



MARQUETTE
UNIVERSITY

HELEN WAY KLINGLER
COLLEGE OF ARTS AND SCIENCES

Handbook

for

Mathematics Majors

2020-2021

Department of Mathematical and Statistical Sciences

Before entering Marquette University, most students' mathematical experience has been with applications in which mathematics is seen primarily as a problem-solving tool. Courses in algebra, geometry and perhaps calculus usually stress this aspect of mathematics. There is, however, another aspect of mathematics which beginning students rarely glimpse – pure mathematics. This is the creative side of mathematics in which new systems and formulas are discovered or derived. Pure mathematics lies at the heart of mathematics as an art and a science. Courses in pure mathematics stimulate the mind, promise intellectual growth, and are an asset to any plan.

In reality, the categories of pure and applied mathematics are not as distinct as they may first appear. Today's applied problem often leads to tomorrow's theory. And, just as often, what was yesterday's esoteric theory provides the practical solution to today's technical challenges. Mathematics reveals hidden patterns that help us understand the world around us, while rigorous investigations into how human beings discern those patterns help us develop and employ useful theories regarding the interplay between the teaching and learning of mathematics. Today mathematics is a diverse discipline that deals with data, measurements, and observations from science; with inference, deduction, and proof; and with mathematical models of natural phenomena, of human behavior, of human learning and of social systems. The special role of mathematics is a consequence of its universal applicability. The results of mathematics and mathematics education – theorems and theories – are both significant and useful. In addition, mathematics and mathematics education each offers pathways and insights into distinctive modes of thought that are both versatile and powerful, including modeling, abstraction, optimization, logical analysis, and inference from data.

Because of this continuing interplay between pure theory, practical applications, and human learning, the mathematics curriculum at Marquette University is designed to open the door to the creative side of mathematics while also providing an atmosphere in which each student's application skills can continue to grow. The curriculum can be tailored to fit an individual's interest and potential. Some students choose to concentrate on subjects with immediate applications such as probability, statistics, and differential equations. Others choose to pursue more abstract topics such as modern algebra, topology or logic. Others are interested in preparing to teach mathematics at the primary or secondary level. In any case the curriculum is designed to provide the technical skills for growth in the discipline.

Marquette mathematics graduates have been successful in a wide variety of careers. Some continue their studies at graduate school in mathematics and related fields, or in some other discipline. Many have successful careers as educators at various levels or in industry, where the intellectual abilities and skills they have acquired at Marquette are recognized by employers as being valuable and transferable. Employers look at a Marquette degree in mathematics as an indication of good analytical ability and a solid technical background. The federal government employs a large number of mathematicians in agencies such as Argonne National Laboratory, NASA, the National Institute of Health, the Census Bureau, the National Science Foundation and the National Security Agency. The number of occupations that require a background in mathematics continues to grow. Thus, majoring in mathematics at Marquette is an excellent preparation in such areas as science, business, law, or medicine. In addition, mathematician was listed as the #3 best business job for 2019, while statistician and actuary came in at #1 and #2, respectively (<https://money.usnews.com/careers/best-jobs/slideshows/best-business-jobs>).

Possible Tracks: Pure Mathematics; Applied Mathematics; Statistics; Secondary Education

ADVISING and PRE-REGISTRATION

A student planning to complete a major in mathematics should enroll in MATH 1450¹ in the first semester of his or her freshman year and in MATH 1451² in the second semester. As soon as he or she has decided to major in the Department, the student should report to the Department office (room #340 of Cudahy Hall) to declare a major and to be assigned a departmental adviser. From this time on the student meets with the adviser to discuss course selections for the next semester and general academic progress, as well as to receive access to pre-registration through Checkmarq.

MATHEMATICS LEARNING OUTCOMES

Upon completion of the required coursework, students should be able to:

1. Demonstrate in-depth knowledge in one of the basic areas of the mathematical sciences.
2. Communicate mathematical ideas using numerical, graphical, and symbolic representations.

