BIOMEDICAL DATA SCIENCE, PHD

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (http://guide.wisc.edu/graduate/#policiesandrequirementstext), 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		
Biostatistics		*6-8*
Students select one of the following (Topics 1-2):		
Topic 1: Biostatistics Theory and Methods		
STAT 609 & STAT 610	Mathematical Statistics I and Introduction to Statistical Inference	
Topic 2: Biostatistical Methods		
STAT 849 & STAT 850	Theory and Application of Regression and Analysis of Variance I and Theory and Application of Regression and Analysis of Variance II	
Computer Science/Informatics		*6-7*
Students select one of the following (Topics 3-6):		
Topic 3: Machine Learning / AI		
COMP SCI 540 & COMP SCI/ E C E 760	Introduction to Artificial Intelligence and Machine Learning	
Topic 4: Database Systems		
COMP SCI 564 & COMP SCI 764	Database Management Systems: Design and Implementation and Topics in Database Management Systems	
Topic 5: Optimization		
COMP SCI/I SY E/ MATH/STAT 525 & COMP SCI/ I SY E/MATH/ STAT 726	Linear Optimization and Nonlinear Optimization I	
Topic 6: Algorithms		
COMP SCI 577 & COMP SCI 787	Introduction to Algorithms and Advanced Algorithms	
Additional Specializations		*6-8*
Students select any of the above or following topics (Topics 1-11):		
Topic 7: Clinical Informatics		
I SY E 417	Health Systems Engineering	
COMP SCI/ E C E 760	Machine Learning	

or COMP SCI 76	Advanced Natural Language Processing	
Topic 8: Clinical Biostatistics		
B M I/STAT 641 & STAT/B M I 642	Statistical Methods for Clinical Trials and Statistical Methods for Epidemiology	
Topic 9: Statistical Computing		
Students take the following courses:		
STAT 771	Statistical Computing	
STAT/ECON/ GEN BUS 775	Introduction to Bayesian Decision and Control I	
Topic 10: Bioinformatics / Statistical Genomics		
Select two of the following courses:		
B M I/ COMP SCI 576	Introduction to Bioinformatics	
B M I/ COMP SCI 776	Advanced Bioinformatics	
B M I/STAT 877	Statistical Methods for Molecular Biology	
Topic 11: 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		**6**
Students consult with their advisor to select courses. 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	Genetic 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		**1-2**
B M I 738	Ethics for Data Scientists	
B M I 738 is recommended. If a student is unable to take B M I 738, one of the following courses may be substituted.		
ONCOLOGY 715	Ethics in Science	
BIOCHEM 729	Advanced Topics (Topic: Responsible Conduct of Research)	
NURSING 802	Ethics and the Responsible Conduct of Research	
SURG SCI 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	
Professional Development Elective		
B M I 800	Becoming a Biomedical Data Scientist	1
Second-Year Literature Seminar		
B M I 881	Biomedical Data Science Scholarly Literature 1	2
Third-Year Professional Skills Seminar		
B M I 883 & B M I 884	Biomedical Data Science Professional Skills 1 and Biomedical Data Science Professional Skills 2	2
Electives		**6**
Electives are selected in consultation with the student's faculty advisor.		
Pre-Dissertator Research		**6**
Three semester#long research rotations (2 credits of B M I 899 Pre-dissertator Research per semester) concerning a substantive problem in biomedical data science, advised by a program faculty member in collaboration with a UW faculty member from the biological, biomedical, or population health sciences.		
Students take additional research and elective credits to reach 51 credits.		
Total Credits		**51**