.
2. **Selection of First Year Fall Courses:** During Orientation Week and prior to the beginning of classes, all entering PULSe students will meet with the Student Services Coordinator to discuss their previous academic experience and future goals with regard to their PULSe course selections. If this discussion indicates a need for background course work, remedial classes will be assigned during the individual advising session to be scheduled during the week prior to the beginning of classes. The Student Services Coordinator will share course recommendations received from the Executive and Curriculum Committee TG representatives.
3. **Registration:** Students and their major professors will plan their program each semester. Students are responsible for registering for each semester with the PULSe office, including summer, as long as they are taking courses, doing research, or writing their thesis. Students should plan to register early each semester for the best course selection and to avoid paying a late fee. Students must be registered either for research hours, for “Degree Only” or “Exam Only” or for a graduate course during the semester in which they receive their degree. All academic requirements must be completed before the first day of classes to register “Exam Only”, “Degree Only” or Research in Absentia registration.
4. **English Speak Test for International Students:** All students are required to teach the equivalent of half time for one semester during their graduate career. Students whose first language is not English must take the Oral English Proficiency Test, administered by Purdue’s Oral English Proficiency Program, before being certified eligible for a teaching appointment. Certification to teach will be determined by the results of this examination and/or satisfactory completion of an appropriate course (e.g. ENGL 62000) that may be required as a result of this examination. The test will be offered after arrival, during Orientation Week. Failure to complete the spoken English requirement by the end of the first year of graduate study may result in the student not being permitted to register and progress in the PULSe Program.
5. **Rotations:** Laboratory rotations are an important part of education and research training. For this reason, policies regarding rotations are designed to allow maximum flexibility to students in choosing the laboratories for their rotations and will allow sufficient time for students and faculty to make a decision regarding a choice of major professor. Rotations will be completed during the first two semesters of a student’s career and each semester will be divided into two rotations. Students may choose to rotate in any laboratories in any TG, subject to the approval of the faculty involved. Students’ preferences for the first two fall rotations must be turned in by August 21, 2019. Preferences for the remaining two spring rotations will be due by November 13, 2019.

To ensure that students have the proper lab safety training, all students must complete “Laboratory Safety Fundamentals” and Personal Protective Equipment (PPE) online training for each of the four required lab rotations. Work in the lab cannot begin until the safety training has been completed and documented. Failure to complete and submit these training safety materials to the PULSe office within the first five (5) business days of the rotation will result in suspension of the lab rotation until the forms are on record.

6. **Selection of the Major Professor:** The major professor shall be a member of the PULSe faculty and have the supervisory responsibility for a student’s research. The selection of the major professor and research laboratory is one of the most important decisions students will make while at Purdue. Each student will be given adequate opportunity to investigate various laboratories and to become acquainted with professors who have positions available. The selection of the major professor will be made by the last week of the second semester. To help students in this decision-making process, PULSe has developed the following procedure:

- Students are encouraged to review the PULSe website to become familiar with the laboratory work of each professor in PULSe.
 - The PULSe Retreat will be held during Orientation Week to acquaint students with the work of the professors who have openings in their laboratories for new students. Students are encouraged to meet the professors and students at the poster session and to set up appointments for further discussions with those with whom they are interested in working.
 - Students are expected to interview at least five professors during Orientation Week and are encouraged to interview more.
 - Students will participate in four selected laboratory rotations. Each rotation will be approximately seven weeks in length. At the end of each semester, pass/fail grades will be assigned by the chair of the Executive Committee based upon evaluations by the rotations advisors. Additional guidelines will be given to students during Orientation Week.
7. **Training Group Affiliation:** Once the selection of the major professor is complete, students must choose their Training Group (TG) affiliation. The student has the option of joining any one of the major professor's TG affiliations for automatic membership. However, should the student wish to join a TG in which their major professor is not a member, the student and the major professor must formally request this affiliation by contacting the chair of the desired TG for approval. Approval must be emailed to the PULSe office for the student's official record.
8. **Advisory Committee:** Until a major professor is selected, the progress of a student is the concern of the PULSe administration. During the first semester of work in a major professor's laboratory, students will in consultation with their major professor, select an Advisory Committee. This committee will consist of the major professor as chairperson and three additional professors. The committee must include at least two faculty members of the TG under which the student is studying (including the major professor). The Advisory Committee will counsel students, review their progress in both thesis research and course work throughout graduate study.
9. **Advisory Committee Meetings:** With the specific purpose of helping students upgrade the quality of research by critical discussion, an Advisory Committee meeting is scheduled by the student at least once a year commencing at the start of the second calendar year of residence. A deadline will be assigned by PULSe office. Students will be responsible for arranging their meetings and may schedule the meeting anytime during the month prior to the deadline. A typed Student Advisory Committee Report is to be prepared and distributed to the advisory committee at least one week prior to each meeting. This report will contain the following information: list of advisory committee members, professional accomplishments, and research summary (statement of the problem and objectives of the research, significance of the problem, changes in objectives, summary of work completed, summary of work attempted but incomplete or unsuccessful, research plan, and anticipated date of completion). The Advisory Committee Evaluation Form (see page 30), completed and signed by the committee members, will be placed on file along with other material pertaining to the student's progress toward the degree objective. Registration for subsequent semesters will be contingent upon compliance with this rule.
10. **Plan of Study:** An electronic draft of the Plan of Study is to be submitted to the PULSe TG within the first year after selection a major professor. The plan is to be drafted in consultation with the major professor and the other members of the student's Advisory Committee. The Plan will consist of a minimum of 15-18 credits required by the student's training group. Neither 100- not 200-level courses may appear on a Plan of Study. No more than a total of six 300- or 400-level course credit hours may appear on the Plan. Otherwise, 500- and 600-level classes are listed on the plan. In general, course requirements will depend on the student's background and objectives. Courses taken on a pass/no pass option cannot be used on the Plan of Study. In general, transfer credits (credits previously earned for relevant course work at other institutions) will be considered under the following conditions:
- The student has a minimum cumulative graduate index at Purdue of 3.00 or better.
 - The student has obtained approval from his/her TG and Advisory Committee for the requested transfer of credits.
 - The number of credits requested for transfer does not exceed the 12 credit hour limit set by the graduate school.