¹ Upon request, 4 credits for MATH 1450 will be awarded to those students who scored 4 or 5 on their Advanced Placement (AP) Calculus AB test or who scored 3, 4, or 5 on their AP Calculus BC test.

² Upon request, 4 credits for MATH 1451 will be awarded to those students who scored 4 or 5 on their AP Calculus BC test.

REQUIREMENTS FOR THE MATHEMATICS MAJOR

REQUIRED COURSES

All students must complete the following five MATH courses:

MATH 1450	Calculus 1	4 sem. hrs.
MATH 1451	Calculus 2	4 sem. hrs.
MATH 2450	Calculus 3	4 sem. hrs.
MATH 2350	Foundations of Mathematics	3 sem. hrs.
MATH 3100	Linear Algebra and Matrix Theory	<u>3 sem. hrs.</u> <u>18 sem hrs</u>

COGNATE REQUIREMENT

COSC 1010	Introduction to Computer Programming	<u>4 sem hrs.</u> <u>4 sem hrs</u>
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SEQUENCE REQUIREMENT

All students must complete one of the following 2-course upper division MATH sequences:

MATH 4120	Abstract Algebra 1	3 sem. hrs.
MATH 4121	Abstract Algebra 2	3 sem. hrs.
MATH 4200	Intermediate Analysis 1	3 sem. hrs.
MATH 4201	Intermediate Analysis 2	3 sem. hrs.
MATH 4200	Intermediate Analysis 1	3 sem. hrs.
MATH 4210	Complex Variables	3 sem. hrs.
MATH 4200	Intermediate Analysis 1	3 sem. hrs.
MATH 4450	Topology	3 sem. hrs.
MATH 4420	Foundations of Geometry	3 sem. hrs.
MATH 4030	Concepts in Geometry & Calculus from an Advanced Standpoint	3 sem. hrs.
MATH 4500	Theory of Differential Equations	3 sem. hrs.
MATH 4510	Elementary Partial Differential Equations	3 sem. hrs.
MATH 4650	Theory of Optimization	3 sem. hrs.
MATH 4670	Applied Combinatorial Mathematics	3 sem. hrs.
MATH 4700	Theory of Probability	3 sem. hrs.
MATH 4710	Mathematical Statistics	<u>3 sem. hrs.</u> <u>6 sem hrs</u>

DISTRIBUTION REQUIREMENT

In addition, each student must complete at least one additional course from each of the three groups listed below:

Group 1 (Pure)	MATH 4120, 4121, 4200, 4201, 4210, 4320, 4420, 4450	3 sem. hrs.
Group 2 (Applied)	MATH 3520, 4500, 4510, 4540, 4630, 4650, 4670	3 sem. hrs.
Group 3 (Statistics)	MATH 4700, 4710, 4720, 4740, 4760, 4780	<u>3 sem. hrs.</u> <u>9 sem hrs</u>

ELECTIVES

To complete a major, **six** additional hours of upper division MATH courses 6 sem. hrs.

TOTAL credit hours: 43 sem. hrs.(39 in MATH)

COURSE SELECTION

A mathematics major must complete the requirements listed on the previous page and must also satisfy the graduation requirements of the College of Arts and Sciences as described in the University Undergraduate Bulletin. Careful selection of the general education courses will also fulfill the University Core of Common Studies requirements. A suggested curriculum for mathematics majors can be found in the Bulletin under Curricula Information, Arts and Sciences and in this handbook. Both the requirements for the major and the general graduation requirements are flexible enough to allow each student to select a variety of courses. The following groupings of courses are intended to aid students in making these selections.

