

**DEPARTMENT OF BIOSTATISTICS AND HEALTH DATA SCIENCE GRADUATE PROGRAMS**  
**STUDENT HANDBOOK**  
**2025-2026**

CONTACT INFORMATION .....	3
POLICIES.....	4
DEGREE PROGRAMS .....	6
Doctor of Philosophy (PhD) in Biostatistics .....	7
Admission .....	7
Program Competencies .....	7
Requirements .....	7
Coursework.....	7
PhD Student Schedule .....	10
PhD Preliminary (Qualifying) Examination .....	11
Doctoral Dissertation.....	12
Graduation.....	14
Statute of Limitations .....	14
Master of Science (MS) in Biostatistics (Generalist).....	16
Admission .....	16
Program Competencies .....	16
Requirements .....	16
Coursework.....	16
MS Student Schedules .....	18
MS Comprehensive Examination.....	19
MS Thesis.....	20
Graduation.....	20
Statute of Limitations .....	20
Master of Science (MS) in Biostatistics: Health Data Science (HDS) .....	22
Admission .....	22
Program Competencies .....	22
Requirements .....	22
Coursework.....	22
HDS Student Schedule .....	24
MS Comprehensive Examination.....	25
MS Thesis.....	25

Graduation.....	26
Statute of Limitations .....	26
Master of Science (MS) in Biostatistics: Statistical and Computational Genomics (SCG) .....	27
Admission .....	27
Program Competencies .....	27
Requirements .....	27
Coursework.....	28
SCG Student Schedule .....	29
MS Comprehensive Examination.....	30
MS Thesis .....	30
Graduation.....	31
Statute of Limitations .....	31
COURSE DESCRIPTIONS .....	32
COURSE OFFERING SCHEDULE .....	32
PhD Degree Requirement Worksheet .....	33
MS Degree Requirement Worksheet .....	36
MS HDS Degree Requirement Worksheet.....	38
MS SCG Degree Requirement Worksheet.....	40

Welcome to the Department of Biostatistics and Health Data Science! The Student Handbook outlines the requirements, policies, and procedures for the operation of our graduate programs. Please keep in mind that policies may change. The department will make every effort to communicate changes in requirements, procedures, or policies.

## CONTACT INFORMATION

For all inquiries, please contact

[biostat@pitt.edu](mailto:biostat@pitt.edu)

412-624-3022

412-624-0184 (fax)

University of Pittsburgh

School of Public Health

Department of Biostatistics and Health Data Science

130 DeSoto Street

Pittsburgh, PA 15261

### University Counseling Center

If you are in distress, please contact 412-648-7930 at any time to speak directly with a clinician.

For urgent mental health concerns or crises, please contact [resolve Crisis Network](#) at 888-796-8226 or the [988 Suicide and Crisis Lifeline](#) by calling 988.

If you are in an emergency situation and immediate assistance is needed, please call 911.

More information on services provided by the University of Pittsburgh please visit the [University of Pittsburgh Office of Student Affairs](#).

# POLICIES

All students in the Department of Biostatistics and Health Data Science are bound by the policies and regulations below. Students should consult the [Graduate and Professional Studies Catalog](#) and [Pitt Public Health Academic Handbook](#) for a complete listing of all policies and regulations.

## Independent Development Plan (IDP)

A Graduate Student Career Development Plan, also known as an [Independent Development Plan \(IDP\)](#), is a tool for helping students and advisors outline and discuss short-term and long-term objectives to guide the student's professional development. PhD students and advisors are required to complete an IDP at least annually. The Doctoral Report on Requirements Form for the PhD preliminary (qualifying) examination and dissertation overview includes a checkbox that the committee must use to certify that an IDP has been completed within six months. If an IDP has not been completed within six months, students and advisors must complete a new IDP.

## Academic Integrity

Students in this course will be expected to comply with the [University of Pittsburgh's Policy on Academic Integrity](#). Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

To learn more about Academic Integrity, visit the [Academic Integrity Guide](#) for an overview of the topic. For hands-on practice, complete the [Academic Integrity Modules](#).

## Disability Services

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and [Disability Resources and Services](#) (DRS), 140 William Pitt Union, (412) 648-7890, [drsrecep@pitt.edu](mailto:drsrecep@pitt.edu), (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

## Sexual Misconduct, Required Reporting, and Title IX

If you are experiencing sexual assault, sexual harassment, domestic violence, and stalking, please report it to me and I will connect you to University resources to support you.

University faculty and staff members are required to report all instances of sexual misconduct, including harassment and sexual violence to the Office of Civil Rights and Title IX. When a report is made, individuals can expect to be contacted by the Title IX Office with information about support resources and options related to safety, accommodations, process, and policy. I encourage you to use the services and resources that may be most helpful to you.

As your professor, I am required to report any incidents of sexual misconduct that are directly reported to me. You can also report directly to Office of Civil Rights and Title IX: 412-648-7860 (M-F; 8:30am-5:00pm) or via the Pitt Concern Connection at: [Make A Report](#)

An important exception to the reporting requirement exists for academic work. Disclosures about sexual misconduct that are shared as a relevant part of an academic project, classroom discussion, or course assignment, are not required to be disclosed to the University's Title IX office.

If you wish to make a confidential report, Pitt encourages you to reach out to these resources:

- The University Counseling Center: 412-648-7930 (8:30 A.M. TO 5 P.M. M-F) and 412-648-7856 (AFTER BUSINESS HOURS)
- Pittsburgh Action Against Rape (community resource): 1-866-363-7273 (24/7)

If you have an immediate safety concern, please contact the University of Pittsburgh Police, 412-624-2121. Any form of sexual harassment or violence will not be excused or tolerated at the University of Pittsburgh. For additional information, please visit the [full syllabus statement](#) on the Office of Diversity, Equity, and Inclusion webpage.

## DEGREE PROGRAMS

The Department of Biostatistics and Health Data Science offers the following graduate programs:

[Doctor of Philosophy \(PhD\) in Biostatistics](#)

[Master of Science \(MS\) in Biostatistics](#)

[Master of Science \(MS\) in Biostatistics with concentration in Health Data Science \(HDS\)](#)

[Master of Science \(MS\) in Biostatistics with concentration in Statistical and Computational Genomics \(SCG\)](#)

Requirements for each program are described on the following pages.

## Doctor of Philosophy (PhD) in Biostatistics

The PhD in Biostatistics degree program is for students with a background in mathematics and a strong interest in public health and medicine. The program emphasizes statistical theory and methods so that students are prepared to be effective statistical collaborators in interdisciplinary studies; lead the design and execution of studies; and develop biostatistics methodology.

### Admission

Application for admission must be made through the School of Public Health Office of Student Affairs. Prospective students should visit the School of Public Health admissions page for [school-wide admission requirements](#) and the Department of Biostatistics and Health Data Science admissions page for [department-specific admission requirements](#). PhD candidates normally complete graduation requirements in four to five years.

### Program Competencies

Students successfully completing the PhD Program in Biostatistics will be able to:

- Develop and implement advanced parametric and nonparametric methods, and the corresponding inference procedures;
- Formulate various linear and mixed models and master the statistical inference on these models;
- Apply linear, generalized linear and non-linear regression models to analyze cross-sectional, or clustered, or longitudinal data with applications to health sciences;
- Derive quantities and inference statistics for time-to-event data, and apply nonparametric, parametric, and semiparametric survival models to such data;
- Contribute to the body of knowledge in the field of biostatistics by submitting article(s) for publication in peer-reviewed journal(s) or preparing book chapter(s) for publication.

### Requirements

#### Coursework

A minimum of 72 credits are required. Students are required to obtain a grade of C or better for all the core (required) courses listed below. A student with a lower than "C" grade for a required course will have to retake the course before the dissertation defense. For PhD Comprehensive (Qualifying) Exam required courses, students are required to obtain a grade of B or better (as stated in the "PhD Preliminary (Qualifying) Examination" section).

