

Department of Statistics & Actuarial Science

The University of Iowa is home to over 29,598 students. In the spring of 2021, the College of Liberal Arts had 13,555 students enrolled.

Currently our department has 100 undergraduate students who have declared actuarial science or actuarial science interest, 54 students have declared statistics, and 32 students in data science.



Department of Statistics & Actuarial Science

Declared Majors- Spring 2022

UI Official Count
Day: 02/01/2022

Graduate Students			
Total Number in Graduate Program	USA	International	Total
	16	23	39
PhD Students			
1st Year	0	0	0
Continuing Students	5	11	16
MS Statistics Students			
1st Year	5	6	11
Continuing Students	2	4	6
MS Actuarial Science Students			
1st Year	3	2	5
Continuing Students	1	0	1
Undergraduate Students			
Total Number in Undergraduate Program Declared	USA	International	Total
Total Number	244	35	279
Statistics Undergraduates			
Primary Program Declared	USA	International	Total
Mathematical Statistics	20	2	22
Statistical Computing and Data Science	13	6	19
Business, Industry, Government and Research	11	2	13
Total Primary Declared	44	10	54
Secondary Program Declared	USA	International	Total
Mathematical Statistics	26	5	31
Statistical Computing and Data Science	5	0	5
Business, Industry, Government and Research	11	2	13
Total Secondary Declared	42	7	49
Actuarial Science			
Primary Program Declared	USA	International	Total
	41	6	47
Secondary Program Declared	USA	International	Total
	4	1	5
	42	7	49
Actuarial Science Interest			
Primary Program Declared	USA	International	Total
	28	1	29
Secondary Program Declared	USA	International	Total
	20	2	22
	48	3	51
Data Science Students			
Primary Program Declared	USA	International	Total
	22	3	25
Secondary Program Declared	USA	International	Total
	6	1	7
	28	4	32
Additional Undergraduate Students			
Statistics Minors Declared	USA	International	Total
	40	4	44

Note: Gender count is not available. The University of Iowa recognizes 8 gender categories.



Program Overview, Updated February 7, 2022

Chair, Department of Statistics and Actuarial Science
Kung-Sik Chan

Director of Undergraduate Studies, Data Science
Sanvesh Srivastava

The B.S. in data science produces graduates with the sophisticated analytical and computational skills required to thrive in a quantitative world where new problems are encountered at an ever-increasing rate. The major emphasizes the statistical/probabilistic and algorithmic methods that underlie the preparation, analysis, and communication of complex data. With focus on technical foundations, the data science program promotes skills useful for creating and implementing new or special-purpose analysis and visualization tools. It also promotes a fundamental understanding of how to best handle uncertainty when making data-driven decisions.

Program Overview

- ▶ Students develop data preparation skills including writing software to obtain, extract, merge, clean, and/or transform the raw data. Analysis or information extraction methods include machine and statistical learning, statistical modeling and inference, and algorithm efficiency analysis. Data visualization, report writing, and oral presentations are important communication methods. The major includes two capstone courses that emphasize communication, ethics, and teamwork.
- ▶ The Department of Statistics and Actuarial Science and the Department of Computer Science collaborate to offer the major in data science. The B.S. in data science is administered by the Department of Statistics and Actuarial Science.

Learning Outcomes

► Graduates will be able to:

understand issues associated with data collection, management, provenance, storage, merging, sharing, and preparation;

work with multiple-source, multiple-format data;

investigate the quality of the data; and

have a basic understanding of ethical and confidentiality issues associated with data collection, storage, merging, and sharing

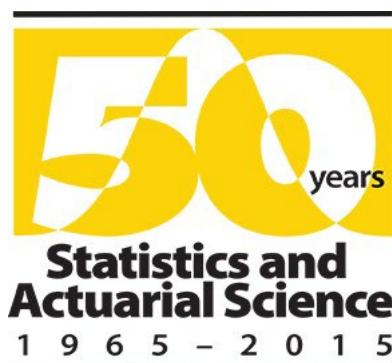
► Computational Skills

use critical thinking skills to translate substantive questions into well-defined computational problems and choose appropriate computational techniques for a given problem;

understand the foundational software skills and associated algorithmic and computational problem-solving methods used in computer science;

be proficient in computational methods for collecting, managing, storing, preparing, sharing, and describing data numerically and graphically from a variety of sources to design and carry out basic simulation studies; and

use professional statistical software and understand the principles of programming and algorithmic problem solving that underlie these packages.