Pure Mathematics (with an emphasis on preparing for advanced study)

MATH 4120	Abstract Algebra 1 (MATH 4121 Abstract Algebra 2 is also strongly recommended.)
MATH 4200	Intermediate Analysis 1 (MATH 4201 Intermediate Analysis 2 is also strongly recommended.)
MATH 4210	Complex Variables
MATH 4320	Theory of Numbers
MATH 4450	Topology
MATH 4500	Theory of Differential Equations
MATH 4700	Theory of Probability

Statistics

MATH 4120	Abstract Algebra 1
MATH 4200	Intermediate Analysis 1
MATH 4540	Numerical Analysis
MATH 4650	Theory of Optimization
MATH 4700	Theory of Probability
MATH 4710	Mathematical Statistics
MATH 4760	Time Series Analysis
MATH 4780	Regression Analysis

Applied Mathematics

MATH 4120	Abstract Algebra 1
MATH 4200	Intermediate Analysis 1
MATH 4500	Theory of Differential Equations
MATH 4510	Elementary Partial Differential Equations
MATH 4540	Numerical Analysis
MATH 4630	Mathematical Modeling and Analysis
MATH 4650	Theory of Optimization
MATH 4670	Applied Combinatorial Mathematics
MATH 4720	Statistical Methods or MATH 4740 Biostatistical Methods and Models
MATH 4760	Time Series Analysis
MATH 4780	Regression Analysis

Teaching Secondary Mathematics

MATH 4020	The Teaching of Mathematics
MATH 4030	Concepts in Geometry and Calculus from an Advanced Standpoint
MATH 4040	Concepts in High School Algebra and Number Theory from an Advanced Standpoint
MATH 4120	Abstract Algebra 1
MATH 4420	Foundations of Geometry
MATH 4630	Mathematical Modeling and Analysis
MATH 4670	Applied Combinatorial Mathematics or MATH 4700 Theory of Probability
MATH 4720	Statistical Methods

Focus on Actuarial Science

Course Selection

Actuarial Science involves the application of probability, statistics, and mathematics to insurance, pensions, and risk management and evaluation. The professional path to becoming an actuary involves passing a series of exams administered by the Society of Actuaries (www.soa.org) and the Casualty Actuarial Society (www.casact.org). The two societies work together for several of the early examinations and maintain a useful informational site www.BeAnActuary.com. Preparing to become an actuary does not require a major in actuarial science, but does require adequate preparation for beginning the examination process.

The Department has prepared a recommended program of courses to prepare a student for the first set of exams and receive VEE (Validation by Educational Experience) for three areas no longer required as tests (Applied Statistical Methods, Corporate Finance, and Economics). A student may complete these requirements by way of a Mathematics or Computational Mathematics major with a Business minor, an Interdisciplinary major in Applied Mathematical Economics, an Economics or Business major with appropriate additional MATH courses.

Any student who has interest in Actuarial Science is urged to consult the Actuarial Science Coordinator, Dr. Naveen Bansal, for information on course offerings and additional details. In addition to the courses below, study groups to prepare for the exams are organized every semester.

Recommended Program of Study:

MATH 1450, MATH 1451 (Calculus I and II)

MATH 4700 (Theory of Probability) – **Test P**

[{MATH 4720 (Statistical Methods) or MATH 4780 (Regression Analysis)} and MATH 4760 (Time Series Analysis)]

or

ECON 4060 (Introduction to Econometrics) – **VEE Applied Statistical Methods**

MATH 4931 (Introduction to Actuarial Science – a “Topics” course) – **Test FM**

ACCO 2030, ACCO 2031 (Accounting)

ECON 2003, ECON 2004 (Micro and Macro Economics) – **VEE Economics**

FINA 3001 (Financial Management) – **VEE Corporate Finance**

In addition to the above course work, study groups to prepare for the exams are organized every semester.

COMBINED MAJORS AND MINORS IN MATHEMATICS AND OTHER AREAS

Major in MATHEMATICS and COMPUTER SCIENCE:

A student majoring in both Mathematics and Computer Science must complete eighty-eight credit hours of MATH and COSC courses. The required courses include: MATH 1450, 1451, 2350 (in place of MATH 2100), 2450, 3100, and 21 additional hours of upper division MATH courses; COSC 1010, 1020, 2100, 2200, 3100, 3250, 3410, 4920, 4998, and twelve additional hours of upper division COSC courses as outlined in the Computer Science major handbook. MATH 4550 (Numerical Analysis) may be double-counted as satisfying both a COSC elective and a MATH elective.