- The request from the student includes documentation about the content of the transfer course and the level at which it was taught, i.e., undergraduate or graduate. Transfer credits will be accepted only after one semester of satisfactory work in residence at Purdue.

Upon approval of the electronic draft, the student submits the final Plan of Study which will be routed electronically for the approval of the PULSe Program, the student's advisors, the home department of the student, and the Graduate School.

11. **Degree Requirements:** PULSe students are not required to meet any additional requirements set by their home department, although a student's degree will be counted by his/her major professor's college.
12. **Changes to the Plan of Study:** To make changes to the Plan of Study, students should file an electronic Change to the Plan of Study. Deletion of courses will require the approval of the major professor, the PULSe Executive Committee (PEC), and the head of the home department before being approved by the Graduate School. Changes must meet the approval of the TG and PEC before being forwarded to Graduate School.
13. **Changes to the Advisory Committee:** If a student's research has changed substantially and upon the advice of his/her major professor, the student determines that the composition of the Advisory Committee must be changed, the student should submit an electronic Change to the Plan of Study. The same process will be used if a professor leaves the University and must be replaced on the committee. If, however, a committee member is absent from campus only at the time of the final examination, there is no need to change the committee member listed on the Plan of Study. Section 20 provides instructions for the assignment of a final examination committee.
14. **Change of Major Professor:** If a student finds that their research interests change such that the student no longer wants to remain with his/her major professor, the student may change to another professor. Signed approval from the original major professor releasing the student and from the proposed new major professor accepting the student must be submitted to the PULSe Operations Office for TG approval and then the PEC's approval. After approval of the change is granted, a revised Plan of Study must be filed in the usual way.
15. **Change of Departments:** If a student wishes to transfer from PULSe to a departmental program, the student should write a letter to the TG and PEC requesting this change. The letter should be signed by the student and by the current major professor. The letter should be accompanied by a completed Request for Transfer Department (G.S. Form 17), which will be forwarded to the department to which transfer is requested, after being signed by the Chair of the PEC. The other department is free to request copies of any application forms, transcripts, GRE scores, etc., which it may desire for making its decision and for its permanent records. The PULSe office will send to the other department copies of the student's records if requested to do so by the students.

A student who has completed a Master's degree program in another department and has not entered into any other degree program in the University need not submit a G. S. Form 17. The student should complete a Graduate School Application.

16. **Academic Requirements:** A graduate student is expected to maintain a graduation index representing a B average (3.0/4.0 Grade Point Average) or better. Indicates below this level are marked "low" on the grade reports. The student also is expected to earn S grades for research registration. Two consecutive sessions of U grades for research registration mandate that the department/program take formal action and inform the student, in writing, and the graduate School with regard to discontinuation or conditions for continuation of the Student's graduate study. In any event, the student's progress will be reviewed each session by the student's department/program. The student's progress also may be reviewed by the Graduate School.

A PULSe student who's cumulative GPA is below 3.00 will be monitored by the PULSe Administration each semester. A PULSe student with an unsatisfactory academic record will be reviewed by the

Executive Committee and may be placed on probationary status. Should the student fail to perform in either coursework or research on a level acceptable to the Executive Committee, the student will be asked to discontinue graduate study in the PULSe Program.

17. **Teaching Requirement:** Each student must serve as a half-time teaching assistant (TA) for at least one semester or two semesters in a quarter-time position. The TA position must involve meaningful student contact. Laboratory TAs, recitation instructors, and the like are considered to have meaningful student contact. TA positions that involve only grading papers, lab preparation, or instrument maintenance do not involve meaningful student contact. A student for who English is not their native language must meet the University requirement for proficiency in spoken English prior to serving as a TA.