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Learning Outcomes, cont.

► Statistical/Probabilistic Skills

use critical thinking skills to translate substantive questions into well-defined statistical or probability problems and choose the appropriate graphical or numerical descriptive and/or inferential statistical techniques for a given problem;

understand the importance of, and issues related to, the choice of the study design, such as designed experiment vs. probability sample vs. convenience sample, used to produce data;

understand that uncertainty, variability, and randomness play significant roles in data-driven decision making;

understand how to measure and display uncertainty, the effect of randomness, confidence/credibility, and the likelihood of incorrect inferences;

understand and be able to explain common misperceptions, paradoxes, and fallacies of probability and statistics; and

understand basic regression, prediction, simulation, and visualization methods.

► Mathematical Skills

have a firm grasp of the mathematical tools underlying statistical and computational methods which are primarily based on ideas in calculus, linear algebra, and discrete mathematics, including distribution theory, uncertainty quantification (e.g., probability theory), the probabilistic basis of formal statistical inference, models, and algorithms, and combinatorial analysis and recursion, which are used for algorithmic analysis, design, and for distribution theory.

► Communication Skills

clearly justify and communicate study results to a nontechnical audience;

write accurate and meaningful reports that describe the statistical and computational analyses and summarize important findings; and

work effectively as part of a team to address substantive questions that can be handled using statistical and computational methods.

Requirements for a Bachelor's Degree

The College of Liberal Arts and Sciences awards Bachelor of Arts (BA), Bachelor of Science (BS), Bachelor of Fine Arts (BFA), and Bachelor of Music (BM) degrees.

To earn a Bachelor's Degree, you must:

- Complete a minimum of 120 semester hours of credit towards graduation
- Satisfy the UI and CLAS residence requirement
- Complete the requirements of the General Education Program
- Complete a major
- Meet the College's academic standards

NOTE: Effective with spring 2021 registration for summer and fall 2021, all CLAS students must have a major declared by the time the student has earned 60 semester hours. In other words, a student who has earned 60 s.h. but does not have a major declared will not be able to register for summer or fall 2022.



Primary Faculty

Name	Phone	E-mail	Office
<u>Matthew Bognar</u> <i>Associate Professor of Instruction</i>	319-335-0799	<u>matthew- bognar@uiowa.edu</u>	358 SH
<u>Kung-Sik Chan</u> <i>Professor and DEO, Statistics and Actuarial Science Robert V. Hogg Professor Fellow, American Statistical Association Fellow, Institute of Mathematical Statistics</i>	319-335-2849	<u>kung-sik- chan@uiowa.edu</u>	241 SH
<u>Joyee Ghosh</u> <i>Associate Professor</i>	319-335-0816	<u>joyee- ghosh@uiowa.edu</u>	372 SH
<u>Jian Huang</u> <i>Professor Fellow, American Statistical Association</i>	319-335-0823	<u>jian- huang@uiowa.edu</u>	271 SH
<u>Joseph B. Lang</u> <i>Professor Fellow, American Statistical Association</i>	319-335-3129	<u>joseph- lang@uiowa.edu</u>	207 SH
<u>Erning Li</u> <i>Lecturer</i>	319-335-0820	<u>erning-li@uiowa.edu</u>	231 SH
<u>Ambrose Lo</u> <i>Associate Professor Fellow, Society of Actuaries Chartered Enterprise Risk Analyst</i>	319-335-1915	<u>ambrose- lo@uiowa.edu</u>	368 SH