#### Core (Required) Courses

BIOST 2025	Biostatistics Seminar	1 credit	<i>(3 terms required)</i>
BIOST 2141	Biostatistical Methods	3 credits	
BIOST 2142	Applied Regression Analysis	3 credits	
BIOST 2143	Longitudinal and Clustered Data Analysis	3 credits	
BIOST 2173	SAS for Data Management & Analysis OR statistical programming equivalent*	2 credits	
BIOST 2179	Biostatistics Consulting Practicum	1 credit	

BIOST 3000**	Doctoral Teaching Practicum	3 credits
BIOST 3011	Introduction to Statistical Inference I	3 credits
BIOST 3012	Introduction to Statistical Inference II	3 credits
BIOST 3021	Advanced Statistical Inference I	3 credits
BIOST 3022	Advanced Statistical Inference II	3 credits
BIOST 3025	Linear Models	3 credits
BIOST 3042	Mixed Models	3 credits
BIOST 3050	Survival Analysis	3 credits
EPIDEM 2110 <sup>†</sup>	Principles of Epidemiology	3 credits
PUBHLT 2011 <sup>†</sup>	Essentials of Public Health	3 credits
PUBHLT 2022 <sup>†</sup>	Public Health Grand Rounds	0 credits (2 terms required)

<sup>†</sup> SPH Core Course

\* A course in statistical programming with a minimum of 2 credits is required. Students may fulfill this requirement with another course that covers similar statistical programming content in R, Python, or SAS, with advisor approval; [Exemption form](#) for BIOST 2173 will need to be filled out.

\*\* The requirement of BIOST 3000 applies to students admitted in Fall 2024 and onwards.

## Electives

### Biostatistics and Health Data Science Electives

This category of elective courses prepares students with advanced biostatistics and health data science knowledge and training for PhD dissertation and career preparation. Students must complete **eighteen (18) credits** of the following courses.

BIOST 2067	Applied Meta-Analysis	1 credit
BIOST 2080	Advanced Statistical Learning	2 credits
BIOST 2146	Introduction to Health Data Science	3 credits
BIOST 2151	Bayesian Data Science	3 credits
BIOST 2154	Statistical Methods for Omics Data	2 credits
BIOST 2155	Introductory Statistical Learning for Health Sciences	2 credits
BIOST 2160	Data Visualization for Health Data Science	3 credits
BIOST 2162	Clinical Trials: Methods & Practice	3 credits
BIOST 2165	Statistical Evaluation of Biomarkers & Classification Tools	3 credits
BIOST 2168	Introduction to Causal Inference	3 credits
BIOST 2174	Advanced R Computing	2 credits
BIOST 3065	Analysis of Data with Missing Values	3 credits

In situations where a student's research interests or needs indicate alternative statistics, data science or machine learning courses outside the department are more appropriate, it may be substituted with the permission of the student's academic or dissertation advisor. Such courses should cover topics not already addressed by the electives listed above, or may be considered if the listed courses are not offered during the desired term. Examples of acceptable substitutions include, but are not limited to:

STAT 2221	Advanced Applied Multivariate Analysis	3 credits
STAT 2320	Applied Time Series	3 credits



### Domain Knowledge and Career Development Electives

This category of elective courses is intended to broaden the interdisciplinary knowledge of students in fields such as bioinformatics, biology, epidemiology, computer science, clinical sciences, or public health practice. Students must complete at least **three (3) credits outside of the Department of Biostatistics and Health Data Science**, in an area that best aligns with their research domain or career goal. PUBHLT 3100 (Grant and Thesis Proposal Writing for Public Health, 3 credits) may be used to fulfill this requirement.

In special circumstances, undergraduate credits may be applied to a Pitt Public Health degree with the permission of the advisor. The undergraduate courses must be upper-level courses (1000-1999), with a limit of six total credits. It must be clear that these credits are taken as a graduate student while enrolled at Pitt Public Health and cannot have been taken as an undergraduate or as a non-degree student.

### **Dissertation Research Credits**

Students must complete three credits of BOST 3010 or one term of FTDR 3999. Please see guidelines for both courses below.

### Independent Study (BOST 2021/3010) Guidelines

Students should give priority to completing core and elective coursework before registering for independent study (BOST 2021/3010). Specifically, no more than three credits of independent study (BOST 2021/3010) can be taken in the terms when core and elective courses are offered that a student needs to take to complete coursework requirements.

Before passing the dissertation overview and comprehensive examination, a doctoral student can register for BOST 2021 for his/her independent PhD level research. After passing the dissertation overview and comprehensive examination, a student is permitted to take BOST 3010 which can fulfill the dissertation research credit requirement while providing credits toward the 72-credit requirement for the PhD degree.

In situations where a student's special interests or needs indicate more credits of independent study (BOST 2021/3010), appropriate approval must be obtained from the student's academic advisor.

### FTDR 3999 Guidelines

Upon enrollment in 72 credits and successful completion of all required coursework, PhD students are required to register for Full-time Dissertation Study (FTDR 3999). FTDR 3999 carries no credit or letter grade but provides students with full-time status. Students enrolled in FTDR 3999 are assessed a special tuition fee.

### **Advanced Standing and Credit Transfer**

PhD students with previous graduate experience in Biostatistics or a related field may apply to transfer up to 30 credits for graduate-level coursework successfully completed with a grade of B or better. The course credits to be transferred must be reviewed by the student's academic advisor and approved by the Pitt Public Health Office of Student Affairs. Students who receive transfer credits for SPH Core Courses must complete the SPH Core Course

Exemption Form in addition to the credit transfer paperwork to be exempt from those classes. Students who receive transfer credits for BIOST 2179 must complete the BIOST [Course Exemption Form](#) in addition to the credit transfer paperwork to be exempt from those classes. All transfer credit paperwork must be completed by the end of a student's first term.

### Course Exemption

Students with sufficient background may be exempt from required core courses and electives by completing the BIOST Course Exemption Form and obtaining approval from the student's advisor, the course instructor, and the Department Chair. Exempted courses do not carry any credits.

### PhD Student Schedule

The following schedule is typical for PhD students who enter the program **with a prior graduate degree in related fields**. It is recommended to help guide timely and balanced course progression. Students may follow a different schedule with advisor approval.

FALL	SPRING
<b>FIRST YEAR</b>	
BIOST 2025 (1)	BIOST 2025 (1)
BIOST 2143 (3)	BIOST 3022 (3)
BIOST 3025 (3)	BIOST 3042 (3)
BIOST 3021 (3)	BIOST 3050 (3)
EPIDEM 2110 (3)	PUBHLT 2011 (3)
PUBHLT 2022 (0)	PUBHLT 2022 (0)
<i>PHD QUALIFYING EXAM</i>	
<b>SECOND YEAR</b>	
BIOST 2025 (1)	BIOST 3000 (3)
BIOST 2179 (1)	ELECTIVE
ELECTIVE	ELECTIVE
ELECTIVE	ELECTIVE
ELECTIVE	ELECTIVE

Remaining year(s) can be used to complete electives and full-time dissertation study.

The following schedule is typical for PhD students who enter the program **without a prior graduate degree in related fields**.

FALL	SPRING
<b>FIRST YEAR</b>	
BIOST 2025 (1)	BIOST 2025 (1)
BIOST 2141 (3)	BIOST 2142 (3)

BIOST 3011 (3)	BIOST 2173 (2) (or equiv.)
EPIDEM 2110 (3)	BIOST 3012 (3)
PUBHLT 2022 (0)	PUBHLT 2022 (0)
ELECTIVE	ELECTIVE
<b>SECOND YEAR</b>	
BIOST 2025 (1)	PUBHLT 2011 (3)
BIOST 2143 (3)	BIOST 3022 (3)
BIOST 3021 (3)	BIOST 3042 (3)
BIOST 3025 (3)	BIOST 3050 (3)
<i>PHD QUALIFYING EXAM</i>	
<b>THIRD YEAR</b>	
BIOST 2179 (1)	BIOST 3000 (3)
ELECTIVE	ELECTIVE
ELECTIVE	ELECTIVE
ELECTIVE	ELECTIVE
ELECTIVE	ELECTIVE

Remaining year(s) can be used to complete electives and full-time dissertation study.

### PhD Preliminary (Qualifying) Examination

The preliminary examination is designed to assess the breadth of the student's knowledge of the discipline, the student's achievement during the first 1-2 years of graduate study, and the potential to apply research methods independently. The preliminary examination is used to identify those students who may be expected to complete the doctoral program successfully and to reveal areas for improvement in the student's preparation.

Students are expected to take the preliminary examination at the end of the first year if they enter the program with a prior graduate degree in related fields, or at the end of the second year if they enter without a graduate degree in related fields. Delaying the exam beyond this timeline is strongly discouraged, as it undermines the purpose of the examination in assessing early progress in the program. In this case, approval by the Department Chair is needed.