A TA position will be assigned most often by the home department of the thesis advisor; however, the home department is not obligated to offer a TA position. A TA position from any department can satisfy this requirement, as long as it meets the criterion of “meaningful student contact”. Some departments may have specific requirements, i.e., course pre-requisites that must be successfully taken prior to the offer of a TA position.

It is recommended that students begin looking during the end of the first year and complete the requirement prior to the start of the second semester of the fourth year. It is not possible to wait until the last semester prior to graduating. Positions are limited and not always readily available.

If equivalent teaching experience was gained at the college level while a graduate student elsewhere, a student may petition to have the experience fulfill the requirement. The petition must include a brief description of the course content and the name of the supervising professor. If a recommendation from the professor is not on file in the PULSe office (as part of your application file for admission), one must be obtained and submitted with the petition. See pages 30 for the Teaching Requirement Verification Form.

18. **Activities Requirement:** Each student must participate in at least three activities hosted by the Office of Interdisciplinary Graduate programs by the completion of the fourth year of study. Activities include but are not limited to:
- PULSe recruitment host
 - Tour guide – PULSe Fall Open House
 - Poster judge – PULSe Spring Awards Reception
 - Panelist – various options

19. **Qualifying Examination:** PULSe has no qualifying examination.

20. **Preliminary Examination:** The purpose of the Preliminary Examination is to stimulate the student to develop original research ideas and to assess their academic knowledge, preparation and ability to analyze and synthesize the literature on and surrounding their topic. In the written proposal, the student is expected to provide the examination committee with adequate background and details to understand the current state of the chosen field of research and to evaluate their proposed experiments. The oral examination allows the committee the opportunity to test the student's knowledge of the chosen research project, their ability to formulate and address a few research questions to anticipate the types of results to be obtained, and to evaluate their understanding of its scientific foundation. The examination will not only assess the science involved in the proposal but also will evaluate the quality of the presentation and the writing.

Students are required to defend a hypothesis-driven research proposal as the basis for their preliminary examination. The proposal must be original and designed to advance the current state of knowledge in the chosen field. Preliminary examination proposals cannot be based on the student's own research project. The proposal may address a topic within a field or area closely related to that of the thesis project

but it must focus on a research problem that is clearly differentiated from their current or past research thesis project (s) in their current advisor's laboratory. For example, a student investigating for his/her thesis project the cell cycle-dependent regulation of protein kinase D by the protein activator Q could develop a prelim proposal to evaluate hypotheses regarding the role of protein kinase D in triggering the onset of cytokinesis.

Regardless of topic, student proposals must satisfy all of the following criteria:

- No specific aim/objective can be identical to, or overlap with, the objectives of the student's current thesis work or past research projects.
- No specific aim/objective can be identical to or overlap with any goals(s) of ongoing or proposed research projects in the advisor's lab including those conducted by the advisor, postdocs, graduate students, undergraduates or technicians.
- The specific aims/objectives must be different from those of research groups actively collaborating with the advisor's laboratory.

Students are not permitted to defend a proposal based on a project developed as part of graduate studies conducted in a laboratory prior to their PULSe entry. Similarly, any student who transfers between laboratories within the PULSe Graduate Program may not select a project topic developed under a previous advisor.

Upon selection of the examination topic, the proposed topic (detailed title and abstract) must be submitted in writing to the Graduate Program Specialist. The TG Chair is responsible for evaluating the topic and providing the student and the PULSe office with the results of the topic evaluation within one week of submission. Proposals not approved are returned to the student for revision. Upon approval of your topic, your chair will be assigned by your Training Group representative. This should be completed by the conclusion of the semester in which your topic has been submitted. The completion of your committee appointments will be assigned by your Training Group representative by *February 1*. This will be communicated to you by the PULSe Office. The Preliminary Examination Committee will consist of two members of the student's Advisory Committee and two additional faculty. A minimum of two PULSe faculty members should serve on the preliminary examination committee. A student may consult with his/her advisor regarding the feasibility of the examination topic. However, the major professor should not critique the proposal or be asked to assist with the exam preparations. The major professor may not serve on the committee nor be present for the oral exam.

The Preliminary Examination must be taken between March 1 and April 1 the spring semester of the second year of study. Delay of this deadline must be approved by the Training Group representative to the PULSe Executive Committee and the Chair of the PULSe Executive Committee.

Since it is necessary to schedule an exam date involving multiple faculty members far in advance, students are advised to secure a date and time with all of the committee members at least one month prior to the anticipated defense. The PULSe Office does not provide individual examination deadlines, so students are expected to meet with their Chair to discuss possible exam dates and to schedule promptly. The scheduling of the examination is a student responsibility, which includes the coordination of faculty members and room reservation, along with proper communication to members and the PULSe Office. Forms will be supplied to you for the proper submission of your exam date to the PULSe Office once your committee is completed by February 1.