Major in MATHEMATICS and SECONDARY EDUCATION:

A student with a major in Mathematics and Secondary Education will complete the core courses for the College of Education. The upper level mathematics courses that the student must complete are MATH 3100, 4030, 4040 or 4320, 4120, 4420, 4630, 4670 or 4700, and 4720. In addition the student is required to take professional education courses MATH 4020, EDUC 1000, 1001, 2001, 2002, 4000, 4003, 4037, 4037, 4217, and 4965. In addition to the cognate course required for the mathematics major (COSC 1010), an additional cognate courses is required: MATH 2032.

A student intending to obtain a license to teach secondary mathematics is urged to see a Department Adviser for secondary teaching majors before the start of classes in the first semester of his or her FRESHMAN year. In order to complete the required major in mathematics and major in education in four years, students must follow a very precise schedule. There is a complex set of prerequisites and some courses are offered only once every two years. A GPA of at least 2.75 in mathematics and successful passing of the Praxis II Exam are required for Student Teaching (EDUC 4965).

Minor in MATHEMATICS and Major in Another Content Area and SECONDARY EDUCATION:

A student with a minor in mathematics wishing to earn a secondary education teaching license in mathematics needs to complete the requirements for the mathematics minor, a certifiable content area major, and the core courses for the College of Education. In addition, the student is required to take professional education courses MATH 4020, EDUC 1000, 1001, 2001, 2002, 4000, 4003, 4037, 4037, 4217, and 4965. A GPA of at least 2.75 in mathematics and successful passing of respective Praxis II Exams are required for Student Teaching (EDUC 4965).

Major in MATHEMATICS and MINOR in COMPUTER SCIENCE:

A student with a major in mathematics needs to complete the computer science requirements for the computer science minor. There are sixteen additional credit hours of COSC courses including: COSC 1020, 2100, 2200, and six additional credit hours of upper division COSC courses. MATH 2350 will substitute for the MATH 2100 requirement of the COSC minor.

Major in MATHEMATICS and MINOR in BUSINESS ADMINISTRATION:

A student with a major in mathematics will need to complete the requirements for the minor in Business Administration as described in the College of Business Administration section of the Undergraduate Bulletin.

Mathematics Major

SAMPLE CURRICULUM

Freshman

<u>First Term</u>	<u>Sem. Hrs.</u>	<u>Second Term</u>	<u>Sem. Hrs.</u>
ENGL 1001 or ESSV1 (MCC)	3	ENGL 1001 or ESSV1 (MCC)	3
MATH 1450	4	PHIL 1001 or THEO 1001 (MCC)	3
PHIL 1001 or THEO 1001 (MCC)	3	MATH 1451	4
Elective	3	COSC 1010	4
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	13		14

Sophomore

<u>First Term</u>	<u>Sem. Hrs.</u>	<u>Second Term</u>	<u>Sem. Hrs.</u>
MATH 2450	4	MATH 3100	3
MATH 2350	3	CORE 1929 (MCC) or Elective	3
DSCV (MCC) ^{3 4}	3	DSCV (MCC) ^{4 5}	3
CORE 1929 (MCC) or Elective	3	Electives	6
Elective	3		-----
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	16		15

Junior

<u>First Term</u>	<u>Sem. Hrs.</u>	<u>Second Term</u>	<u>Sem. Hrs.</u>
MATH Sequence (part 1)	3	MATH Sequence (part 2)	3
MATH Group 1 (pure)	3	MATH Group 3 (Statistics)	3
DSCV (MCC) ^{4 5}	3	DSCV (MCC) ^{4 5}	3
Electives	6	Electives	6
	-----		-----
	15		15

