BIOMEDICAL DATA SCIENCE, M.S.

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	31 credits
Minimum Residence Credit Requirement	16 credits
Minimum Graduate Coursework Requirement	16 credits must be graduate-level coursework. Details can be found in the Graduate School's Minimum Graduate Coursework (50%) policy (https://policy.wisc.edu/library/UW-1244 (https://policy.wisc.edu/library/UW-1244/)).
Overall Graduate GPA Requirement	3.00 GPA required. This program follows the Graduate School's 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 [1]		**12**
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:		
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/ HORT 571	Statistical Methods for Bioscience I	
B M I/ POP HLTH 552	Regression Methods for Population Health	
B M I/ COMP SCI 567	Medical Image Analysis	
STAT/F&W ECOL/ HORT 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	
I SY E/B M I 617	Health Information Systems	
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 [1]		**12**

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
STAT 610	Introduction to Statistical Inference
STAT 627	Professional Skills in Data Science
STAT 771	Statistical Computing
STAT 849	Theory and Application of Regression and Analysis of Variance I
STAT 850	Theory and Application of Regression and Analysis of Variance II
COMP SCI 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 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	**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
Research [2]	**3-6**
B M I 699	Independent Study
Electives	**0-3**
Additional elective credits are not required if student completes two semesters (6 credits) of research.	
Total Credits	**31**

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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). Statistics-oriented courses include those in the Department of Statistics course listing (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 count as either a computer sciences-oriented course or a statistics-oriented course at the discretion of the MS Program Steering Committee.

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Students who take only 3 credits of research may need an additional electives course to reach the program minimum requirement.