If the proposal is acceptable as written or only requires minor revision, the student will be advised to proceed with the official request for examination on the date initially reserved with the faculty committee. If there is consensus among the exam committee that the written proposal is not defensible (as defined by the PULSe preliminary examination criteria rubric), the student will be advised to establish a target date commensurate with the extent of revision recommended by the committee. The student will then be expected to submit the revised proposal to the exam committee two weeks prior to the newly assigned

date of the examination. The examination will proceed as planned. To increase the uniformity of the examination process, those who rewrite their proposal should not receive additional feedback on the revised proposal prior to the oral examination.

When the Written Research Proposal has been prescreened and approved by the Preliminary Examination Committee, the student submits and Appointment of Examining Committee (G.S. Form 8) request for an examination at least three weeks in advance of the examination.

Written proposals are not to exceed 15 double-spaced pages, excluding the title page, references, figures, and figure legends. Font size is limited to 11pt. Arial or 12 pt. Times New Roman. Excessive length may be considered grounds for not accepting the proposal.

Students passing the Preliminary Exam will be advanced to candidacy for the Ph.D. degree. In the event that a student fails the Preliminary Exam on the first attempt, the preliminary examination committee may recommend that the student be permitted one re-examination which will be scheduled after one term has elapsed, but within six months. A failed student's oral preliminary examination rubric, as compiled by the examination committee chair, is shared with the respective TG Chair before disseminating to the student and his/her major professor.

If a re-examination is recommended, the same Examination Committee will be appointed for the second preliminary examination defending the same topic. If the student elects to develop a new examination topic, the topic must be presented to the PULSe Office. The TG's representative to the PEC may assign a new examination committee, if appropriate. According to Graduate School regulations, should the preliminary examination be failed twice, the student may not be given a third examination. After consulting with the other exam committee members, the Preliminary Examination Committee Chair will be required to submit a brief report to the PULSe Office that specifies the result of the exam and any weak areas in a student's training or performance. A copy of this report will be provided to the student and forwarded to the major professor. Any student who has not taken the preliminary examination by the end of December of the third year must appeal to the PEC to be allowed to continue in the PULSe Program.

A PULSe student who is not recommended for a second Preliminary Examination or who fails the Preliminary Examination a second time may continue studies for the Master of Science degree only with the consent of the major professor and the student's Advisory Committee. A thesis will be required. The exact number of course credit hours for the Master's degree will be determined by the student's TG; a minimum of at least 18 course credits is expected (including the core PULSe course requirements). The Graduate School requires a minimum of 30 credit hours, which may be a combination of course work and Master's research credit hours, toward fulfillment of a thesis Master's degree. The deadline for completing and defending a Master's degree will be expected to be no more than two semester (excluding summer session) following the student's transfer to the M.S. track.

A student cannot be credited with passing the preliminary examination until all deficiencies are removed, and most core courses have been successfully completed. At least two terms, but no more than five years, must elapse and be devoted to research between the preliminary examination and the final exam.

See page 28 for the PULSe Preliminary Examination Timeline.

21. **Thesis Preparation and Final Examination:** Once the Ph.D. thesis has been written, the Ph.D. candidate will present the thesis research in an open seminar of no longer than forty minutes duration. Immediately thereafter, the candidate will be examined on the material in the thesis and on related topics by the members of his/her Advisory Committee. If the thesis is acceptable (and worthy of publication, as determined by the candidate's Advisory Committee) and if the examination is passed, the candidate will be recommended to the Graduate School for the degree of Doctor of Philosophy (see Thesis Preparation, Approval and Distribution section). The final examination must be held before the last week of classes of

the semester. A G.S. Form 8, requesting approval of the examining committee from the Graduate School, is to be submitted at least three weeks prior to the exam. A Deposit Copy, incorporating all changes and modifications requested by the final examining committee and complying with all University and departmental format requirements, is to be prepared and submitted electronically to the Thesis/Dissertation Office before the last day of classes of the semester. A Thesis Receipt must be delivered to the Graduate School before the last of classes of the semester.

22. **Time-To-Degree**: To expedite the progress toward degree completion, students are encouraged to devote full-time effort to their graduate courses and thesis research. Normally, the degree of Ph.D. will be completed with a period of five years from entry into the PULSe Program. However, the actual time required will be determined by the student's progress as assessed by the major professor and the Advisory Committee. Any student who is in the six or seventh year of study toward a Ph.D. degree must be reviewed semi-annually for progress toward the degree. Such students are obligated to communicate with their Advisory Committee every six months and, if the committee deems necessary, schedule a meeting. Any student who fails to complete all requirements for the Ph.D. degree within five calendar years of successful completion of the Preliminary Examination will be dismissed from the program unless an appeal is made to the PEC. In addition, no course on a Ph.D. Plan of Study shall be more than eight years old when a student applies for permission to take the final Ph.D. examination.
23. **Grievances**: Grievances that arise can be transmitted to the PEC by submitting them in writing to the PULSe Office.
24. **Academic Misconduct**: As stated in the Purdue University Graduate School's Policies and Procedures Manual:

Integrity in research is an essential part of Purdue University's intellectual and social structure, and adherence to its spirit and principles must be maintained. These principles include commitment to truth, objectivity, fairness, honesty, and free inquiry.

Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty. The commitment of the acts of cheating, lying, and deceit in any of their diverse forms (such as the use of ghost-written papers, the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during an examination) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly other parties in committing dishonest acts is in itself dishonest (Part 5, Section II-B-2-a of University Regulations). Plagiarism consists in using another's words or ideas without clear and explicit acknowledgment. Self-plagiarism consists in using one's own previous work in a new context without clear and explicit acknowledgment of previous use.

Serious violations of integrity in research are rare. However, those that do occur strike at the very heart of scholarship and the concept of the University. The integrity of the research process must depend largely on self-regulation; it is the responsibility of all who engage in the search for knowledge. Procedures to be followed in any situation related to research misconduct are presented in University Policies on Teaching, Research, and Outreach, Policy on Research Misconduct (VIII.3.1).

Acts of academic misconduct could result in review of status in the PULSe Program. Additional requirements may be imposed upon students involved in academic misconduct, and termination from the program may be deemed suitable. The Heads of PULSe and Office of Interdisciplinary Graduate Programs will determine the appropriate course of action.

25. **Nondiscrimination Policy Statement**:
https://www.purdue.edu/purdue/ea_eou_statement.php

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters, tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life.

Purdue University views, evaluates, and treats all persons in any University related activity or circumstance in which they may be involved, solely as individuals on the basis of their own personal abilities, qualifications, and other relevant characteristics.

Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, genetic information, marital status, parental status, sexual orientation, gender identity and expression, disability, or status as a veteran. The University will conduct its programs, services and activities consistent with applicable federal, state and local laws, regulations and orders and in conformance with the procedures and limitations as set forth in Purdue's Equal Opportunity, Equal Access and Affirmative Action policy which provides specific contractual rights and remedies. Additionally, the University promotes the full realization of equal employment opportunity for women, minorities, persons with disabilities and veterans through its affirmative action program.

Any question of interpretation regarding this Nondiscrimination Policy Statement shall be referred to the Vice President for Ethics and Compliance for final determination.

MISCELLANEOUS INFORMATION

1. **Change of Name, Address, and Telephone Number:** The PULSe office receives requests from time to time for the local address and telephone number of graduate students. On occasion, we urgently need to locate a student in the program for the Graduate School or for another department. We can be of more service to the student and to those who make such requests, especially in times of emergency, if we have current information available.
 - a. **Change of Name:** If a female student marries after she is admitted to Purdue, she may wish to change her name on her Purdue records. To do this, the marriage certificate should be presented as evidence to the Office of the Registrar, Room 45, Hovde Hall. The office complete the form to make the change of name official. The PULSe office should also be informed of the change of name.
 - b. **Change of Address and Telephone Number:** The Registrar's Office should be informed of any address change. Students can update address and phone information electronically by logging into the Student Services Information myPurdue web site or by making the change through the Registrar's Office. The PULSe office and the home department would also like to be informed of any change in permanent forwarding address. We also request the name, address, and telephone number, if possible, of a parent (preferably), other relative, friend, attorney, or bank who will always know the whereabouts of the student and will forward mail in the years after leaving the program.
 - c. **Resident Status:** An emancipated student shall be classified as a resident if the student is domiciled in the State of Indiana prior to the first day of classes of the academic session for which resident classification is sought. An un-emancipated student shall qualify for resident classification if a parent or guardian of the student has been domiciled in the State of Indiana prior to the first day of classes of the academic session for which resident classification is sought. To be considered domiciled in Indiana, a person must reside continuously in the state for a predominant purpose other than attending an institution of higher education for at least twelve months immediately preceding the first day of classes of the term for which resident classification is sought.
 - d. **Changes from Non-resident to Resident Status:** Application for classification as a resident shall be submitted in writing on a form supplied by the Registrar's Office any time after the domiciled requirement, including one year of residence has been met, but no later than fifteen days after the day on which classes begin for the academic session for which reclassification is sought. The Registrar shall render a decision no later than 30 days after the application is filed.
2. **Automobile Parking Permits:** Permits are necessary for all students owning and operating automobiles on campus. Registration forms may be obtained from Parking Facilities Office. Half-time assistants may obtain staff parking permits for a fee.
3. **Clerical Assistance:** Clerical assistance is provided for graduate students in their respective department only for official business approved by a faculty member.
4. **Pulse Seminar Series:** Seminars, including discussion of current research, are given at frequent intervals by visiting lecturers and by staff members. All graduate students are strongly urged to attend, but first-year PULSe students are expected to attend all PULSe seminars.
5. **Employment Opportunities:** Letters or announcements received by the department concerning opportunities for employment for advanced degree graduates in colleges or universities, business, and

government are filed in the main office of each department. Those received by the PULSe office will be forwarded via the PULSe student email distribution list.

