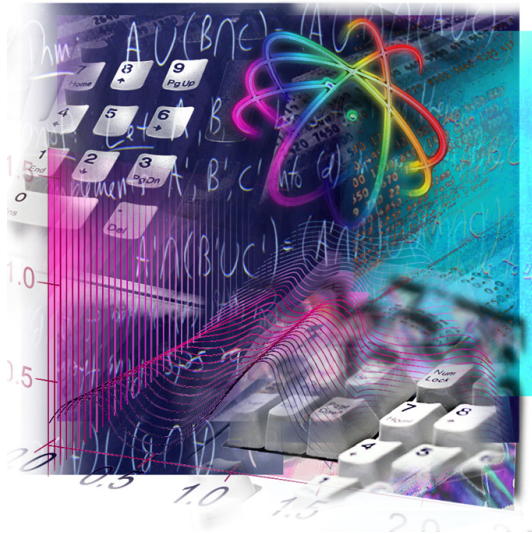# CLARKSON UNIVERSITY

Department of Mathematics

Undergraduate Student Handbook
Class of 2027 and beyond
Fall 2023

Undergraduate Student Handbook
Department of Mathematics
Class of 2027 and beyond

Fall 2023

This handbook has been prepared for advising purposes. It contains detailed requirements and advice for students majoring in **Mathematics**, **Applied Mathematics and Statistics**, or **Data Science**. The current version of this handbook can be found online at the Mathematics Department website.

Note that the Clarkson Catalog and the Clarkson Regulations remain the official references.

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Contents

1   Overview of Mathematics Programs

The Department of Mathematics offers three majors (which cannot be combined with each other for a double or triple major):

Mathematics (MA) Major:
Mathematics is the study of numbers, functions, geometrical forms, and abstract logical structures and their associated relationships. In addition to providing an essential foundation for scientific and technical fields, mathematics is studied both for its own intellectual appeal and challenge and for its application to real-life problems. Students of mathematics also develop critical thinking and analytical skills useful for a wide variety of careers.

The major in Mathematics is designed for students whose primary interest is mathematics or statistics, and is good preparation either for careers in those fields or for graduate study. Students pursuing this major choose one of two options, which differ primarily in the upper-division courses they emphasize:

- *Math Option:* Prepares students for careers in mathematics or for graduate school in mathematics, applied mathematics, or related fields.
- *Statistics Option:* Prepares students for careers as statisticians or actuaries or for graduate school in statistics.

Applied Mathematics and Statistics (AM&S) Major:
Applied mathematics is a problem-solving profession. Mathematical and statistical methods provide the tools for the analysis and solution of real-world problems which can be formulated quantitatively.

The major in Applied Mathematics and Statistics is designed for students who wish to develop their mathematical skills and apply them to solve challenging problems in science, engineering, or business. This major has less emphasis on abstract mathematics and proof than does the MA major. In addition to a broad base of applied mathematics courses, students choose applications electives in their areas of interest.

Data Science (DS) Major:

Across business, industry, government, and nearly all scientific efforts, the explosion of data and data collection drives a growing need to manage, analyze, and extract insight and knowledge from the data produced. Not only must scientists and engineers grapple with the vast volumes of data, but throughout business and industry the ability to reason effectively using data continues to grow in importance. The skillset required to excel in that environment lies at the intersection of math, statistics, and computational science. The emerging discipline of Data Science addresses that interdisciplinary space.

The major in Data Science provides students the opportunity to develop an interdisciplinary, data-focused skillset and then apply those skills to real-world challenges. The program provides strong preparation in critical aspects of working with data by thorough grounding in mathematics and statistics and the foundations of computer science as related to data and data processing. The program provides early focus on foundational competencies across the spectrum of science of data. Once that baseline is established, the students are expected to apply those skills to in specific domains of interest to the student, with a significant component of the curriculum based on team projects and experiential learning.

Other programs administered by the department:

- Major in Mathematical Economics (joint program with the Reh School of Business)
- Major in Digital Arts and Sciences (joint with departments of Communication and Media and Computer Science)
- Minor in Mathematics
- Minor in Statistics
- Minor in Computational Science

The department also administers graduate programs leading to the M.S. and Ph.D. degrees in Mathematics. For information, contact the department office or visit the department website.

2   Academic Opportunities

As you plan your program of study, keep in mind the following considerations and special programs.

Free Electives.   All majors in the Mathematics Department include a large number of free electives. You are strongly encouraged to use these electives in a meaningful way. While you can use some of your free electives to take additional courses in your major, many students use some of their free electives to earn either a minor or a second major. This second discipline can be closely related to your major or it can be a discipline in which you have a strong personal or professional interest.