The PhD preliminary examination is typically offered annually in June. The examination consists of two separate components: theory and application (including public health based on epidemiology). In order to pass the preliminary examination, students must receive passing scores for both components of the examination. Eligible students are permitted to retake the portions of the examination they did not pass when the examination is offered again the following year. When a student fails the first attempt and has demonstrated far below average performance in both the exam and coursework, the Qualifying Exam Committee may discuss with the Department Chair concerns about the student's progress and advise that continuation in the program may not be in the student's best interest, recommending consideration of alternative academic or career paths. Students who do

not pass the examination on the second attempt will be dismissed from the PhD Program in accordance with the [Pitt Public Health Probation and Dismissal Guidelines](#).

Once a student passes the preliminary examination, the student may begin working on his/her dissertation. Students should not begin dissertation work before they pass the preliminary examination.

#### Eligibility

A student is eligible to take the preliminary examination if the student:

1. did not fail the preliminary examination more than once.

#### Required Coursework

##### Theory (Part 1 of 2)

BIOST 3021	Advanced Statistical Inference I
BIOST 3022	Advanced Statistical Inference II
BIOST 3025	Linear Models
BIOST 3042	Mixed Models

##### Application (Part 2 of 2)

BIOST 2141	Biostatistical Methods
BIOST 2142	Applied Regression Analysis
BIOST 2143	Longitudinal and Clustered Data Analysis
BIOST 3042	Mixed Models
EPIDEM 2110	Principles of Epidemiology

#### **Doctoral Dissertation**

Students must write a dissertation that presents the results of a research project carried out by the student. An appropriate research project involves a substantive piece of original and independent research grounded in an appropriate body of literature. The PhD dissertation should consist of materials sufficient for at least two publications in peer-reviewed journals. At least one of the manuscripts, based on the dissertation and first authored by the student, must be submitted before the PhD dissertation defense. It is the responsibility of the student's dissertation committee to evaluate the dissertation in these terms and to recommend the awarding of the doctoral degree only if the dissertation is judged to demonstrate these qualities.

A dissertation advisor must be a primary or a secondary faculty member in BIOS. When a secondary faculty member advises a BIOS PhD dissertation for the first time, it is required to find a primary faculty member as a co-advisor to ensure that procedure and quality of the dissertation development are followed. Exceptions can be made but need to be approved by the Department Chair. Before the student's dissertation overview and comprehensive examination, the student's dissertation advisor proposes the approval of the Department Chair and Student Affairs, a doctoral dissertation committee.

[Rules for PhD Dissertation Committee Composition:](#)

- The committee must consist of at least four University of Pittsburgh faculty members
- At least two members must be on the [core faculty list](#) of some Pitt Public Health department
- The majority of members must have [graduate faculty](#) status
- One of the University of Pittsburgh faculty on the committee must not be on the [core faculty list](#) from the student's department
- If thesis work includes internship/practical experience, including data and policies, from the Allegheny County Health Department the committee must include a preceptor from the Allegheny County Health Department. If the preceptor is an adjunct faculty member, they count as a faculty member. If they do not hold an adjunct appointment, they must be added in addition to all faculty on the committee.

### **Dissertation Overview & Comprehensive Examination**

Doctoral students must prepare and present a dissertation proposal. The dissertation proposal consists of two parts: (i) a presentation of a dissertation overview to members of the student's doctoral committee and all interested members of the Department of Biostatistics and Health Data Science and (ii) a comprehensive examination attended only by the student and his/her doctoral committee. The purposes of the overview and the comprehensive exam are for a student to demonstrate that he/she is prepared to complete a dissertation by showing a general breadth of biostatistical knowledge and deep understanding of particular area(s) of biostatistics, demonstrating the ability to use biostatistical research methods and presenting a carefully formulated plan of novel dissertation research. An announcement advertising the time and location of the dissertation overview should be disseminated to the Department at least one week prior to the presentation. The doctoral committee must unanimously approve the dissertation topic and research plan before the student is admitted to candidacy for the doctoral degree. Approval of the overview does not imply either the acceptance of a dissertation prepared in accordance with the overview or the restriction of the dissertation to its original overview. The dissertation overview and comprehensive examination should be passed at least one academic term before scheduling the dissertation defense.

### **Admission to Candidacy**

Admission to candidacy for a doctoral degree constitutes a promotion of the student to the most advanced stage of graduate study and provides formal approval to devote essentially exclusive attention to the research and the writing of the dissertation.

#### **Eligibility**

To qualify for admission to candidacy a student must:

1. be in full graduate status
2. have satisfied the requirement of preliminary examination
3. have completed all required coursework with a minimum quality point average (QPA) of 3.00
4. shown proficiency in a research or investigative tool
5. have received approval of the proposed dissertation subject and plan following successful completion of the dissertation overview and comprehensive examination requirements

Students are informed of admission to candidacy by written notification from the Pitt Public Health Office of Student Affairs.

Admission to candidacy should occur at least one academic term before the defense of the dissertation in order to provide an opportunity for the dissertation committee members to review, criticize, and monitor the proposed research.

Meetings of the dissertation committee and student must occur at least annually from the time the student gains admission to doctoral candidacy. During these meetings, the dissertation committee should assess the student's progress toward the completion of degree requirements and discuss objectives for the following year and a timetable for completing degree requirements.

### **Doctoral Dissertation Defense**

The final oral examination in defense of the doctoral dissertation is conducted by the student's dissertation committee. One copy of the dissertation must be submitted to each member of the dissertation committee at least two weeks before the scheduled doctoral defense. The defense may not be scheduled earlier than two weeks following submission of the dissertation but must be held at least two weeks before the degree is conferred.

At least one month before the scheduled defense, the student must provide the department registrar with the defense time, date, place, dissertation title and abstract for school-wide advertisement. More information on defense announcement guidelines can be found by viewing the [complete instructions for announcing your defense](#).

The final copy of the dissertation must be prepared and submitted according to [Detailed Essay, Thesis, and Dissertation Rules](#). Additional information regarding dissertations can be found by visiting the [essays, theses, and dissertations](#) section of the Pitt Public Health graduation site.

### **Graduation**

All PhD students must register for at least one credit during the term in which they intend to graduate. Please visit the [Pitt Public Health Graduation](#) page for detailed information on applying for graduation and graduation requirements.

### **Statute of Limitations**

The purpose of the statute of limitations is to ensure that a graduate degree from the University of Pittsburgh represents mastery of current knowledge in the field of study.

From the student's initial registration for graduate study, all requirements for the PhD degree must be completed within a period of ten years or eight years if the student has received credit for a master's degree appropriate to the field of study. The statute of limitations is the same for both full- and part-time students.

Under exceptional circumstances, a candidate for the PhD degree may apply for an extension of the statute of limitations. The request must be approved by the department or departmental doctoral monitoring committee and submitted to the dean for final action. Requests for an extension of the statute of limitations must be accompanied by a departmental assessment of the work required of the student to complete the degree as well as documented evidence of the extenuating circumstances leading to the requested extension. Students who request an extension of the statute of limitations must demonstrate proper preparation for the completion of all current degree requirements.

## Master of Science (MS) in Biostatistics (Generalist)

The traditional (generalist) MS in Biostatistics degree program is for students with a background in mathematics and a strong interest in public health. The Generalist concentration emphasizes multipurpose assembly of biostatistical theory and statistical methods for analyzing and interpreting data from biomedical and other fields to prepare students for effective statistical collaboration in designing and analyzing interdisciplinary studies.

### Admission

Application for admission must be made through the School of Public Health Office of Student Affairs. Prospective students should visit the School of Public Health admissions page for [school-wide admission requirements](#) and the Department of Biostatistics and Health Data Science admissions page for [department-specific admission requirements](#). Full-time students normally complete graduation requirements for the MS degree within three to four terms (18 to 24 months).

### Program Competencies

Students successfully completing the MS Program in Biostatistics will be able to:

- Identify appropriate problem definitions, study designs, and data collection methods to address public health problems
- Utilize fundamental theoretical concepts and relationships to effectively apply and interpret common statistical inference techniques
- Use common biostatistical inference techniques and regression models to analyze data and interpret the results for public health practice
- Recognize strengths and weaknesses of approaches, including alternative designs, data sources, and analytic methods
- Communicate the meaning, potential, and results of biostatistical analyses to potential collaborators with varying degrees of statistical knowledge
- Effectively use SAS software for advanced data management and in-depth statistical analysis
- Appropriately utilize generalized linear models to analyze clustered and longitudinal data (binary/continuous/count) applicable to health sciences
- Derive and interpret fundamental quantities and statistics from various survival analysis models; Perform the analysis and interpret the results from nonparametric, parametric, and semiparametric survival models
- Apply advanced methods or theories in at least three major areas of classical biostatistics

### Requirements

#### Coursework

A minimum of 40 credits are required. Students are required to obtain a grade of C or better for all the core (required) courses listed below. A student with a lower than "C" grade for a required course will have to retake



the course before the thesis defense. For MS Comprehensive Exam required courses, students are required to obtain a grade of B or better (as stated in the “MS Comprehensive Examination” section).