6. **Student Medical Insurance:** Graduate research and teaching assistants with appointments of 50% or greater are covered under Purdue's insurance program for graduate student staff.
 - a. Each graduate staff member pays \$479 per year via payroll deduction of the cost; the University covers the remaining cost.
 - b. A graduate staff member has the option of insuring his or her spouse and dependents under the same plan. The graduate staff member is responsible for these premiums.
 - c. Eligible domestic graduate staff with medical through other sources can opt out of the Purdue coverage. However, all international students are required to purchase the Purdue University Student Health Insurance plan as a condition of their enrollment. Individual and private insurance plans do not qualify for a waiver.
 - d. Registration for health insurance takes place during the August Graduate Payroll session. In subsequent years, students receive insurance packets each fall from their home department business offices.
 - e. Workmen's compensation covers accidents occurring while on the job in the lab.
7. **Keys:** The major professor will arrange for the student to obtain the keys for the outside door and necessary laboratories of the building in which the student will be working. Keys are university property and must be returned upon leaving a lab and/or the university.
8. **Email:** Email accounts are available to all students through the Information Technology at Purdue. Students are to establish a Purdue email address prior to arrival.
9. **Vacation and Illness:** Graduate students earn vacation time at the rate of 22 days per year. The student may not take any vacation until the end of the first semester of the first year. Graduate students may take sick leave as needed for illness up to 10 working days per year.

Vacation and illness leave must be requested through the SuccessFactors system.

First-year students should submit the *First Year Absence form* (see page 30) to the Office of Interdisciplinary Graduate Program for approval. Once a student has been assigned a major professor, the leave form will be submitted to the major professor for approval.

10. **Bereavement Leave:** Graduate student staff are eligible for one to three working days per occurrence of paid bereavement leave for a death in the immediate family. "Immediate family" is defined as spouse, same-sex domestic partner, parents, children, grandparents, grandchildren, sisters, brothers and corresponding in-laws and step-relations. Family members not included here but who reside in the employee's home are considered immediate family. Bereavement Leave must be requested through the SuccessFactors system.

Holidays	
Labor Day	September 2, 2019
Thanksgiving Holiday	November 28 & 29, 2019
President's Designated Holiday	December 24, 2019
Christmas Holiday	December 25-26, 2019
New Year's Holiday	January 1, 2020
Martin Luther King, Jr. Day	January 20, 2020
Memorial Day	May 25, 2020
Independence Day	July 4, 2020

11. **Class Breaks**: Classes are not in session, but graduate staff students are in work status. Students who choose not to work during these times are required to file for vacation leave with the Office of Interdisciplinary Graduate Programs.

Fall Break

October 7-8, 2019

Winter Break

December 16, 2019 – January 10, 2020

Spring Break

March 16-21, 2020

12. **Paychecks**: For graduate staff appointments, salary payments are distributed on the last working day of each month. Pay dates for fiscal year and academic year paid staff follow the monthly payroll calendar. The University requires direct deposit for paychecks. Registering for direct deposit is a simple step and will be explained at the August Graduate Payroll Orientation.

THESIS PREPARATION, APPROVAL, AND DISTRIBUTION

All candidates must meet certain requirements in thesis preparation. Thesis format requirements have been separated into two categories: a) departmental format requirements that will be reviewed by the student's home department, covering such matters as how figures are prepared and numbered; style of references; placement of notes; headings; chapter headings; etc., and b) University format requirements that will be reviewed by the Thesis/Dissertation Office covering paper requirements; typeface and quality; spacing; margins, page numbering; title page; and abstract. General guidelines for completing the final examination and thesis are:

1. Inform the PULSe office that you wish to be registered as a candidate for the session the degree is expected.
2. Submit a first draft of the thesis to the major professor and obtain the departmental guidelines regarding departmental format requirements.
3. Contact the Thesis/dissertation Office for University format requirements: Thesis/Dissertation Office, Room B-80 Young Hall, phone 765-494-3231, <http://www.purdue.edu/gradschool/research/thesis/index.cfm>.
4. At least three before the final examination date, submit an approval request for the Final Examination G.S. Form 8. Final examinations must be held before the last week of classes. When the Graduate School approves the G.S. Form 8, an approved copy of the form will be sent to the departmental graduate office. Doctoral candidates will receive the required on line exit questionnaires information.
5. Prepare a final copy of the thesis. This Deposit Copy will incorporate all editorial changes and modifications requested by the members of the Examining Committee and will comply with both University and Department format requirements. The abstract in the dissertation can be no longer than 350 words. Once a committee member has signed the Thesis Acceptance, the document is approved by that individual.
6. Submit the Deposit Copy of the thesis electronically to the Thesis/Dissertation Office before the last day of classes of the semester the degree is expected. The Deposit Copy will be reviewed by the Thesis/Dissertation Office to see that University format requirements have been met. No changes may be made to the thesis after it has been deposited.
7. Submit a Thesis Receipt to the Graduate School Office, Young Grad House, before the last day of classes of the semester the degree is expected. The exit questionnaire and National Research Council questionnaire are also need to be completed online. Instructions will be provided by the Graduate School Office.

