

BIOMEDICAL DATA SCIENCE, MS

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	30 credits
Minimum Residence Requirement	16 credits
Minimum Graduate Coursework Requirement	15 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: Students must earn a B or above in all core curriculum coursework.

Assessments and Examinations: No formal examination required.

Language Requirements: No language requirements.

REQUIRED COURSES

Code	Title	Credits
Concentration Electives		
In consultation with their faculty advisor, students will select electives in an area of concentration within biomedical data science. Examples include but are not limited to:		12
I SY E 517	Decision Making in Health Care	
B M I/STAT 541	Introduction to Biostatistics	
or B M I/POP HLTH 551	Introduction to Biostatistics for Population Health	
or STAT/F&W ECOL 571	Statistical Methods for Bioscience I	
B M I/POP HLTH 552	Regression Methods for Population Health	
B M I/COMP SCI 567	Biomedical Image Analysis	
STAT/F&W ECOL 572	Statistical Methods for Bioscience II	
B M I 573	Foundations of Data-Driven Healthcare	
B M I/COMP SCI 576	Introduction to Bioinformatics	
B M I/BIOCHEM/BMOLCHEM/MATH 609	Mathematical Methods for Systems Biology	
B M I/STAT 620	Statistics in Human Genetics	
B M I/STAT 641	Statistical Methods for Clinical Trials	
B M I/STAT 642	Statistical Methods for Epidemiology	
B M I/POP HLTH 651	Advanced Regression Methods for Population Health	
B M I/STAT 741	Survival Analysis Theory and Methods	
B M I/COMP SCI 767	Computational Methods for Medical Image Analysis	
B M I/STAT 768	Statistical Methods for Medical Image Analysis	
B M I 773	Clinical Research Informatics	
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	

Data Science Electives

In consultation with their faculty advisor, students will select electives in computer science and/or statistics. Examples include but are not limited to:

STAT 609	Mathematical Statistics I	12
STAT 610	Introduction to Statistical Inference	
STAT 627	Professional Skills in Data Science	
STAT 771	Computational Statistics	
STAT 849	Advanced Statistical Methods	
STAT 850		
COMP SCI/ E C E 766	Computer Vision	
COMP SCI/E C E/ I SY E 524	Introduction to Optimization	
COMP SCI/E C E/ M E 532	Matrix Methods in Machine Learning	
COMP SCI 544	Introduction to Big Data Systems	
COMP SCI 571	Building User Interfaces	
COMP SCI/I SY E/ MATH/STAT 726	Nonlinear Optimization I	
COMP SCI 744	Big Data Systems	
COMP SCI 762	Advanced Deep Learning	
COMP SCI 765	Data Visualization	
COMP SCI 784	Foundations of Data Management	
COMP SCI 564	Database Management Systems: Design and Implementation	
COMP SCI 764	Topics in Database Management Systems	
COMP SCI 570	Introduction to Human-Computer Interaction	
COMP SCI/ ED PSYCH/ PSYCH 770	Human-Computer Interaction	
COMP SCI 540	Introduction to Artificial Intelligence	
COMP SCI/ E C E 760	Machine Learning	
COMP SCI/ E C E 761	Mathematical Foundations of Machine Learning	
COMP SCI 769	Advanced Natural Language Processing	
COMP SCI/I SY E/ MATH 425	Introduction to Combinatorial Optimization	
COMP SCI/I SY E/ MATH/STAT 525	Linear Optimization	
COMP SCI 642	Introduction to Information Security	

Research Ethics Course

The following is recommended: 1-2

B M I 738	Ethics for Data Scientists
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

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

Professional Development Elective

B M I 800	Becoming a Biomedical Data Scientist	1
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Research

Complete 4 credits of following:		4
B M I 699	Independent Study	

Total Credits **30**

Electives

Between the Concentration Electives and Data Science Electives, students must complete at least 6 credits of computer sciences-oriented courses and 6 credits of statistics-oriented courses. Computer sciences-oriented courses include those in the Department of Computer Sciences course listing (COMP SCI (https://guide.wisc.edu/courses/comp_sci/)). Statistics-oriented courses include those in the Department of Statistics course listing (STAT (<https://guide.wisc.edu/courses/stat/>)), in addition to B M I/POP HLTH 552 Regression Methods for Population Health **and** B M I/POP HLTH 651 Advanced Regression Methods for Population Health . A specific section of B M I 826 Special Topics in Biostatistics and Biomedical Informatics can satisfy as either a computer sciences-oriented course or a statistics-oriented course at the discretion of the MS Program Steering Committee.