### Core (Required) Courses

BIOST 2025	Biostatistics Seminar	1 credit
BIOST 2081	Mathematical Methods for Statistics	3 credits
BIOST 2131	Foundations of Statistical Theory	4 credits
BIOST 2141	Biostatistical Methods	3 credits
BIOST 2142	Applied Regression Analysis	3 credits
BIOST 2143	Longitudinal and Clustered Data Analysis	3 credits
BIOST 2150	Applied Survival Analysis: Methods and Practice	3 credits
BIOST 2173	SAS for Data Management & Analysis OR SAS programming equivalent*	2 credits
BIOST 2179**	Biostatistics Consulting Practicum	1 credit
BIOST 2198***	MS Thesis Preparation	1 credit
BIOST 2199***	MS Thesis	2 credits
EPIDEM 2110 <sup>†</sup>	Principles of Epidemiology	3 credits
PUBHLT 2011 <sup>†</sup>	Essentials of Public Health	3 credits
PUBHLT 2022 <sup>†</sup>	Public Health Grand Rounds	0 credits (2 terms required)

<sup>†</sup> SPH Core Course

\* A course in **SAS** with a minimum of 2 credits is required. Students may fulfill this requirement with EPID 2185 (offered in Fall) or another approved course that covers equivalent content in **SAS**, with advisor approval; [Exemption form](#) for BIOST 2173 will need to be filled out.

\*\* MS students should enroll after completing as many Biostatistics core courses as possible and no sooner than passing the MS comprehensive exam.

\*\*\* After successfully completing the MS Comprehensive Examination, students must enroll in a total of three credits across two semesters: BIOST 2198 (1 credit) in the penultimate semester to develop the thesis topic, and BIOST 2199 (2 credits) in the final semester to complete the thesis.

### Electives

Students must complete BIOST elective credits to bring the total number of course credits to 40. Students must choose at least **eight (8) credits** of elective courses from the list provided below. In situations where a student's special interests or needs indicate an alternative course outside of the department is more appropriate it may be substituted with the permission of the student's academic advisor. Additional Biostatistics Seminar (BIOST 2025) credits cannot be used to fulfill elective credits.

BIOST 2067	Applied Meta-Analysis	1 credit
BIOST 2080	Advanced Statistical Learning	2 credits
BIOST 2146	Introduction to Health Data Science	3 credits
BIOST 2151	Bayesian Data Science	3 credits
BIOST 2154	Statistical Methods for Omics Data	2 credits
BIOST 2155	Intro Stat Learning for Health Sciences	2 credits
BIOST 2160	Data Visualization for Health Data Science	3 credits
BIOST 2162	Clinical Trials: Methods and Practice	3 credits

BIOST 2165	Statistical Evaluation of Biomarkers and Classification Tools	3 credits
BIOST 2168	Introduction to Causal Inference	3 credits
BIOST 2174	Advanced R Computing	2 credits

### Advanced Standing and Credit Transfer

MS students with previous graduate experience in Biostatistics or a related field may apply to transfer up to six credits for graduate-level coursework successfully completed with a grade of B or better (within the last five years). The course credits to be transferred must be reviewed by the student's academic advisor and approved by the Pitt Public Health Office of Student Affairs. Students who request transfer credits for SPH Core Courses must complete the SPH Core Course Exemption Form in addition to the credit transfer paperwork to be exempt from those classes. Students who request transfer credits for BIOST 2179 must complete the BIOST [Course Exemption Form](#) in addition to the credit transfer paperwork to be exempt from the class. All transfer credit paperwork must be completed by the end of a student's first term.

### Course Exemption

Students with sufficient background may be exempt from required core courses and electives by completing the BIOST Course Exemption Form and obtaining approval from the student's advisor, the course instructor and the Department Chair. Exempted courses do not carry any credits.

### MS Student Schedule

The following schedule is recommended to help guide timely and balanced course progression. Students may follow a different schedule with advisor approval.

FALL	SPRING
<b>FIRST YEAR</b>	
BIOST 2081 (3)	BIOST 2142 (3)
BIOST 2131 (4)	BIOST 2173 (2) (or SAS equiv.)
BIOST 2141 (3)	PUBHLT 2011 (3)
EPIDEM 2110 (3)	PUBHLT 2022 (0)
PUBHLT 2022 (0)	ELECTIVE
<i>MAY OF 1<sup>ST</sup> YEAR MS COMPREHENSIVE EXAM</i>	
<b>SECOND YEAR</b>	
BIOST 2025 (1)	BIOST 2179 (1)
BIOST 2143 (3)	BIOST 2199 (2)
BIOST 2150 (3)	ELECTIVE
BIOST 2198 (1)	
ELECTIVE	

An 18-month schedule is available for MS students who wish to complete the program in a shorter time frame. Students pursuing this option must ensure that **all program requirements are met** and are strongly encouraged to discuss their plans with their academic advisor early in the program. The following is an example schedule.

### Eighteen-Month Schedule

FALL	SPRING
<b>FIRST YEAR</b>	
BIOST 2081 (3)	BIOST 2142 (3)
BIOST 2131 (4)	BIOST 2173 (2) (or SAS equiv.)
BIOST 2141 (3)	PUBHLT 2011 (3)
EPIDEM 2110 (3)	PUBHLT 2022 (0)
PUBHLT 2022 (0)	BIOST 2198 (1)
	ELECTIVE
<i>MAY OF 1<sup>ST</sup> YEAR MS COMPREHENSIVE EXAM</i>	
<b>SECOND YEAR</b>	
BIOST 2025 (1)	
BIOST 2143 (3)	
BIOST 2150 (3)	
BIOST 2179 (1)	
BIOST 2199 (2)	
ELECTIVE	

### **MS Comprehensive Examination**

MS students must pass a written comprehensive examination offered annually at the end of the first year of study in early May. The MS comprehensive examination covers fundamental applied methods and theoretical concepts in a 3-hour exam. The examination is a proctored closed book exam.

Eligible students who fail the examination on the first attempt are permitted to take the examination a second time during the summer. The summer examination is only for eligible first-year students who did not pass the examination on the first attempt in order not to delay graduation or decisions about continuation in the program. Eligible students who fail the examination on the first attempt may also choose to wait until the following May to retake the exam. Students who do not pass the examination on the second attempt will be dismissed from the MS Program in accordance with the [Pitt Public Health Probation and Dismissal Guidelines](#).

### Eligibility

A student is eligible to take the comprehensive examination if the student:

1. is enrolled in the MS Program in Biostatistics with good standing (3.00 QPA or greater)
2. did not fail the comprehensive examination more than once

3. completed the required courses (listed below) with a B or better, or equivalent coursework which the student has obtained transfer credits or exemption for

#### Required Coursework

BIOST 2131	Foundation of Statistical Theory
BIOST 2141	Biostatistical Methods
BIOST 2142	Applied Regression Analysis
EPIDEM 2110	Principles of Epidemiology

### **MS Thesis**

After successful completion of the MS Comprehensive Examination requirement, MS students must register for two semesters, three credits total, of supervised thesis research (BIOST 2198 and BIOST 2199). Thesis work includes analysis, writing, and defending a master's thesis. The final master's thesis document must be in accord with specifications stipulated in the [Pitt Public Health Detailed Essay, Thesis, and Dissertation Rules](#).

The MS thesis committee, assembled according to the [school-wide guidelines](#) and **include at least one core faculty from the Department of Biostatistics and Health Data Science**—as additionally required by the Department—will judge the adequacy of the MS thesis by the final oral presentation/examination covering the subject of the thesis, which will occur during the scheduled defense. Successful completion of the MS thesis requires unanimous agreement by the MS thesis committee.

It is required that all students follow the [Pitt Public Health Detailed Essay, Thesis, and Dissertation Rules](#) and work in the ETD template when they start to write their thesis. The final copy of the thesis must be prepared and submitted according to [University Guidelines for Electronic Theses and Dissertations \(ETD\)](#).

### **Graduation**

All MS students must register for at least one credit during the term in which they intend to graduate. Please visit the [Pitt Public Health Graduation](#) page for detailed information on applying for graduation and graduation requirements.