Candidate Fees: The degree candidate must pay the thesis microfilm fee and the diploma fee in the Office of the Bursar as specified by the Bursar. The candidate will receive no direct billing or reminder from the Bursar relative to the payment of these fees.

RESEARCH IN ABSENTIA

After a Ph.D. candidate has finished all course work, passed the preliminary examination, and reached the point where the remaining work on the research problem and thesis may be completed off campus, the student may (with the approval of the major professor and head of the graduate program) request permission to register for research in absentia.

Steps in the Process of Approval and Registration for Research in Absentia:

1. The student should submit a completed Request for Ph.D. Degree Candidate Research in Absentia Graduate School Form 12 with the major professor's signature on it to the PULSe office. The Graduate School form must be received by the Graduate School at least one month prior to the beginning of the initial session for which absentia registration is sought.
2. After approval of the request by the Graduate School, the PULSe office will register the student for three credit hours per semester. The Bursar will bill the student for research in absentia for the regular session fees. Late registration will be subject to the usual additional fee. Nonpayment of absentia fees will terminate the student's registration and cancel the absentia privilege.
3. Until the requirements for the degree are completed, the PULSe office will be responsible for registering the student each semester, for the three credit hours, until the student graduates, returns to campus for regular research, or leaves the university. The student must be registered each fall and spring semester to satisfy the subsequent semester restriction.
4. Summer session registration is not required unless the student expects to receive his/her degree at the end of a summer session. Summer registration is not automatic and must be processed through the PULSe office if the student expects to receive a degree at the close of the session.

Standard registration for research in absentia is for three credit hours. In special circumstances, students who will be devoting substantial time to research may request permission to register for additional research credits up to 18 credit hours for full-time effort and a proportional registration in the summer session. Registration requests for more than three credit hours must be approved the Dean of the Graduate School. Requests must be supported by an accompanying statement prepared by the major professor and approved by the head of the graduate program. The statement should provide information about the student's employment status and the level of support provided for the student's research in terms of facilities and/or release time. The duration of this support also should be indicated.

Once a student stops registering in absentia, that student cannot register for absentia for a later session. Knowing this, if a student still wishes to stop registering for absentia credits, a completed course request (Registrar's Form 23) signed by the student, major professor, and head of the graduate program must be submitted to the Graduate School.

FRINGE BENEFITS AND PRIVILEGES OF GRADUATE ASSISTANTS AND GRADUATE INSTRUCTORS

BENEFITS

Accident Insurance	Workmen's compensation
Social Security	No
TIAA	No
Group Medical Insurance	Yes, if funded by a graduate research or teaching appointment of 50% or greater, the graduate staff member is covered under Purdue's insurance program for graduate student staff.
Group Life Insurance	No
Fee Reduction	<p>Yes, pay approximately \$303.00 per semester</p> <ol style="list-style-type: none"> 1. Regular summer session fees are approximately \$151.50. 2. Academic year appointees holding appointments for the semester preceding and the semester \$151.50 for summer session. 3. If a free grant fellowship is held in conjunction with employment, full tuition and fees will be assessed. 4. Employment must be certified by your home department business office.
Staff Dependent Fee Reduction	Yes, staff spouse/staff child reduction
Married Student Housing	Student rate
Parking Privileges	Yes, if employed 50% or more
Co-Rec Gymnasium	Included in reduced fee (approximately \$303.00)
Tenure	No
Sabbatical Leave	No
Sick Leave	Yes, 10 working days in general policy
Military Leave (with pay)	15 days/annual, general rule
Vacation	22 days per fiscal year
Athletic Tickets	At staff rate
Purdue University Hospital	Included in reduced fee

POINTS TO REMEMBER

1. Plan to register early each semester for best course selection and to avoid a late fee.
2. Graduate level coursework taken as an undergraduate in excess of degree requirements can be used only if approved by your Advisory Committee, the PEC, and the Dean of the graduate School.
3. Solicit advice about procedural problems from the PULSe office as they have access to the latest Graduate School regulations. Policies may change, so what could apply to a fellow student may not necessarily be applicable to you.
4. Incomplete course grades must be cleared prior to declaring candidacy.
5. You must register in the semester in which you receive your degree, for graduate course work, for research hours, either for "Exam Only" or "Degree Only", or Research in Absentia. To register "Degree Only", "Exam Only", or Research in Absentia, all academic requirements must be completed before the first day of classes.

PULSE

PRELIMINARY EXAMINATION TIMELINE

November 1, 2019	Student – Submits Prelim Topic to the Office of Interdisciplinary Graduate Programs (OIGP)
December 1, 2019	OIGP – Notifies students of prelim chair if topic is approved.
December 15, 2019	Faculty – TG head provides the prelim committee to OIGP.
January 15, 2020	OIGP – Notifies students of prelim committees and distributes instructions for submitting the online graduate School Form 8 “Request for Appointment of Examining Committee”
Beginning February 1, 2020	Student – Set examination date with the committee (exam date needs to be between March 1 st and April 1 st)
No Later than February 15, 2019	Student- Notifies the OIGP of Exam date for final approval.
Upon OIGP approval	Student – Submits Written Research Proposal to the OIGP at least four weeks prior to exam date, but no later than February 10th .
Upon OIGP approval	Student – Submits the online Graduate School Form 8.
Upon receiving	OIGP – Notifies student on defensibility (Upon initial review, chair feedback is provided to student by OIGP, defensible or not)
No Later than 5:00pm on April 1, 2020	Students - Orally defend Written Proposal

Prelim Topic Submission

Student submits a hard copy of the thesis and exam topic summaries, along with the “Request for Preliminary Examination” form, to the Office of Interdisciplinary Graduate Programs.

