INTRODUCTION

Statistics is the science of data with a principled foundation in mathematics that has applications in many fields such as social sciences, engineering, business, biomedical sciences, and economics. The undergraduate statistics curriculum is a program of study leading to a Bachelor of Science degree in Statistical Science (STSC), offered by the Department of Mathematical and Statistical Sciences. This program includes the study of probability and statistical theory, along with the prerequisite foundational mathematics, especially calculus and linear algebra, and applications to practical real-world problems. Students will receive training in statistical reasoning, analysis of statistical studies, exploration of unstructured data, and development of the necessary skills for collaboration and teamwork.

CAREER OPPORTUNITIES

The undergraduate curriculum in Statistical Science produces graduates who are uniquely positioned for careers in combination with skills that are not exclusively mathematical. The goal is to equip students with quantitative skills that they can employ and build on in flexible ways. Some students will plan graduate work in statistics or other fields, while others will seek immediate employment after degree completion.

Such careers vary greatly depending upon individual interests but tend to involve the development and application of statistical models that can test theories and predict future actions in the real world. For example, a graduate working with a medical research team may develop models based on theories related to certain diseases and immunizations and use these models to predict the long term effects of a particular immunization program. Other graduates might find themselves involved in financial institutions, banks, or credit unions. Still, others find careers in pharmaceutical companies, insurance providers, or even "Silicon Valley" type technology companies. Indeed, the list seems endless with opportunities in both large and small corporations, which can in fact, lead to the creation of a graduate's own consulting business.

ADVISING and PRE-REGISTRATION

A student planning to complete a major in statistics should enroll in COSC 1010[1] and MATH 1450[2] in the first semester of his or her freshman year and MATH 1455[3] in the second semester. As soon as he or she has decided to major in Statistical Science, the student should complete and submit the Arts and Sciences major declaration form to the Department of Mathematical and Statistical Science office (room #340 of Cudahy Hall) in order to formally declare the major and be assigned a departmental advisor. From this time on the student meets with the advisor to discuss

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[1] Upon request, 4 credits for COSC 1010 will be awarded to those students who scored a 4 or 5 on their Advanced Placement (AP) Computer Science A test.

[2] Upon request, 4 credits for MATH 1450 will be awarded to those students who scored a 4 or 5 on their Advanced Placement (AP) Calculus AB test or who scored a 3, 4, or 5 on their AP Calculus BC test.

[3] Upon request, 4 credits for MATH 1455 will be awarded to those students who scored a 4 or 5 on their AP Calculus BC test.

course selections for the next semester and general academic progress, as well as to receive access to pre-registration through Checkmarq.

STUDENT LEARNING OUTCOMES

By the end of the program of study, the student will be able to:
1. Use mathematical and probabilistic reasoning to draw conclusions from data and make inference.
2. Use data to build models for real world complex systems and provide description, interpretation and exploratory analysis of the data by graphical and other means.
3. Incorporate statistical software, computing and programming tools to manage, visualize, and interpret data of all kinds.
4. Communicate effectively in writing and verbally to both technical and non-technical audiences.
5. Be an acknowledged part of a community of learners and scholars benefitting from shared experiences both inside and outside the classroom where learning is accepted and nurtured between peers and between students and faculty members.

REQUIREMENTS FOR THE STATISTICAL SCIENCE MAJOR

R E Q U I R E D   C O U R S E W O R K

All students must take the following eleven courses:

COSC 1010	Introduction to Computer Programming	4 Credits
MATH 1450	Calculus 1	4 Credits
MATH 1455	Calculus 2	4 Credits
MATH 2100	Discrete Mathematics	3 Credits
	(Or MATH 2350 Foundations of Mathematics, 3 Credits)	
MATH 2440	Calculus 3	4 Credits
MATH 3100	Linear Algebra & Matrix Theory	3 Credits
MATH 3700	An Introduction to Modeling with Simul. and Sci. Computing	3 Credits
MATH 4700	Theory of Probability	3 Credits
MATH 4710	Mathematical Statistics	3 Credits
MATH 4720	Statistical Methods	3 Credits
	(Or MATH 4740 Biostatistical Methods and Models)	
MATH 4750	Statistical Computing[4]	3 Credits
	(Or MATH 4760 Time Series Analysis*)	
MATH 4780	Regression Analysis	3 Credits
	Subtotal	36 Credits

Two of the following courses:

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[4] Alternate years.

MATH 3570	Introduction to Data Science	3 Credits
MATH 4200	Intermediate Analysis 1	3 Credits
MATH 4540	Numerical Analysis	3 Credits
MATH 4630	Mathematical Modeling and Analysis	3 Credits
MATH 4650	Theory of Optimization	3 Credits
MATH 4670	Applied Combinatorial Mathematics	3 Credits
MATH 4750	Computational Statistics[4]	3 Credits
MATH 4760	Time Series Analysis[4]	3 Credits
MATH 4770	Statistical Machine Vision	3 Credits
MATH 4790	Bayesian Statistics	3 Credits

And a computer science cognate course:

COSC 1010	Introduction to Computer Programming	4 Credits

Total 46 Credits

Note: MATH 4931: Topics in Mathematical or Statistical Sciences or MATH 4999: Senior Thesis may be counted as a Mathematics elective with the approval by the Chair of Undergraduate Committee.