Primary Faculty

<u>Lan Luo</u> <i>Assistant Professor</i>	319-467-1802	lan-luo@uiowa.edu	205 SH
<u>Elias S.W. Shiu</u> <i>Professor</i>	319-335-2580	elias-shiu@uiowa.edu	362 SH
<u>Nariankadu D. Shyamalkumar</u> <i>Associate Professor</i>	319-335-1980	shyamal-kumar@uiowa.edu	208 SH
<u>Sanvesh Srivastava</u> <i>Assistant Professor</i>	319-335-0824	sanvesh-srivastava@uiowa.edu	219 SH
<u>Osnat Stramer</u> <i>Associate Professor</i>	319-335-3182	osnat-stramer@uiowa.edu	370 SH
<u>Aixin Tan</u> <i>Director of Graduate Studies</i> <i>Associate Professor</i>	319-335-0821	aixin-tan@uiowa.edu	259 SH
<u>Luke Tierney</u> <i>Professor</i> <i>Ralph E. Wareham</i> <i>Professor of Mathematical Sciences</i> <i>Fellow, American Statistical Association</i> <i>Fellow, Institute of Mathematical Statistics</i>	319-335-3386	luke-tierney@uiowa.edu	209 SH
<u>Josh Zhiwei Tong</u> <i>Assistant Professor</i>	319-467-0160	zhiwei-tong@uiowa.edu	374 SH
<u>Boxiang Wang</u> <i>Assistant Professor</i>	319-335-2294	boxiang-wang@uiowa.edu	261 SH
<u>Blake Whitten</u> <i>Lecturer</i>	319-335-0647	blake-whitten@uiowa.edu	260 SH
<u>Dale Zimmerman</u> <i>Professor</i> <i>Fellow, American Statistical Association</i>	319-335-0818	dale-zimmerman@uiowa.edu	217 SH

Course Work

Prerequisite Courses

Students choose one of the following sequences.

Course List

Code	Title	Hours
These:		
MATH:1550	Engineering Mathematics I: Single Variable Calculus	4
MATH:1560	Engineering Mathematics II: Multivariable Calculus	4
MATH:2700	Introduction to Linear Algebra	4
Or these:		
MATH:1850	Calculus I	4
MATH:1860	Calculus II	4
MATH:2700	Introduction to Linear Algebra	4
MATH:2850	Calculus III	4

Core Courses

Course List

Code	Title	Hours
All of these:		
CS:1210	Computer Science I: Fundamentals	4
CS:2210	Discrete Structures	3
CS:2230	Computer Science II: Data Structures	4
CS:3330	Algorithms	3
STAT:2010	Statistical Methods and Computing	3
STAT:3100/IGPI:3100	Introduction to Mathematical Statistics I	3
STAT:3101/IGPI:3101	Introduction to Mathematical Statistics II	3
STAT:3200/IGPI:3200/ISE:3760	Applied Linear Regression	3

Course Work

Advanced Courses		
Course List		
Code	Title	Hours
Both of these:		
CS:4400	Database Systems	3
STAT:4580/IGPI:4580	Data Visualization and Data Technologies	3
One of these:		
CS:5430	Machine Learning	3
STAT:4540/IGPI:4540	Statistical Learning	3
Advanced Electives		
Course List		
Code	Title	Hours
Three of these, with at least one computer science course and one statistics course:		
CS:4440	Web Mining	3
CS:4470	Health Data Analytics	3
CS:4700/MATH:4860	High Performance and Parallel Computing	3
CS:5630	Cloud Computing Technology	3
STAT:3210	Experimental Design and Analysis	3
STAT:4520/IGPI:4522/PSQF:4520	Bayesian Statistics	3
STAT:4560	Statistics for Risk Modeling	3
STAT:5810/BIOS:5310/IGPI:5310	Research Data Management	3
Other advanced computer science or statistics courses approved by advisor		
Capstone Courses		
Course List		
Code	Title	Hours
Both of these:		
DATA:4880	Data Science Creative Component	1
DATA:4890	Data Science Practicum	2

Sample Program of Study for Data Science

Data Science Major – Sample Program of Study