Double Majors.   Many students in the department graduate having satisfied the requirements for two different majors. Mathematics and Computer Science is a common combination; other popular second majors include Physics, Biology, and Business. Doubling with an engineering major usually requires overloading. See your advisor and the Chair of the second department. Sample programs for several common double majors are at the end of this booklet. These are only samples, so you must verify your program with both major departments in advance.

Dual Degrees.   A dual degree (the simultaneous awarding of two B.S. degrees) is like a double major, but requires 150 credit hours (instead of 120) and thus is much less common. See the Catalog and the Clarkson Regulations for details.

Minors.   In recent years, mathematics students have satisfied the requirements for minors spanning over a dozen different disciplines, from Software Engineering to History to Political Science. See the Catalog for an up-to-date list of available minors. Then see your advisor and the department offering the minor.

Co-ops and Internships.   You may spend a summer or semester (or more) working in a professional capacity for a business. Besides providing valuable experience, participating in this program may pave the way to a job after graduation. Usually the junior year is best for a co-op, but you should start planning in the fall of your sophomore year. Contact the Career Center. It's never too early.

Undergraduate Research. Many students participate in research with a faculty member while at Clarkson. For some this gives a change of pace from classroom learning and a taste of what graduate research might be like. For others this becomes a significant part of their education and may culminate in an honors thesis or journal publication. If you're interested, talk early with the mathematics professors to see what they're doing and what your options are. Undergraduate research projects may earn academic credit and may involve work during the semester or the summer.

Off-campus Research. Students with sufficient mathematical preparation may pursue research projects off-campus. The National Science Foundation sponsors many Research Experience for Undergraduates (REU) programs each summer, and many national laboratories have internships or similar opportunities. Such programs are competitive; start your search and apply early.

Study Abroad. Clarkson has agreements with universities in England, Australia, France, and many other countries for transfer of credits taken there. This is usually done in the junior year. Contact the International Center for more information.

Cross-Registration. The Associated Colleges of the St. Lawrence Valley (Clarkson, SUNY Potsdam, St. Lawrence University, and SUNY Canton) have a cross-registration program for transferring credit. You may cross-register for up to two courses per year. Contact your advisor or SAS for details.

Master's Degrees. You can complete an MBA (Master of Business Administration) or MAT (Master of Arts in Teaching) degree at Clarkson in one additional year if you choose appropriate electives as an undergraduate. Contact the Reh School of Business or the Department of Education, respectively, for more information.

Careers. Many careers are open to students with degrees in mathematics—more than you might imagine. For extensive information on careers, visit the websites of the Society for Industrial and Applied Mathematics, the American Mathematical Society, the Mathematical Association of America, and the American Statistical Association. For information about a career as an actuary, visit BeAnActuary.org.

3 Activities

Math Club. This CUSA-sponsored club serves as the focus of extra-curricular student activities in the department. Coordinating events with the AWM, SIAM, and PME chapters, the club organizes math-related informational and social activities for the department, university, and community. Contact Prof. Iyiola for information.

Society for Industrial and Applied Mathematics (SIAM).
SIAM is the leading professional society for mathematicians interested in applied and computational mathematics. All interested students are welcome to join. Contact Prof. Iyiola for information.

Association for Women in Mathematics (AWM).
Meetings and events are open to all students, regardless of major or gender. These meetings and activities expose students to the world of professional mathematics, to obtain information about career options in mathematics, to network with professional mathematicians, and to develop leadership skills. Contact Prof. Yao for information.

Pi Mu Epsilon (PME). Pi Mu Epsilon is the national mathematics honor society. Membership is honorary and based on scholastic achievement; however, most activities are open to all interested students. Contact Prof. Yao for information.

Mathematical Contest in Modeling (MCM).
Held each spring, the MCM is a contest where teams of undergraduates use mathematical modeling to develop solutions to real-world problems. Contact Prof. Asante-Asamani for information.

William Lowell Putnam Mathematical Competition.
The Putnam Exam is a national competition held each December, testing originality and technical competence. Fame and glory await students who score well. Contact Prof. Greene for information.

4   Graduation Requirements

The following graduation requirements apply to all three majors (MA, AM&S, and DS) in the Mathematics Department.