SAMPLE CURRICULUMS

Typical 4-year Program for Statistical Science Major

Freshman			
First Term	Hours	**Second Term**	Hours
MATH 1450	4	MATH 1455	4
COSC 1010	4	ESSV 1 or ENGL 1001	3
ENGL 1001 or ESSV 1	3	PHIL 1001 or THEO 1001	3
PHIL 1001 or THEO 1001	3	Elective	3
ARSC 1953	1	Elective	3
	15		**16**
Sophomore			
First Term	Hours	**Second Term**	Hours
MATH 4720	3	MATH 2350	3
MATH 2440	4	MATH Elective	3
MATH 3700	3	CORE 1929	3
DSCV	3	DSCV	3
Elective	2-3	Elective	3
	15-16		**15**
Junior			
First Term	Hours	**Second Term**	Hours

MATH 3100	3	MATH Elect. or MATH 4710	3
MATH 4700	3	MATH 4750* or MATH 4760	3
DSCV	3	DSCV	3
Elective	3	Elective	3
Elective	3	Elective	3
	15		**15**
Senior			
First Term	Hours	**Second Term**	
MATH 4780	3	MATH Elect. or MATH 4710	3
Elective	3	MATH 4750 or MATH 4760	3
Elective	3	CORE 4929	3
Elective	3	Elective	3
Elective	3	Elective	3
	15		**15**

Typical 4-year Program for Statistical Science Major with Minor in Business Administration

Freshman			
First Term	Hours	**Second Term**	Hours
MATH 1450	4	MATH 1455	4
COSC 1010	4	ESSV 1 or ENGL 1001	3
ENGL 1001 or ESSV 1	3	PHIL 1001 or THEO 1001	3
PHIL 1001 or THEO 1001	3	ECON 1001	3
		Elective	3
	14		**16**
Sophomore			
First Term	Hours	**Second Term**	Hours
MATH 4720	3	MATH 2350	3
MATH 2450	4	MATH Elective	3
DSCV	3	CORE 1929	3
OSCM 3001	3	DSCV	3
Elective	2-3	Elective	3
	15-16		**15**
Junior			
First Term	Hours	**Second Term**	Hours
MATH 3100	3	MATH Elect. or MATH 4710	3
MATH 3700	3	MATH 4750 or MATH 4760	3
MATH 4700	3	DSCV	3
DSCV	3	BUAD 2100	3
BUAD 1060	1	Elective	3
Elective	3		
	16		**15**
Senior			
First Term	Hours	**Second Term**	
MATH 4780	3	MATH Elect. or MATH 4710	3
INSY 3001	3	MATH 4750 or MATH 4760	3
MANA 3001	3	CORE 4929	3
Elective	3	MARK 3001	3
Elective	3	Elective	3
	15		**15**

Typical 5-year Program for Statistical Science STEM APST Program for Statistical Science BS/Applied Statistics MS

Fall 1	Hours	Spring 1	Hours
MATH 1450	4	MATH 1455	4
COSC 1010	4	ESSV 1 or ENGL 1001	3
ENGL 1001 or ESSV 1	3	PHIL 1001 or THEO 1001	3
PHIL 1001 or THEO 1001	3	Elective	3
		Elective	3
	14		**16**
Fall 2	Hours	**Spring 2**	Hours
MATH 4720	3	MATH 2350	3
MATH 2450	4	MATH 3570	3
DSCV	3	CORE 1929	3
Elective	3	DSCV	3
Elective	2-3	Elective	3
	15-16		**15**
Fall 3	Hours	**Spring 3**	Hours
MATH 3100	3	MATH Elective	3
MATH 3700	3	MATH 4750 or MATH 4760	3
MATH 4700	3	DSCV	3
DSCV	3	Elective	3
Elective	3	Elective	3
	15		**15**
Fall 4	Hours	**Spring 4**	Hours
MATH 5780	3	MATH 5710	3
Elective	3	MATH 5750 or MATH 5760	3
Elective	3	CORE 4929	3
Elective	3	Elective	3
Elective	3	Elective	3
	15		**15**
Fall 5	Hours	**Spring 5**	Hours
MSSC 6010	3	MSSC 6020	3
MSSC 6040	3	MSSC 6250	3
MSSC 6240	3	MSSC 6975	3
	9		**9**

STUDENT COMPUTING FACILITIES

Katherine Reed Cudahy Hall houses the University's Information Technology Service (ITS) central computing facilities on the second floor, and MSSC department computing facilities on the first, third and fourth floors.

Marquette students, faculty and staff are granted accounts on the Emarq and CheckMarq systems maintained by ITS. Authentication credentials can be obtained from the ITS Help Desk (room CU 293) and are maintained throughout a student's enrollment at Marquette. Additional information regarding university computing facilities can be obtained by calling the ITS Help Desk on 288-7799.

The MSSC Department maintains its own independent computing facilities for both teaching and research purposes. Students enrolled in MSSC courses or as department majors are granted access to general purpose laboratories in CU 101, CU 310, and CU 412. In addition, students enrolled in particular courses or involved in research projects may be granted access to special-purpose laboratories in CU 145, CU 301, CU 310, CU 368, CU 392, or CU 410.

The MSSC network features Gigabit internal connectivity between seven subnets with a wide variety of computing hardware and operating systems. Solaris and Linux servers provide centralized file, mail, web and print services to Windows, Linux, Solaris and Mac clients. Computer configurations range from an in-desk PC classroom to laboratories of dual-head workstations for collaborative project work.

Although students may have their own computer equipment, the MSSC department provides sufficient facilities for all MSSC coursework. Students are encouraged to make use of department facilities; experience with heterogeneous computing environments provides a rich educational opportunity, and MSSC maintains a large body of software tailored to the needs and interests of department majors.

Additional information about MSSC department computing facilities can be obtained from the MSSC system administrator at 288-1580, or online at https://www.marquette.edu/mathematical-and-statistical-sciences/