Senior

<u>First Term</u>	<u>Sem. Hrs.</u>	<u>Second Term</u>	<u>Sem. Hrs.</u>
MATH Group 2 (applied)	3	MATH 3xxx/4xxx	3
MATH 3xxx/4xxx	3	CORE 4929 (MCC) or Elective	3
CORE 4929 (MCC) or Elective	3	Electives	10
Electives	7		-----
	-----		-----
	16		16

³ The four courses in the Discovery Tier (DSCV) of the MCC must be completed in the same theme and include the following content areas: Humanities (HUM), Social Science (SSC), Natural Science and Mathematics (NSM) and one elective (ELE), which is an additional course from any of the three content areas. A maximum of two courses in the Discovery Tier can apply towards a primary major.

⁴ Students must also complete the Writing Intensive (WRIT) and Engaging Social System and Values 2 (ESSV2) requirements of the MCC. These requirements can be fulfilled through designated courses in the Discovery Tier or other degree requirements.

Mathematics and Computer Science Double Major⁵

SAMPLE CURRICULUM

<i>First Term</i>		<i>Sem. Hrs.</i>	<i>Freshman</i>	<i>Second Term</i>	<i>Sem. Hrs.</i>
COSC 1010		4		COSC 1020	4
MATH 1450		4		MATH 1451	4
ENGL 1001 or ESSV1 (MCC)		3		ENGL 1001 or ESSV1 (MCC)	3
Natural Science with Laboratory ⁶		4		PHIL 1001 or THEO 1001 (MCC)	3
		-----			-----
		15			14

<i>First Term</i>		<i>Sem. Hrs.</i>	<i>Sophomore</i>	<i>Second Term</i>	<i>Sem. Hrs.</i>
COSC 2100		3		COSC 3100	3
COSC 2200		3		COSC 3250	3
MATH 2350		3		MATH 3100	3
MATH 2450		4		MATH 3xxx/4xxx	3
PHIL 1001 or THEO 1001 (MCC)		3		CORE 1929 (MCC)	3
		-----			-----
		16			15

<i>First Term</i>		<i>Sem. Hrs.</i>	<i>Junior</i>	<i>Second Term</i>	<i>Sem. Hrs.</i>
COSC 3410		3		COSC 3xxx/4xxx	3
COSC 3xxx/4xxx		3		MATH Group 3 (statistics)	3
MATH Sequence (part 1)		3		MATH Sequence (part 2)	3
Math/Science Elective		3-4		Math/Science Elective	3-4
DSCV (MCC) ^{4,5}		3		DSCV (MCC) ^{4,5}	3
		-----			-----
		15-16			15-16

<i>First Term</i>		<i>Sem. Hrs.</i>	<i>Senior</i>	<i>Second Term</i>	<i>Sem. Hrs.</i>
COSC 4920		3		COSC 4998	3
COSC 3xxx/4xxx		3		COSC 3xxx/4xxx	3
MATH Group 1 (pure)		3		MATH Group 2 (applied)	3
MATH 3xxx/4xxx		3		CORE 4929 (MCC)	3
DSCV (MCC) ^{4,5}		3		DSCV (MCC) ^{4,5}	3
		-----			-----
		15			15

⁵ For a single major program that combines aspects of both Computer Science and Mathematics with fewer course requirements, please see the Computational Mathematics major handbook.

⁶ Must complete 16 additional credit hours of Math/Sciences electives, including at least:

- two 3 credit-hour upper-division (3000- or 4000-level) MATH courses,
- one 3-4 credit hour science course with a laboratory component (BIOL, CHEM or PHYS), and
- one course designated by the College of Arts & Sciences to meet UCCS - Science & Nature requirement.

Mathematics & Secondary Education (double major)

SAMPLE CURRICULUM

For Students Who Enter Marquette in EVEN-NUMBERED Years (2022, ...)