General requirements for all Clarkson students:

Complete at least 120 credit hours
Achieve at least a 2.0 cumulative GPA overall
Satisfy the Clarkson Common Experience requirements
Complete the requirements of at least one major
Achieve at least a 2.0 cumulative GPA in the major

Clarkson Common Experience (CCE) requirements:

Five courses must be taken covering at least four of the six Knowledge Areas (CGI, CSO, EC, IA, IG, and STS); these must include one University Course (which covers two Knowledge Areas). In addition, six communication points must be earned, including at least two points in courses in the major numbered 300 or higher. Most (or all) of these may be earned in these courses:

Two points: MA211, 363, and 377
One point: MA311, 313, 314, 321, 322, and STAT488

Details applicable to all majors in the department:

1. The following courses do not count toward graduation: MA030, MA031, MA041, MA042, SC131, and all AS and MS courses at the 100 and 200 levels

2. The following courses are not open to majors in the department (but may count toward graduation as free electives if taken before becoming a major in the department): MA120, MA125, MA180, MA181, MA239, MA277, MA330, STAT282, and STAT318.

3. The GPA in the major is computed based on courses in the *major field of study list*, consisting of all MA courses MA131 or higher except 180, 181, 239, MA277, 300–310, 330, 351, 400–432, 497–499, and all STAT courses except 282, 318, and 488. For the DS major, the GPA computation also includes the courses DS241, DS392, CS141, CS142, CS344, CS449, IS314, IS415, and IS426.

Requirements for the Mathematics (MA) major:

		credit hours
Mathematics (MA) and Statistics (STAT) courses[1]		44
Computer Science (CS141)		4
Physics (PH131 and PH132)		8
Science (PH, CM, or BY course)		3
First-Year Seminar (FY100)		1
The Clarkson Seminar (UNIV190)		3
Knowledge Area Courses		12
University Course		3
Free Electives		42
	Total:	120

[1] The MA and STAT courses include the following required courses:

MA131, MA132, MA200, MA211, MA231, MA232, MA321, MA339, MA499, STAT383, and either MA451 or MA453

plus either of the following options:

Math Option: two of MA311, 312, 313, 314, and 322
Stats Option: all of STAT381, 382, 384, and 488 (1–3 credits)

plus additional MA/STAT courses to total at least 44 credits.

A student may not major in both MA and either AM&S or DS.

A worksheet for MA major can be downloaded here for Math Option and Stat Option.

Requirements for the Applied Mathematics and Statistics (AM&S) major:

	credit hours
Mathematics (MA) and Statistics (STAT) courses[1]	44
Computer Science (CS141)	4
Physics (PH131 and PH132)	8
Science (PH, CM, or BY course)	3
First-Year Seminar (FY100)	1
The Clarkson Seminar (UNIV190)	3
Knowledge Area Courses	12
University Course	3
Application Electives[2]	15
Free Electives	27
Total:	120

[1]The MA and STAT courses include the following required courses:

MA131, MA132, MA200, MA211, MA231, MA232, MA339, MA363, MA377, MA499, STAT383, and either MA451 or MA453

plus three of the following courses:

MA331, MA332, STAT381, STAT382, STAT384

plus additional MA/STAT courses to total at least 44 credits.

[2]Five Application Electives for the AM&S major must be chosen from the following list:

BY314; CE420, 438; CH260, 330, 490; CM371, 372
EC311, 350 (or 150 and 200), 384
EE264; EM333;
ES220, 222, 223, 250, 260, 330, 340, 400, 405
ME442, 443; OM331
PH221, 231, 323, 325, 331, 380, 381, 432, 451

A student may not major in both AM&S and either MA or DS.

A worksheet for AM&S major can be downloaded here.

Requirements for the Data Science (DS) major:

	credit hours
Mathematics (MA) and Statistics (STAT) courses[1]	35
Data Science (DS241, DS392)	6
Computer Science (CS141, CS142, CS344, CS449)	13
Science (BY, CM, or PH courses)[2]	8
Information Systems (IS314, IS415, IS426)	9
First-Year Seminar (FY100)	1
The Clarkson Seminar (UNIV190)	3
Knowledge Area and University Courses	15
Application Electives[3]	6
Free Electives	24
Total:	120

[1]The MA and STAT courses include the following required courses:

MA131, MA132, MA200, MA211, MA231, MA339, MA499, STAT381, STAT382, STAT383, STAT384, STAT385, and STAT488 (2 credits)

[2]The Science courses must include at least two courses with labs.

[3]Application Electives for the DS major are courses from outside the MA, STAT, CS, and IS course designations that provide depth of knowledge in some domain. Students must take two 3-credit courses at the 200 level or higher, both from the same subject area, with the particular pairing approved by the Mathematics Department.

A student may not major in both DS and either AM&S or MA.

A worksheet for DS major can be downloaded here.