The Graduate Programs Specialist forwards the exam topic and thesis summaries, “Request for Preliminary Examination” form to the respective TG Chair. Students may suggest up to two external faculty (faculty not on the student’s advisory committee) for the exam committee on the “Request for Preliminary Examination” form TG Chair evaluates the topic and provides the Graduate Programs Specialist with the results of the topic evaluation. Results are then shared with the student.

If the topic is approved by the TG Chair, the TG Chair assigns a committee.

If the topic is not approved, the TG Chair returns it to the student for revision.

Committee Assignments

The TG Chair and Graduate Programs Specialist assign a faculty exam committee consisting of two members of the student’s Advisory Committee and two additional faculty. A minimum of two PULSe faculty members should serve on the exam committee. The TG Chair has the final decision; student nominated reviewers may or may not serve on the exam committee.

The OIGP notifies students of prelim committees and distributes instructions for submitting the online Graduate School Form 8 “Request for Appointment of Examining Committee”, and Prelim Committee Criteria.

Scheduling the Preliminary Oral Examination

Student sets preliminary oral examination date with committee between March 1st and April 1st prior to the approval of the Written Research Proposal. Once a date is determined, the student notifies the OIGP of the date for approval.

Upon exam date approval, Student is instructed by the PULSe office to submit the online Graduate School Form 8, “Request for Appointment of Examining Committee” at least 3 weeks before the exam.

Written Research Proposal

Student submits hard and electronic (PDF) copies of the Written Research Proposal to the PULSe office by the assigned due date, **at least four weeks before the exam date, but no later than February 10th**.

The Graduate Programs Specialist will forward an electronic copy of the student's proposal, cover sheet, and rubric to the exam committee members. This rubric is used by all of the committee members to evaluate the proposal and determine if the proposal is defensible.

Exam committee reviews the proposal, consult with one another, and come to a majority consensus to approve or not approve the proposal **within two (2) weeks of submission**.

Note: Since it is not possible to schedule the exam date with the exam committee members on short notice, the oral exam often must be set up prior to the committee's decision whether the written proposal is approved or not. Depending on the outcome of the written proposal evaluation, the oral exam date may need to be rescheduled.

If the Written Research Proposal is **approved** by the committee, the student and PULSe office are notified by the exam Chair that the proposal has been approved and that the oral exam may proceed as scheduled. The complete rubric is not shared with the student, but the exam chair provides the student with a summary statement explaining why the proposal was approved. The student may be given general guidance regarding the nature and format of the oral exam, but scientific tutoring is not allowed at this time.

If the Written Research Proposal is **not approved** by the committee, the "Student Criteria for Preliminary Examination" rubric compiled by the exam Chair is shared with the student to discuss the specific deficiencies, discrepancies, etc. that are the cause of the proposal rejection. When the proposal is not approved, a meeting between the exam committee Chair and student is strongly encouraged. The exam Chair is expected to work with the student to set up a meeting to review the feedback results. The exam Chair is the main point of contact. After a student consults with the exam Chair, a revised proposal is due to the exam committee within two weeks. The exam Chair may grant an extended timeline, if needed, for proposal resubmission, but the completion of the examination must take place prior to April 15th. No further feedback will be provided to the student after the revised proposal has been submitted to the exam committee, other than approval from the exam Chair for the oral exam to proceed.

The Graduate School notifies the student when the Form 8 has been approved. The OIGP instructs the exam committee on how to complete the online Graduate School Form 10, "Report of the Preliminary Examination".

Upon completion of the exam, the exam committee completes the online Form 10. After consulting with the other committee members, the exam committee Chair is responsible for completing the "Student Criteria for Preliminary Examination" rubric within 24-48 hours of the exam. For students who pass the oral exam, copies of the "Student Criteria for Preliminary Examination" rubric are sent to the student and his/her major professor. For students who fail the oral exam, the Student Criteria for Preliminary Examination rubric, as compiled by the exam committee chair, is shared with the respective TG Chair before disseminating to the student and his/her major professor.

If the student fails the exam, the exam committee may recommend that the student be permitted one re-exam after one term, but within six months. The same exam committee will be appointed for the second examination defending the same topic.

Forms

[PULSe Teaching Requirement](#)

[PULSe Advisory Committee Evaluation](#)

[Preliminary Examination Evaluation](#)

[Research in Absentia](#)

[First Year Absence Form](#)