### **Statute of Limitations**

The purpose of the statute of limitations is to ensure that a graduate degree from the University of Pittsburgh represents mastery of current knowledge in the field of study.

All requirements for the MS degree must be completed within a period of four consecutive calendar years from the student's initial registration for graduate study. The statute of limitations is the same for both full- and part-time students.

Under exceptional circumstances, a candidate for the MS degree may apply for an extension of the statute of limitations. The request must be approved by the department and submitted to the dean for final approval and action. Requests for an extension of the statute of limitations must be accompanied by a departmental assessment

of the work required of the student to complete the degree as well as documented evidence of the extenuating circumstances leading to the requested extension. Students who request an extension of the statute of limitations must demonstrate proper preparation for the completion of all current degree requirements.

## Master of Science (MS) in Biostatistics: Health Data Science (HDS)

The MS in Biostatistics with a concentration in Health Data Science (HDS) is an academic degree program for students with a background in mathematics/programming and a strong interest in biology, public health, and data science. The HDS concentration emphasizes biostatistical theory and data-science methods for analyzing, processing and interpreting large-scale data sets to prepare students to clean, store, manage, manipulate, visualize, and process high-dimensional data for effective statistical collaboration in interdisciplinary studies with large-scale health-related data.

### Admission

Application for admission must be made through the School of Public Health Office of Student Affairs. Prospective students should visit the School of Public Health admissions page for [school-wide admission requirements](#) and the Department of Biostatistics and Health Data Science admissions page for [department-specific admission requirements](#). Full-time students normally complete graduation requirements for the MS HDS degree within four terms (2 years).

### Program Competencies

Students successfully completing the MS Health Data Science concentration in Biostatistics will be able to:

- Identify appropriate problem definitions, study designs, and data collection methods to address public health problems
- Utilize fundamental theoretical concepts and relationships to effectively apply and interpret common statistical inference techniques
- Use common biostatistical inference techniques and regression models to analyze data and interpret the results for public health practice
- Recognize strengths and weaknesses of approaches, including alternative designs, data sources, and analytic methods
- Communicate the meaning, potential, and results of biostatistical analyses to potential collaborators with varying degrees of statistical knowledge
- Effectively use R software for basic statistical analysis and advanced programming tasks
- Apply data curation, wrangling, and management techniques such as data munging, data scraping, sampling, and cleaning to construct informative, usable, and manageable data sets for meaningful analyses
- Apply methods for big data, including supervised and unsupervised machine learning to reveal patterns, trends and associations including visualization
- Apply advanced methods in at least three major areas of data science

### Requirements

#### Coursework

A minimum of 40 credits are required. Students are required to obtain a grade of C or better for all the core (required) courses listed below. A student with a lower than "C" grade for a required course will have to retake

the course before the thesis defense. For MS Comprehensive Exam required courses, students are required to obtain a grade of B or better (as stated in the “MS Comprehensive Examination” section).

### Core (Required) Courses

BIOST 2025	Biostatistics Seminar	1 credit	
BIOST 2081	Mathematical Methods for Statistics	3 credits	
BIOST 2131	Foundations of Statistical Theory	4 credits	
BIOST 2141	Biostatistical Methods	3 credits	
BIOST 2142	Applied Regression Analysis	3 credits	
BIOST 2146	Introduction to Health Data Science	3 credits	
BIOST 2155	Introductory Statistical Learning for Health Sciences	2 credits	
BIOST 2160	Data Visualization for Health Data Science	3 credits	
BIOST 2179*	Biostatistics Consulting Practicum	1 credit	
BIOST 2198**	MS Thesis Preparation	1 credit	
BIOST 2199**	MS Thesis	2 credits	
EPIDEM 2110 <sup>†</sup>	Principles of Epidemiology	3 credits	
PUBHLT 2011 <sup>†</sup>	Essentials of Public Health	3 credits	
PUBHLT 2022 <sup>†</sup>	Public Health Grand Rounds	0 credits	(2 terms required)

<sup>†</sup> SPH Core Course

\* MS students should enroll after completing as many Biostatistics core courses as possible and no sooner than passing the MS comprehensive exam.

\*\* After successfully completing the MS Comprehensive Examination, students must enroll in a total of three credits across two semesters: BIOST 2198 (1 credit) in the penultimate semester to develop the thesis topic, and BIOST 2199 (2 credits) in the final semester to complete the thesis.

### HDS Electives

Students must complete HDS elective credits to bring the total number of course credits to 40. Students must choose at least **eight (8) credits** of elective courses from the list provided below. In situations where a student’s special interests or needs indicate an alternative course outside of the department is more appropriate it may be substituted with the permission of the student’s academic advisor. Additional Biostatistics Seminar (BIOST 2025) credits cannot be used to fulfill elective credits.

BIOST 2080	Advanced Statistical Learning	2 credits
BIOST 2151	Bayesian Data Science	3 credits
BIOST 2173	SAS for Data Management and Analysis	2 credits
BMIS 2542	Data Programming Essentials with Python	3 credits
BMIS 2588	Data Base Management	3 credits
INFSCI 2160	Data Mining	3 credits
INFSCI 2410	Introduction to Neural Networks	3 credits
INFSCI 2595	Machine Learning	3 credits
INFSCI 2725	Data Analytics (R, Java, or Python experience required)	3 credits
PHARM 5834	Python for Data Management and Analytics	3 credits
STAT 2270	Data Mining	3 credits

### Advanced Standing and Credit Transfer

MS students with previous graduate experience in Biostatistics or a related field may apply to transfer up to six credits for graduate-level coursework successfully completed with a grade of B or better (within the last five years). The course credits to be transferred must be reviewed by the student's academic advisor and approved by the Pitt Public Health Office of Student Affairs. Students who request transfer credits for SPH Core Courses must complete the SPH Core Course Exemption Form in addition to the credit transfer paperwork to be exempt from those classes. Students who request transfer credits for BIOST 2179 must complete the BIOST [Course Exemption Form](#) in addition to the credit transfer paperwork to be exempt from the class. All transfer credit paperwork must be completed by the end of a student's first term.

### Course Exemption

Students with sufficient background may be exempt from required core courses and electives by completing the BIOST Course Exemption Form and obtaining approval from the student's advisor, the course instructor and the Department Chair. Exempted courses do not carry any credits.

### HDS Student Schedule

The following schedule is recommended to help guide timely and balanced course progression. Students may follow a different schedule with advisor approval.

FALL	SPRING
<b>FIRST YEAR</b>	
BIOST 2081 (3)	BIOST 2025 (1)
BIOST 2131 (4)	BIOST 2142 (3)
BIOST 2141 (3)	BIOST 2146 (3)
EPIDEM 2110 (3)	BIOST 2160 (3)
PUBHLT 2022 (0)	PUBHLT 2022 (0)
	HDS ELECTIVE
<i>MAY OF 1<sup>ST</sup> YEAR MS COMPREHENSIVE EXAM</i>	
<b>SECOND YEAR</b>	
BIOST 2155 (2)	PUBHLT 2011 (3)
BIOST 2179 (1)	BIOST 2199 (2)
BIOST 2198 (1)	HDS ELECTIVE
HDS ELECTIVE	

An 18-month schedule is available for MS students who wish to complete the program in a shorter time frame. Students pursuing this option must ensure that **all program requirements are met** and are strongly encouraged to discuss their plans with their academic advisor early in the program.



## MS Comprehensive Examination

MS students must pass a written comprehensive examination offered annually at the end of the first year of study in early May. The MS comprehensive examination covers fundamental applied methods and theoretical concepts in a 3-hour exam. The examination is a proctored closed book exam.

Eligible students who fail the examination on the first attempt are permitted to take the examination a second time during the summer. The summer examination is only for eligible first-year students who did not pass the examination on the first attempt in order not to delay graduation or decisions about continuation in the program. Eligible students who fail the examination on the first attempt may also choose to wait until the following May to retake the exam. Students who do not pass the examination on the second attempt will be dismissed from the MS Program in accordance with the [Pitt Public Health Probation and Dismissal Guidelines](#).

### Eligibility

A student is eligible to take the comprehensive examination if the student:

1. is enrolled in the MS Program in Biostatistics with good standing (3.00 QPA or greater)
2. did not fail the comprehensive examination more than once
3. completed the required courses (listed below) with a B or better, or equivalent coursework which the student has obtained transfer credits or exemption for

### Required Coursework

BIOST 2131	Foundation of Statistical Theory
BIOST 2141	Biostatistical Methods
BIOST 2142	Applied Regression Analysis
EPIDEM 2110	Principles of Epidemiology

## MS Thesis

After successful completion of the MS Comprehensive Examination requirement, MS students must register for two semesters, three credits total, of supervised thesis research (BIOST 2198 and BIOST 2199). Thesis work includes analysis, writing, and defending a master's thesis. The final master's thesis document must be in accord with specifications stipulated in the [Pitt Public Health Detailed Essay, Thesis, and Dissertation Rules](#).

