

BIOMEDICAL DATA SCIENCE, PHD

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum degree requirements (<https://guide.wisc.edu/graduate/#requirements>) and policies (<https://guide.wisc.edu/graduate/#policies>), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

Face to Face	Evening/ Weekend	Online	Hybrid	Accelerated
Yes	No	No	No	No

Mode of Instruction Definitions

Accelerated: Accelerated programs are offered at a fast pace that condenses the time to completion. Students typically take enough credits aimed at completing the program in a year or two.

Evening/Weekend: Courses meet on the UW–Madison campus only in evenings and/or on weekends to accommodate typical business schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.

Face-to-Face: Courses typically meet during weekdays on the UW–Madison Campus.

Hybrid: These programs combine face-to-face and online learning formats. Contact the program for more specific information.

Online: These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.

CURRICULAR REQUIREMENTS

Requirement Detail

Minimum Credit Requirement	51 credits
Minimum Residence Credit Requirement	32 credits
Minimum Graduate Coursework Requirement	26 credits must be graduate-level coursework. Refer to the Graduate School: Minimum Graduate Coursework (50%) Requirement policy: https://policy.wisc.edu/library/UW-1244 (https://policy.wisc.edu/library/UW-1244/).
Overall Graduate GPA Requirement	3.00 GPA required. Refer to the Graduate School: Grade Point Average (GPA) Requirement policy: https://policy.wisc.edu/library/UW-1203 (https://policy.wisc.edu/library/UW-1203/).

Other Grade Requirements PhD candidates should maintain a 3.0 GPA in all core curriculum courses and may not have any more than two Incompletes on their record at any one time.

Assessments and Examinations Students must complete an Oral Preliminary Exam, ideally taken in the students' third year.

Language Requirements No language requirements.

Graduate School Breadth Requirement All doctoral students are required to complete a doctoral minor or graduate/professional certificate. Refer to the Graduate School: Breadth Requirement in Doctoral Training policy: <https://policy.wisc.edu/library/UW-1200> (<https://policy.wisc.edu/library/UW-1200/>).

REQUIRED COURSES

Code	Title	Credits
Core Topics		
<i>Biostatistics</i>		
Topic 1: Biostatistics Theory and Methods		
Students must complete the following:		
STAT 609	Mathematical Statistics I	3
Select one course from the following:		3-4
STAT 610	Introduction to Statistical Inference	
STAT/B M I 641	Statistical Methods for Clinical Trials	
STAT/B M I 642	Statistical Methods for Epidemiology	
STAT 771	Computational Statistics	
STAT/ECON/ GEN BUS 775	Bayesian Statistics	
STAT 849	Advanced Statistical Methods	
<i>Computer Science/Informatics</i>		
Students select one of the following sequences (Topics 2-5):		6-7
Topic 2: Machine Learning / AI		
COMP SCI 540 & COMP SCI/ E C E 760	Introduction to Artificial Intelligence and Machine Learning	
Topic 3: Database Systems		
COMP SCI 564 & COMP SCI 764	Database Management Systems: Design and Implementation and Topics in Database Management Systems	
Topic 4: Optimization		
COMP SCI/I SY E/ MATH/STAT 525 & COMP SCI/ I SY E/MATH/ STAT 726	Linear Optimization and Nonlinear Optimization I	
Topic 5: Algorithms		
COMP SCI 577 & COMP SCI 787	Introduction to Algorithms and Advanced Algorithms	
<i>Additional Specializations</i>		
Students select any of the above or following topics (Topics 1-10):		6-8
Topic 6: Clinical Informatics		
I SY E 417	Health Systems Engineering	

COMP SCI/
E C E 760 Machine Learning
or COMP SCI 768 Advanced Natural Language Processing

Topic 7: Clinical Biostatistics

B M I/STAT 641 Statistical Methods for Clinical Trials
& STAT/B M I 642
and Statistical Methods for
Epidemiology

Topic 8: Statistical Computing

Students take the following courses:

STAT 771 Computational Statistics
STAT/ECON/
GEN BUS 775 Bayesian Statistics

Topic 9: Bioinformatics / Statistical Genomics

Select two of the following courses:

B M I/
COMP SCI 576 Introduction to Bioinformatics
B M I/STAT 620 Statistics in Human Genetics
B M I/
COMP SCI 775 Computational Network Biology
B M I/
COMP SCI 776 Advanced Bioinformatics
B M I/STAT 877 Statistical Methods for Molecular
Biology

Topic 10: Biomedical Image Analysis

Select two of the following courses:

COMP SCI 765 Data Visualization
COMP SCI/
E C E 766 Computer Vision
B M I/
COMP SCI 767 Computational Methods for Medical
Image Analysis
B M I/STAT 768 Statistical Methods for Medical
Image Analysis

Biology Courses

Students consult with their advisor to select courses. 6
Possible options listed below.

POP HLTH 750 Cancer Epidemiology
POP HLTH 752 Principles of Population Health:
Determinants of Health and Health
Disparities
POP HLTH 753 Principles of Population Health:
Population Health and Healthcare
Systems
POP HLTH 795 Principles of Population Health
Sciences
POP HLTH/
SOC 797 Introduction to Epidemiology
POP HLTH 801 Epidemiology of Infectious Diseases
POP HLTH 805 Advanced Epidemiology: Causal
Inference in Epidemiological Studies
POP HLTH 847 Cardiovascular Epidemiology
POP HLTH/
AN SCI/
GENETICS 849 Genomic Epidemiology
MICROBIO 303 Biology of Microorganisms

MICROBIO 450 Diversity, Ecology and Evolution of
Microorganisms

MICROBIO 526 Physiology of Microorganisms

BIOCHEM 501 Introduction to Biochemistry

GENETICS 466 Principles of Genetics

GENETICS 467 General Genetics 1

GENETICS 468 General Genetics 2

GENETICS/
MD GENET 565 Human Genetics

GENETICS/
BIOCHEM/
MD GENET 620 Eukaryotic Molecular Biology

GENETICS/
CHEM 626 Genomic Science

GENETICS 633 Population Genetics

GENETICS/
MD GENET 662 Cancer Genetics

GENETICS/
MD GENET 677 Advanced Topics in Genetics

Research Ethics Course

To be completed by the end of year two. B M I 738 is 1-2
recommended. If a student is unable to take B M I 738, one
of the courses in the Alternatives list may be substituted.

B M I 738 Ethics for Data Scientists
(recommended)

Alternatives

BIOCHEM 729 Advanced Topics (Topic:
Responsible Conduct of Research)
NURSING 802 Ethics and the Responsible Conduct
of Research
PATH-BIO/
COMP BIO 812 Research Ethics and Career
Development
OBS&GYN 955 Responsible Conduct of Research
for Biomedical Graduate Students
OBS&GYN 956 Advanced Responsible Conduct of
Research for Biomedical Students
MED HIST 950 Responsible Conduct of Research

Professional Development Elective

B M I 800 Becoming a Biomedical Data 1
Scientist

Second-Year Literature Seminar

B M I 881 Biomedical Data Science Scholarly 2
Literature 1

Third-Year Professional Skills Seminar

B M I 883 Biomedical Data Science 2
& B M I 884 Professional Skills 1
and Biomedical Data Science
Professional Skills 2

Electives

Electives are selected in consultation with the student's 6
faculty advisor.

Pre-Dissertator Research

At least two rotations (4-6 credits in following course), 4-6
each spanning 4 weeks during the fall semester need to be
completed.

B M I 899 Pre-dissertator Research

Additional Coursework

Students take additional research and elective credits to satisfy minimum credit requirement. 4-11

Total Credits **51**