Freshman

<u>First Term</u>	<u>Sem. Hrs.</u>	<u>Second Term</u>	<u>Sem. Hrs.</u>
MATH 1450	4	MATH 1451	4
PHIL 1001 or THEO 1001 (MCC)	3	PHIL 1001 or THEO 1001 (MCC)	3
ENGL 1001 (MCC)	3	COSC 1010	4
ARSC1020, BIOL1420, PHYS1007, PHYS1009	3-4	EDUC 1001 Psych Dev (MCC ESSV1)	3
EDUC 1000 Ed Inquiry 1	3	EDUC 4217 Exceptional Learners	3
Service Learning		Service Learning	
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	16-17		17

Sophomore

<u>First Term</u>	<u>Sem. Hrs.</u>	<u>Second Term</u>	<u>Sem. Hrs.</u>
MATH 2350	3	MATH 3100	3
MATH 2450	4	MATH 4670 or DSCV (MCC) ^{4,5}	3
CORE 1929 (MCC)	3	MATH 1700	3
Native American HIST or ENGL*	3	MATH 4040	3
EDUC 2001 (Teaching Practice 1)	3	EDUC 2002 (Teaching Practice 2)	3
Field Experience			
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	16		15

Junior

<u>First Term</u>	<u>Sem. Hrs.</u>	<u>Second Term</u>	<u>Sem. Hrs.</u>
MATH 4420	3	MATH 2032	3
MATH 4720	3	MATH 4030	3
DSCV(MCC) ^{4,5}	3	MATH 4630	3
EDUC 4003 (Teaching Practice 3)	3	DSCV(MCC) ^{4,5}	3
EDUC 4037 (Disciplinary Literacy)	3	EDUC 4000 Adv Topics in Ed Inquiry (MCC Writ)	3
Field Experience		EDUC 4047 Adv Teaching Practice MS/HS	3
	-----	Field Experience	
	15		-----
			18

Senior

<u>First Term</u>	<u>Sem. Hrs.</u>	<u>Second Term</u>	<u>Sem. Hrs.</u>
MATH 4020 ⁷	3	EDUC 4965 (Student Teaching)	15
MATH 4120	3		
MATH 4700 or DSCV (MCC)	3		
DSCV(MCC) ^{4,5}	3		
CORE 4929 (MCC)	3		
Field Experience			
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	15		15

Total credits: 127-128

⁷ Students consult with MSSC Advisor.

Mathematics & Secondary Education (double major)

SAMPLE CURRICULUM

For Students Who Enter Marquette in ODD-NUMBERED Years (2021,...)

Freshman

<u>First Term</u>	<u>Sem. Hrs.</u>	<u>Second Term</u>	<u>Sem. Hrs.</u>
MATH 1450	4	MATH 1451	4
PHIL 1001 or THEO 1001 (MCC)	3	PHIL 1001 or THEO 1001 (MCC)	3
ENGL 1001 (MCC)	3	COSC 1010	4
ARSC1020, BIOL1420, PHYS1007, PHYS1009	3-4	EDUC 1001 Psych Dev (MCC ESSV1)	3
EDUC 1000 Ed Inquiry 1	3	EDUC 4217 Exceptional Learners	3
Service Learning		Service Learning	
	-----		-----
	16-17		17

Sophomore

<u>First Term</u>	<u>Sem. Hrs.</u>	<u>Second Term</u>	<u>Sem. Hrs.</u>
MATH 2350	3	MATH 3100	3
MATH 2450	4	MATH 4670 or DSCV (MCC) ^{4 5}	3
CORE 1929 (MCC)	3	MATH 1700	3
Native American HIST or ENGL*	3	MATH 2032	3
EDUC 2001 (Teaching Practice 1)	3	EDUC 2002 (Teaching Practice 2)	3
Field Experience			
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	16		15