The MS thesis committee, assembled according to the [school-wide guidelines](#) and include at least one core faculty from the Department of Biostatistics and Health Data Science—as additionally required by the Department—will judge the adequacy of the MS thesis by the final oral presentation/examination covering the subject of the thesis, which will occur during the scheduled defense. Successful completion of the MS thesis requires unanimous agreement by the MS thesis committee.

It is required that all students follow the [Pitt Public Health Detailed Essay, Thesis, and Dissertation Rules](#) and work in the ETD template when they start to write their thesis. The final copy of the thesis must be prepared and submitted according to [University Guidelines for Electronic Theses and Dissertations \(ETD\)](#).

## **Graduation**

All MS students must register for at least one credit during the term in which they intend to graduate. Please visit the [Pitt Public Health Graduation](#) page for detailed information on applying for graduation and graduation requirements.

## **Statute of Limitations**

The purpose of the statute of limitations is to ensure that a graduate degree from the University of Pittsburgh represents mastery of current knowledge in the field of study.

All requirements for the MS degrees must be completed within a period of four consecutive calendar years from the student's initial registration for graduate study. The statute of limitations is the same for both full- and part-time students.

Under exceptional circumstances, a candidate for the MS degree may apply for an extension of the statute of limitations. The request must be approved by the department and submitted to the dean for final approval and action. Requests for an extension of the statute of limitations must be accompanied by a departmental assessment of the work required of the student to complete the degree as well as documented evidence of the extenuating circumstances leading to the requested extension. Students who request an extension of the statute of limitations must demonstrate proper preparation for the completion of all current degree requirements.

## Master of Science (MS) in Biostatistics: Statistical and Computational Genomics (SCG)

The MS in Biostatistics with a concentration in Statistical and Computational Genomics (SCG) is an academic degree program for students with a background in mathematics/programming and a strong interest in biology, public health, and genomics. The SCG concentration emphasizes biostatistical theory and statistical computational methods for analyzing and interpreting ‘omics’ data to prepare students for effective statistical collaborators in interdisciplinary studies with a genomics component.

### Admission

Application for admission must be made through the School of Public Health Office of Student Affairs. Prospective students should visit the School of Public Health admissions page for [school-wide admission requirements](#) and the Department of Biostatistics and Health Data Science admissions page for [department-specific admission requirements](#). Full-time students normally complete graduation requirements for the MS SCG degree within four terms (2 years).

### Program Competencies

Students successfully completing the MS Statistical and Computational Genomics (SCG) concentration in Biostatistics will be able to:

- Identify appropriate problem definitions, study designs, and data collection methods to address public health problems
- Utilize fundamental theoretical concepts and relationships to effectively apply and interpret common statistical inference techniques
- Use common biostatistical inference techniques and regression models to analyze data and interpret the results for public health practice
- Recognize strengths and weaknesses of approaches, including alternative designs, data sources, and analytic methods
- Communicate the meaning, potential, and results of biostatistical analyses to potential collaborators with varying degrees of statistical knowledge
- Effectively use R software for processing and analysis of ‘omics’-type data
- Apply specialized statistical, bioinformatics, and computational methods for analysis of ‘omics’ data and interpret the results
- Apply methods of statistical learning, including dimension reductions, clustering, and subgroup analysis to visualize and analyze ‘omics’-type data
- Apply advanced methods in at least three major areas of genomics

### Requirements

## Coursework

A minimum of 40 credits are required. Students are required to obtain a grade of C or better for all the core (required) courses listed below. A student with a lower than "C" grade for a required course will have to retake the course before the thesis defense. For MS Comprehensive Exam required courses, students are required to obtain a grade of B or better (as stated in the "MS Comprehensive Examination" section).

### Core (Required) Courses

BIOST 2025	Biostatistics Seminar	1 credit	
BIOST 2081	Mathematical Methods for Statistics	3 credits	
BIOST 2131	Foundations of Statistical Theory	4 credits	
BIOST 2141	Biostatistical Methods	3 credits	
BIOST 2142	Applied Regression Analysis	3 credits	
BIOST 2154	Statistical Methods for Omics Data	2 credits	
BIOST 2155	Introductory Statistical Learning for Health Sciences	2 credits	
BIOST 2160	Data Visualization for Health Data Science	3 credits	
BIOST 2179*	Biostatistics Consulting Practicum	1 credit	
BIOST 2198**	MS Thesis Preparation	1 credit	
BIOST 2199**	MS Thesis	2 credits	
EPIDEM 2110 <sup>†</sup>	Principles of Epidemiology	3 credits	
PUBHLT 2011 <sup>†</sup>	Essentials of Public Health	3 credits	
PUBHLT 2022 <sup>†</sup>	Public Health Grand Rounds	0 credits	(2 terms required)

<sup>†</sup> SPH Core Course

\* MS students should enroll after completing as many Biostatistics core courses as possible and no sooner than passing the MS comprehensive exam.

\*\* After successfully completing the MS Comprehensive Examination, students must enroll in a total of three credits across two semesters: BIOST 2198 (1 credit) in the penultimate semester to develop the thesis topic, and BIOST 2199 (2 credits) in the final semester to complete the thesis.

### SCG Electives

Students must complete SCG elective credits to bring the total number of course credits to 40. Students must choose at least **nine (9) credits** of elective courses from the list provided below. In situations where a student's special interests or needs indicate an alternative course outside of the department is more appropriate it may be substituted with the permission of the student's academic advisor. Additional Biostatistics Seminar (BIOST 2025) credits cannot be used to fulfill elective credits.

BIOSC 2140	Genomics	2 credits
BIOSC 2940	Molecular Biology	3 credits
BIOST 2080	Advanced Statistical Learning	2 credits
HUGEN 2020	Intro to Population Genetics & Genetic Epidemiology	3 credits
HUGEN 2029	Introduction to Gene Mapping	3 credits
HUGEN 2071	Genomic Data Processing and Structure	3 credits
HUGEN 2072	Genomic Data Pipelines & Tools	3 credits

HUGEN 2073	Genomic Data Visualization & Integration	3 credits
HUGEN 2080	Statistical Genetics	3 credits

### Advanced Standing and Credit Transfer

MS students with previous graduate experience in Biostatistics or a related field may apply to transfer up to six credits for graduate-level coursework successfully completed with a grade of B or better (within the last five years). The course credits to be transferred must be reviewed by the student's academic advisor and approved by the Pitt Public Health Office of Student Affairs. Students who request transfer credits for SPH Core Courses must complete the SPH Core Course Exemption Form in addition to the credit transfer paperwork to be exempt from those classes. Students who request transfer credits for BIOST 2179 must complete the BIOST [Course Exemption Form](#) in addition to the credit transfer paperwork to be exempt from the class. All transfer credit paperwork must be completed by the end of a student's first term.

### Course Exemption

Students with sufficient background may be exempt from required core courses and electives by completing the BIOST Course Exemption Form and obtaining approval from the student's advisor, the course instructor and the Department Chair. Exempted courses do not carry any credits.

### SCG Student Schedule

The following schedule is recommended to help guide timely and balanced course progression. Students may follow a different schedule with advisor approval.

FALL	SPRING
<b>FIRST YEAR</b>	
BIOST 2081 (3)	BIOST 2025 (1)
BIOST 2131 (4)	BIOST 2142 (3)
BIOST 2141 (3)	BIOST 2160 (3)
EPIDEM 2110 (3)	PUBHLT 2022 (0)
PUBHLT 2022 (0)	SCG ELECTIVE
<i>MAY OF 1<sup>ST</sup> YEAR MS COMPREHENSIVE EXAM</i>	
<b>SECOND YEAR</b>	
BIOST 2154 (2)	PUBHLT 2011 (3)
BIOST 2155 (2)	BIOST 2199 (2)
BIOST 2179 (1)	SCG ELECTIVE
BIOST 2198 (1)	
SCG ELECTIVE	

An 18-month schedule is available for MS students who wish to complete the program in a shorter time frame. Students pursuing this option must ensure that **all program requirements are met** and are strongly encouraged to discuss their plans with their academic advisor early in the program.

