DATA SCIENCE, CERTIFICATE

Students in the data science certificate will develop abilities such as data management, reproducibility, modeling strategies, and ethical considerations of data science to be paired with their knowledge gained from their major or domain area. The certificate is a great fit for students who like programming, want to learn data analysis, and seek to be high-end users of data science tools in domain areas. Data science is one of the fastest growing career sectors in Wisconsin and across the nation.

By its very nature, the field of data science is one that teaches novel and cutting-edge ways to engage in the "continual sifting and winnowing by which alone the truth can be found."

HOW TO GET IN

Students are eligible to declare the certificate at any point in their studies. They should declare it as early as possible to plan the required coursework. See the departmental website (https://stat.wisc.edu/data-science-certificate/) for information about how to declare.

Students declared in the Data Science major and Engineering Data Analytics Certificate are not eligible to declare the Data Science certificate.

REQUIREMENTS

REQUIREMENTS FOR THE CERTIFICATE IN DATA SCIENCE

The certificate requires a minimum of 16 credits.

Code	Title	Credits
Foundation Courses		**10-12**
L I S 461	Data and Algorithms: Ethics and Policy	3-4
Complete two courses from		*7-8*
COMP SCI 220	Data Science Programming I [1]	
or COMP SCI 32	Data Science Programming II	
STAT 240	Data Science Modeling I	
E C E 204	Data Science & Engineering	
Elective Courses		**6**
Complete a minimum of 6 credits of electives, including at least 3 credits from the Fundamental Electives list.		
Fundamental Electives		*3-6*
BIOCORE 382	Evolution, Ecology, and Genetics Laboratory	
BIOCORE 384	Cellular Biology Laboratory	
BIOCORE 486	Principles of Physiology Laboratory	
COMP SCI 320	Data Science Programming II [1]	
COMP SCI/E C E/ M E 532	Matrix Methods in Machine Learning	
COMP SCI 544	Introduction to Big Data Systems	
COMP SCI/ B M I 576	Introduction to Bioinformatics	
ECON 315	Data Visualization for Economists	
ECON 400	Introduction to Applied Econometrics	
ECON 410	Introductory Econometrics	
ECON 460	Economic Forecasting	
ECON 570	Fundamentals of Data Analytics for Economists	
ECON 695	Topics in Economic Data Analysis	
ED PSYCH 551	Quantitative Ethnography	
FINANCE 310	Data Analytics for Finance	
GEOG 378	Introduction to Geocomputing	
GEOG 573	Advanced Geocomputing and Geospatial Big Data Analytics	
GEOG 574	Geospatial Database Design and Development	
GEOG 579	GIS and Spatial Analysis	
I SY E 412	Fundamentals of Industrial Data Analytics	
I SY E 521	Machine Learning in Action for Industrial Engineers	
MATH 535	Mathematical Methods in Data Science	
SOC 362	Statistics for Sociologists III	
STAT 340	Data Science Modeling II	
STAT 405	Data Science Computing Project	
STAT 436	Statistical Data Visualization	
STAT/ COMP SCI 471	Introduction to Computational Statistics	
Domain Electives		*0-3*
A A E/ECON 421	Economic Decision Analysis	
BIOCHEM 570	Computational Modeling of Biological Systems	
COMP SCI/E C E/ I SY E 524	Introduction to Optimization	
GEN BUS 307	Business Analytics II	
INFO SYS 322	Introduction to Databases	
SOC 351	Introduction to Survey Methods for Social Research	

RESIDENCE AND QUALITY OF WORK

- Minimum 2.000 GPA on all certificate courses
- At least 9 credits must be taken in residence at UW-Madison

FOOTNOTES

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COMP SCI 320 may count toward either the Foundation Courses or Fundamental Electives requirement, but not both.

CERTIFICATE COMPLETION REQUIREMENT

This undergraduate certificate must be completed concurrently with the student's undergraduate degree. Students cannot delay degree completion to complete the certificate.

LEARNING OUTCOMES

1. Apply tools and processes necessary for data management and reproducibility.
2. Produce meaning from data employing modeling strategies.
3. Learn best practices related to data science concepts and methods.
4. Articulate policy, privacy, security and ethical considerations in data science projects.

ADVISING AND CAREERS

LOOKING FOR DATA SCIENCE ADVISING?

Students who are interested in data science academic advising should check out the advising information on our website (https://stat.wisc.edu/data-science-certificate/) or send an email to dscert@stat.wisc.edu.

WHAT DO DATA SCIENTISTS DO?

Data Scientists are trained to manage, process, model, gain meaning and knowledge, and present data. These skills can be employed in a wide variety of different sectors of employment. Examples of interests of our students include finance, banking, sports analytics, marketing, retail, humanities, psychology, biosciences, healthcare, and consulting, just to name a few. Students are encouraged to combine data science with majors, certificates, and courses from differing areas to best be able to apply their data science in the area of their choosing.

Data science is one of the fastest growing area of jobs in the U.S. and in Wisconsin. All of the major job search engines regularly list thousands of jobs, for example, in 2018 Data Scientist was the #1 job on the web site Glassdoor with over 25,000 jobs, Monster.com listed over 12,000 jobs in data science nationally, and Indeed.com had over 1,000 jobs for data analysts just in the state of Wisconsin.

Additionally, the Occupational Outlook Handbook (OOH) from the Bureau of Labor Statistics shows the job growth outlook from 2016-26 for Mathematicians and Statisticians to be 33% (much faster than average) and for Computer and Information Research Scientists to be 19% (much faster than average).

Some students may want to continue to develop additional advanced data science skills through graduate education.

L&S CAREER RESOURCES

Every L&S major opens a world of possibilities. SuccessWorks (https://successworks.wisc.edu/) at the College of Letters & Science helps students turn the academic skills learned in their major, certificates, and other coursework into fulfilling lives after graduation, whether that means jobs, public service, graduate school or other career pursuits.

In addition to providing basic support like resume reviews and interview practice, SuccessWorks offers ways to explore interests and build career skills from their very first semester/term at UW all the way through graduation and beyond.

Students can explore careers in one-on-one advising, try out different career paths, complete internships, prepare for the job search and/or graduate school applications, and connect with supportive alumni and even employers in the fields that inspire them.

- SuccessWorks (https://careers.ls.wisc.edu/)
- Set up a career advising appointment (https://successworks.wisc.edu/make-an-appointment/)
- Enroll in a Career Course (https://successworks.wisc.edu/career-courses/) - a great idea for first- and second-year students:
  - INTER-LS 210 L&S Career Development: Taking Initiative (1 credit)
  - INTER-LS 215 Communicating About Careers (3 credits, fulfills Comm B General Education Requirement)
- Learn about internships and internship funding (https://successworks.wisc.edu/finding-a-job-or-internship/)
  - INTER-LS 260 Internship in the Liberal Arts and Sciences
- Activate your Handshake account (https://successworks.wisc.edu/handshake/) to apply for jobs and internships from 200,000+ employers recruiting UW-Madison students
- Learn about the impact SuccessWorks has on students' lives (https://successworks.wisc.edu/about/mission/)

PEOPLE

ADVISING STAFF

Information regarding the Data Science advisors and how to make appointment can be found on the program page (https://stat.wisc.edu/data-science-certificate/).

DATA SCIENCE MAJOR PROGRAM COMMITTEE

- Tyler Caraza-Harter (Computer Sciences)
- Michael Ferris (Computer Sciences)
- B. Ian Hutchins (iSchool)
- Bret Larget, Program Director (Statistics), committee chair
- Sebastien Roch (Mathematics)
- Sara Rodock (Statistics), advising representative