Junior

<u>First Term</u>	<u>Sem. Hrs.</u>	<u>Second Term</u>	<u>Sem. Hrs.</u>
MATH 4020 ⁸	3	MATH 4040	3
MATH 4120	3	MATH 4630	3
MATH 4700 or DSCV (MCC) ^{4 5}	3	DSCV(MCC) ^{4 5}	3
EDUC 4003 (Teaching Practice 3)	3	EDUC 4000 Adv Topics in Ed Inquiry (MCC Writ)	3
EDUC 4037 (Disciplinary Literacy)	3	EDUC 4047 Adv Teaching Practice MS/HS	3
Field Experience		Field Experience	
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	15		15

Senior

<u>First Term</u>	<u>Sem. Hrs.</u>	<u>Second Term</u>	<u>Sem. Hrs.</u>
MATH 4420	3	MATH 4030	3
MATH 4720	3	EDUC 4965 (Student Teaching)	15
DSCV(MCC) ^{4 5}	3		
DSCV(MCC) ^{4 5}	3		
CORE 4929 (MCC)	3		
Field Experience			
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	15		18

Total credits: 127-128

Mathematics Major with a Business Administration Minor

SAMPLE CURRICULUM

Freshman

<u>First Term</u>	<u>Sem. Hrs.</u>	<u>Second Term</u>	<u>Sem. Hrs.</u>
ENGL 1001 or ESSV1 (MCC)	3	ENGL 1001 or ESSV1 (MCC)	3
MATH 1450	4	COSC 1010	4
ECON 1001	3	MATH 1451	4
PHIL 1001 or THEO 1001 (MCC)	3	PHIL 1001 or THEO 1001 (MCC)	3
Elective	3		
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	16		14

Sophomore

<u>First Term</u>	<u>Sem. Hrs.</u>	<u>Second Term</u>	<u>Sem. Hrs.</u>
MATH 2450	4	MATH 3100	3
MATH 2350	3	DSCV (MCC) ^{4,5}	3
BUAD 1060 ⁸	1	DSCV (MCC) ^{4,5}	3
BUAD 2100	3	Statistics ⁹	3
CORE 1929 (MCC)	3	Elective	3
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	14		15

Junior

<u>First Term</u>	<u>Sem. Hrs.</u>	<u>Second Term</u>	<u>Sem. Hrs.</u>
MATH Sequence (part 1)	3	MATH Sequence (part 2)	3
MATH Group 1 (pure)	3	OSCM 3001	3
Elective	3	DSCV (MCC) ^{4,5}	3
INSY 3001	3	Electives	6
DSCV (MCC) ^{4,5}	3		
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	15		15

Senior

<u>First Term</u>	<u>Sem. Hrs.</u>	<u>Second Term</u>	<u>Sem. Hrs.</u>
MATH Group 2 (applied)	3	MATH 3xxx/4xxx	3
MATH 3xxx/4xxx	3	MANA 3001	3
MARK 3001	3	Electives	9
CORE 4929	3		
Elective	3		
	-----		-----
	15		15

⁸ BIEN 1100 or CEEN 1210 or GEEN 1130 or GEEN 1200 or GEEN 1210 can be substituted.

⁹ BUAD 1560 Introduction to Statistics and Business Analytics, MATH 1700 Modern Elementary Statistics, MATH 4710 Mathematical Statistics, MATH 4720 Statistical Methods, MATH 4740 Biostatistical Methods and Models, MEEN 3426 Engineering Statistics, SOCI 2060 Social Statistics or PSYC 2001 Psychological Measurements and Statistics may be used to satisfy the statistics requirement.

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 University 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 University. Additional information regarding University computing facilities can be obtained by calling the ITS Help Desk at 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: CU 145, CU 301, 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 computing facilities of the MSSC department can be obtained from the MSSC system administrator at 288-1580, or online at <https://www.marquette.edu/mathematical-and-statistical-sciences/>.

STUDENT ORGANIZATIONS

Students interested in mathematics or computer science are urged to consider joining the following organizations.

- | | |
|----------------------|--------------------------------------|
| ➤ Pi Mu Epsilon | Mathematics honor society |
| ➤ Upsilon Pi Epsilon | Computer Science honor society |
| ➤ AWM | Association for Women in Mathematics |