## MS Comprehensive Examination

MS students must pass a written comprehensive examination offered annually at the end of the first year of study in early May. The MS comprehensive examination covers fundamental applied methods and theoretical concepts in a 3-hour exam. The examination is a proctored closed book exam.

Eligible students who fail the examination on the first attempt are permitted to take the examination a second time during the summer. The summer examination is only for eligible first-year students who did not pass the examination on the first attempt in order not to delay graduation or decisions about continuation in the program. Eligible students who fail the examination on the first attempt may also choose to wait until the following May to retake the exam. Students who do not pass the examination on the second attempt will be dismissed from the MS Program in accordance with the [Pitt Public Health Probation and Dismissal Guidelines](#).

### Eligibility

A student is eligible to take the comprehensive examination if the student:

1. is enrolled in the MS Program in Biostatistics with good standing (3.00 QPA or greater)
2. did not fail the comprehensive examination more than once
3. completed the required courses (listed below) with a B or better, or equivalent coursework which the student has obtained transfer credits or exemption for

### Required Coursework

BIOST 2131	Foundation of Statistical Theory
BIOST 2141	Biostatistical Methods
BIOST 2142	Applied Regression Analysis
EPIDEM 2110	Principles of Epidemiology

## MS Thesis

After successful completion of the MS Comprehensive Examination requirement, MS students must register for two semesters, three credits total, of supervised thesis research (BIOST 2198 and BIOST 2199). Thesis work includes analysis, writing, and defending a master's thesis. The final master's thesis document must be in accord with specifications stipulated in the [Pitt Public Health Detailed Essay, Thesis, and Dissertation Rules](#).

The MS thesis committee, assembled according to the [school-wide guidelines](#) and include at least one core faculty from the Department of Biostatistics and Health Data Science—as additionally required by the Department—will judge the adequacy of the MS thesis by the final oral presentation/examination covering the subject of the thesis, which will occur during the scheduled defense. Successful completion of the MS thesis requires unanimous agreement by the MS thesis committee.

It is required that all students follow the [Pitt Public Health Detailed Essay, Thesis, and Dissertation Rules](#) and work in the ETD template when they start to write their thesis. The final copy of the thesis must be prepared and submitted according to [University Guidelines for Electronic Theses and Dissertations \(ETD\)](#).

## **Graduation**

All MS students must register for at least one credit during the term in which they intend to graduate. Please visit the [Pitt Public Health Graduation](#) page for detailed information on applying for graduation and graduation requirements.

## **Statute of Limitations**

The purpose of the statute of limitations is to ensure that a graduate degree from the University of Pittsburgh represents mastery of current knowledge in the field of study.

All requirements for the MS degrees must be completed within a period of four consecutive calendar years from the student's initial registration for graduate study. The statute of limitations is the same for both full- and part-time students.

Under exceptional circumstances, a candidate for the MS degree may apply for an extension of the statute of limitations. The request must be approved by the department and submitted to the dean for final approval and action. Requests for an extension of the statute of limitations must be accompanied by a departmental assessment of the work required of the student to complete the degree as well as documented evidence of the extenuating circumstances leading to the requested extension. Students who request an extension of the statute of limitations must demonstrate proper preparation for the completion of all current degree requirements.

## **COURSE DESCRIPTIONS**

Detailed course descriptions, credit information, and prerequisites or corequisites can be found in PeopleSoft/HighPoint Campus Experience (CX). Instructions for accessing this system are available at: <https://services.pitt.edu/TDClient/33/Portal/KB/ArticleDet?ID=220>.

## **COURSE OFFERING SCHEDULE**

Course offerings are subject to change. The most current schedules can be found in PeopleSoft/HighPoint Campus Experience (CX). Please refer to the instructions linked above for guidance on how to search for classes by term.



# PhD Degree Requirement Worksheet

Student Name:

PeopleSoft #:

Entered Program:

Statute of Limitation:

Advisor:

## **Provisional Requirements**

*For students accepted provisionally*

Completed	Provision	Credits	Term

## **Course Requirements**

*A minimum of 72 credits are required*

### **Core (Required) Courses**

Completed	Course #	Course Name	Credits	Grade	Credit Transfer	Waiver
	BIOST 2025	Biostatistics Seminar	1			
			1			
			1			
	BIOST 2141	Biostatistical Methods	3			
	BIOST 2142	Applied Regression Analysis	3			
	BIOST 2143	Longitudinal and Clustered Data Analysis	3			
	BIOST 2173	SAS for Data Management & Analysis (or equiv.)*	2			
	BIOST 2179	Biostatistics Consulting Practicum	1			
	BIOST 3000	Doctoral Teaching Practicum**	3			
	BIOST 3011	Introduction to Statistical Inference 1	3			
	BIOST 3012	Introduction to Statistical Inference 2	3			
	BIOST 3021	Advanced Statistical Inference 1	3			
	BIOST 3022	Advanced Statistical Inference 2	3			
	BIOST 3025	Linear Models	3			
	BIOST 3042	Mixed Models	3			
	BIOST 3050	Survival Analysis	3			
	EPIDEM 1110	Principles of Epidemiology	3			
	PUBHLT 2011	Essentials of Public Health	3			
	PUBHLT 2022	Public Health Grand Rounds	0			
			0			

\* A course in statistical programming with a minimum of 2 credits is required. Students may fulfill this requirement with another course that covers similar statistical programming content in R, Python, Stata or SAS, with advisor approval; [Exemption form](#) for BIOST 2173 will need to be filled out.

*\*\* The requirement of BIOST 3000 applies to students admitted in Fall 2024 and onwards.*

### **Biostatistics and Health Data Science Electives**

In situations where a student's research interests or needs indicate alternative statistics, data science or machine learning courses outside the department are more appropriate, it may be substituted with the permission of the student's academic or dissertation advisor.

*At least **eighteen (18) credits** of the following courses:*

Completed	Course #	Course Name	Credits	Grade	Credit Transfer
	BIOST 2067	Applied Meta-Analysis	1		
	BIOST 2080	Advanced Statistical Learning	2		
	BIOST 2146	Introduction to Health Data Science	3		
	BIOST 2151	Bayesian Data Science	3		
	BIOST 2154	Statistical Methods for Omics Data	2		
	BIOST 2155	Introductory Statistical Learning for Health Sciences	2		
	BIOST 2160	Data Visualization for Health Data Science	3		
	BIOST 2162	Clinical Trials: Methods & Practice	3		
	BIOST 2165	Statistical Evaluation of Biomarkers & Classification Tools	3		
	BIOST 2168	Introduction to Causal Inference	3		
	BIOST 2174	Advanced R Computing	2		
	BIOST 3065	Analysis of Data with Missing Values	3		

### **Domain knowledge and Career Development Electives**

*At least **three (3) credits** taken outside BIOST:*

Completed	Course #	Course Name	Credits	Grade	Credit Transfer

### **Research/Dissertation Courses**

*3 credits of BIOST 3010 or 1 term of FTDR 3999*

☐ BIOST 3010

☐ FTDR 3999

### **Milestones**

#### **1. Doctoral Preliminary Evaluation (Qualifying Exam)**

Attempt	Theory	Applied	Overall	Date
First				
Second (if applicable)				

#### **2. Doctoral Overview/Prospectus \_\_\_\_\_**

3. Doctoral Comprehensive Exam \_\_\_\_\_

4. Admission Doctoral Candidacy \_\_\_\_\_

5. Manuscript Submitted \_\_\_\_\_

*At least one of the manuscripts, based on the dissertation and first authored by the student, must be submitted before the PhD dissertation defense.*

6. Dissertation Defense \_\_\_\_\_

7. Exit Survey \_\_\_\_\_

Term	Term GPA	Term Credits	CUM. GPA	CUM. Credits	IDP

**Notes**

# MS Degree Requirement Worksheet

Student:

PeopleSoft #:

Start Date:

Statute of Limitations:

Academic Advisor:

## Provisional Requirements

*For students accepted provisionally*

Completed	Provision	Credits	Term

## Course Requirements

*A minimum of 40 credits are required*

### Core (Required) Courses

Completed	Course #	Course Name	Credits	Grade	Credit Transfer	Waiver
	BIOST 2025	Biostatistics Seminar	1			
	BIOST 2081	Mathematical Methods for Statistics	3			
	BIOST 2131	Foundations of Statistical Theory	4			
	BIOST 2141	Biostatistical Methods	3			
	BIOST 2142	Applied Regression Analysis	3			
	BIOST 2143	Longitudinal and Clustered Data Analysis	3			
	BIOST 2150	Applied Survival Analysis: Methods and Practice	3			
	BIOST 2173	SAS for Data Management and Analysis (or SAS equiv.)*	2			
	BIOST 2179	Biostatistics Consulting Practicum**	1			
	EPIDEM 2110	Principles of Epidemiology	3			
	PUBHLT 2011	Essentials of Public Health	3			
	PUBHLT 2022	Public Health Grand Rounds	0			
			0			
	BIOST 2198	MS Thesis Preparation***	1			
	BIOST 2199	MS Thesis***	2			

\* A course in **SAS** with a minimum of 2 credits is required. Students may fulfill this requirement with EPID 2185 (offered in Fall) or another approved course that covers equivalent content in **SAS**, with advisor approval; [Exemption form](#) for BIOST 2173 will need to be filled out.

\*\* MS students should enroll after completing as many Biostatistics core courses as possible and no sooner than passing the MS comprehensive exam.

\*\*\* After successfully completing the MS Comprehensive Examination, students must enroll in a total of three credits across two semesters: BIOST 2198 (1 credit) in the penultimate semester to develop the thesis topic, and BIOST 2199 (2 credits) in the final semester to complete the thesis.

### Electives

Students must complete BIOST elective credits to bring the total number of course credits to 40. Students must choose at least **eight (8) credits** of elective courses from the list provided below. In situations where a student's special interests or needs indicate an alternative course outside of the department is more appropriate it may be substituted with the permission of the student's academic advisor. Additional Biostatistics Seminar (BIOST 2025) credits cannot be used to fulfill elective credits.

Completed	Course #	Course Name	Credits	Grade	Credit Transfer
	BIOST 2067	Applied Meta-Analysis	1		
	BIOST 2080	Advanced Statistical Learning	2		
	BIOST 2146	Introduction to Health Data Science	3		
	BIOST 2151	Bayesian Data Science	3		
	BIOST 2154	Statistical Methods for Omics Data	2		
	BIOST 2155	Intro Stat Learning for Health Sciences	2		
	BIOST 2160	Data Visualization for Health Data Science	3		
	BIOST 2162	Clinical Trials: Methods and Practice	3		
	BIOST 2165	Statistical Evaluation of Biomarkers and Classification Tools	3		
	BIOST 2168	Introduction to Causal Inference	3		
	BIOST 2174	Advanced R Computing	2		

### MS Comprehensive Examination

Attempt	Date	Result
First		
Second (if applicable)		

### MS Thesis/Capstone

	Date	Result
Defense Presentation		

Term	Term GPA	Term Credits	CUM. GPA	CUM. Credits

### Notes

# MS HDS Degree Requirement Worksheet

Student:

PeopleSoft #:

Start Date:

Statute of Limitations:

Academic Advisor:

## Provisional Requirements

*For students accepted provisionally*

Completed	Provision	Credits	Term

## Course Requirements

*A minimum of 40 credits are required*

### Core (Required) Courses

Completed	Course #	Course Name	Credits	Grade	Credit Transfer	Waiver
	BIOST 2025	Biostatistics Seminar	1			
	BIOST 2081	Mathematical Methods for Statistics	3			
	BIOST 2131	Foundations of Statistical Theory	4			
	BIOST 2141	Biostatistical Methods	3			
	BIOST 2142	Applied Regression Analysis	3			
	BIOST 2146	Introduction to Health Data Science	3			
	BIOST 2155	Introductory Statistical Learning for Health Sciences	2			
	BIOST 2160	Data Visualization for Health Data Science	3			
	BIOST 2179	Biostatistics Consulting Practicum*	1			
	EPIDEM 2110	Principles of Epidemiology	3			
	PUBHLT 2011	Essentials of Public Health	3			
	PUBHLT 2022	Public Health Grand Rounds	0			
			0			
	BIOST 2198	MS Thesis Preparation**	1			
	BIOST 2199	MS Thesis**	2			

\* MS students should enroll after completing as many Biostatistics core courses as possible and no sooner than passing the MS comprehensive exam.

\*\* After successfully completing the MS Comprehensive Examination, students must enroll in a total of three credits across two semesters: BIOST 2198 (1 credit) in the penultimate semester to develop the thesis topic, and BIOST 2199 (2 credits) in the final semester to complete the thesis.

## HDS Electives

Students must complete HDS elective credits to bring the total number of course credits to 40. Students must choose at least **eight (8) credits** of elective courses from the list provided below. In situations where a student's special interests or needs indicate an alternative course outside of the department is more appropriate it may be substituted with the permission of the student's academic advisor. Additional Biostatistics Seminar (BIOST 2025) credits cannot be used to fulfill elective credits.

Completed	Course #	Course Name	Credits	Grade	Credit Transfer
	BIOST 2080	Advanced Statistical Learning	2		
	BIOST 2151	Bayesian Data Science	3		
	BIOST 2173	SAS for Data Management & Analysis	2		
	BMIS 2542	Data Programming Essentials with Python	3		
	BMIS 2588	Data Base Management	3		
	INFSCI 2160	Data Mining	3		
	INFSCI 2410	Introduction to Neural Networks	3		
	INFSCI 2595	Machine Learning	3		
	INFSCI 2725	Data Analytics (Prior R, Java, or Python programming experience required)	3		
	PHARM 5834	Python for Data Management and Analytics	3		
	STAT 2270	Data Mining	3		

#### **MS Comprehensive Examination**

Attempt	Date	Result
First		
Second (if applicable)		

#### **MS Thesis/Capstone**

	Date	Result
Defense Presentation		

Term	Term GPA	Term Credits	CUM. GPA	CUM. Credits

#### **Notes**

# MS SCG Degree Requirement Worksheet

Student:

PeopleSoft #:

Start Date:

Statute of Limitations:

Academic Advisor:

## Provisional Requirements

*For students accepted provisionally*

Completed	Provision	Credits	Term

## Course Requirements

*A minimum of 40 credits are required*

### Core (Required) Courses

Completed	Course #	Course Name	Credits	Grade	Credit Transfer	Waiver
	BIOST 2025	Biostatistics Seminar	1			
	BIOST 2081	Mathematical Methods for Statistics	3			
	BIOST 2131	Foundations of Statistical Theory	4			
	BIOST 2141	Biostatistical Methods	3			
	BIOST 2142	Applied Regression Analysis	3			
	BIOST 2154	Statistical Methods for Omics Data	2			
	BIOST 2155	Introductory Statistical Learning for Health Sciences	2			
	BIOST 2160	Data Visualization for Health Data Science	3			
	BIOST 2179	Biostatistics Consulting Practicum*	1			
	EPIDEM 2110	Principles of Epidemiology	3			
	PUBHLT 2011	Essentials of Public Health	3			
	PUBHLT 2022	Public Health Grand Rounds	0			
			0			
	BIOST 2198	MS Thesis Preparation**	1			
	BIOST 2199	MS Thesis**	2			

\* MS students should enroll after completing as many Biostatistics core courses as possible and no sooner than passing the MS comprehensive exam.

\*\* After successfully completing the MS Comprehensive Examination, students must enroll in a total of three credits across two semesters: BIOST 2198 (1 credit) in the penultimate semester to develop the thesis topic, and BIOST 2199 (2 credits) in the final semester to complete the thesis.

### SCG Electives



Students must complete SCG elective credits to bring the total number of course credits to 40. Students must choose at least **nine (9) credits** of elective courses from the list provided below. In situations where a student's special interests or needs indicate an alternative course outside of the department is more appropriate it may be substituted with the permission of the student's academic advisor. Additional Biostatistics Seminar (BIOST 2025) credits cannot be used to fulfill elective credits.

Completed	Course #	Course Name	Credits	Grade	Credit Transfer
	BIOSC 2140	Genomics	2		
	BIOSC 2940	Molecular Biology	3		
	BIOST 2080	Advanced Statistical Learning	2		
	HUGEN 2020	Intro to Population Genetics and Genetic Epidemiology	3		
	HUGEN 2029	Introduction to Gene Mapping	3		
	HUGEN 2071	Genomic Data Processing & Structure	3		
	HUGEN 2072	Genomic Data Pipelines & Tools	3		
	HUGEN 2073	Genomic Data Visualization & Integration	3		
	HUGEN 2080	Statistical Genetics	3		

#### **MS Comprehensive Examination**

Attempt	Date	Result
First		
Second (if applicable)		

#### **MS Thesis/Capstone**

	Date	Result
Defense Presentation		

Term	Term GPA	Term Credits	CUM. GPA	CUM. Credits

#### **Notes**