5 Professional Experience

MA499 Professional Experience. This course records success in completing requirements other than course work for the MA, AM&S, and DS majors, and fulfills the Professional Experience requirement of the Clarkson Common Experience. Given Pass/No credit only. Specific requirements (complete one from each category):

1. Demonstrate skill in computer applications by one of the following:

    (a) Complete a course from this list: MA377, CS452, EE468, or other courses as may be specified from time to time.

    (b) Complete a project requiring the effective use of professional level software such as SAS, Matlab, Maple or other software such as that used in the courses mentioned in item (a).

2. Demonstrate skill in communication by at least one of the following:

    (a) Serve satisfactorily as tutor or undergraduate recitation leader in a mathematics course for at least one semester.

    (b) Give a presentation at a regional, national or international mathematics meeting.

    (c) Write a paper on a mathematical subject that is accepted for publication in a national or international mathematics, science or engineering journal.

    (d) Participate and give a presentation about his or her work in a mathematics seminar at Clarkson.

    (e) Present for evaluation by the department faculty an acceptable portfolio of writings and/or other communications on mathematical subjects.

3. Demonstrate understanding of the profession by one or more of the following:

   (a) Serve as an active officer in a student chapter of a professional or honorary society.

   (b) Complete an internship or a co-op experience in a professional capacity.

   (c) Participate in an undergraduate research project or a summer research experience for undergraduates.

   (d) Take part in a mathematics or statistics consulting experience.

   (e) Attend a meeting of a mathematics or statistics society.

   (f) Join a professional mathematics or statistics society.

The student must present documentary evidence of satisfying these requirements to the Chair of the Department of Mathematics. Any courses presented to satisfy these requirements may also be counted toward course requirements for graduation.

While students may register for MA499 in either semester of their senior year, planning should start by the junior year at the latest. Satisfaction of the requirements is recorded on a form available from the Mathematics Department office or website and signed by the Department Chair. Individual requirements may be fulfilled and recorded as soon as they are completed.

6   Sample Programs

Sample Program for Mathematics Major (Math Option)

First Year			
MA131 Calculus I	3	MA132 Calculus II	3
PH131 Physics I	4	PH132 Physics II	4
CS141 Computer Science I	4	MA200 Math Modeling & Soft.	3
UNIV190 Clarkson Seminar	3	Knowledge Area Course	3
FY100 First-Year Seminar	1	Free Elective (CS142 rec.)	3
	15		16
Sophomore Year			
MA211 Discrete Math & Proof	3	MA231 Calculus III	3
MA232 Differential Equations	3	MA339 Applied Linear Algebra	3
Science Elective	3	STAT383 Probability & Stats.	3
Knowledge Area Course	3	Knowledge Area Course	3
Free Elective	3	Free Elective	3
	15		15
Junior Year			
MA321 Advanced Calculus I	3	MA312, MA314 or MA322[1]	3
MA311 or MA313[1]	3	MA/STAT Elective	3
KA/University Course	3	KA/University Course	3
Free Elective	3	MA451 or MA453	2
Free Elective	3	Free Elective	3
	15		14
Senior Year			
MA/STAT Elective	3	MA/STAT Elective	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
MA499 Professional Exp.	0		
	15		15

[1]These courses are offered in alternate years: take any two of these five (in either your junior or senior year).

Sample Program for Mathematics Major (Statistics Option)

First Year			
MA131 Calculus I	3	MA132 Calculus II	3
PH131 Physics I	4	PH132 Physics II	4
CS141 Computer Science I	4	MA200 Math Model.&Soft.	3
UNIV190 Clarkson Seminar	3	Knowledge Area Course	3
FY100 First-Year Seminar	1	Free Elective (CS142 rec.)	3
	15		16
Sophomore Year			
MA211 Discrete Math&Proof	3	MA231 Calculus III	3
MA232 Differential Eqns.	3	MA339 Applied Linear Alg.	3
Science Elective	3	STAT383 Prob. & Stats.	3
Knowledge Area Course	3	Knowledge Area Course	3
Free Elective	3	Free Elective	3
	15		15
Junior Year			
MA321 Advanced Calculus I	3	STAT382 or STAT384[1]	3
STAT381 Probability	3	MA/STAT Elective	3
KA/University Course	3	KA/University Course	3
Free Elective	3	MA451 or MA453	2
Free Elective	3	Free Elective	3
	15		14
Senior Year			
STAT488 Statistics Project[2]	1–3	STAT382 or STAT384[1]	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
MA499 Professional Exp.	0		
	15		15

[1]STAT382 and STAT384 are offered in alternate springs. Both are required—each year take the one which is offered.

[2]If STAT488 is taken for 1 or 2 credits, then another MA/STAT course will be needed to total 44 credits in MA/STAT.

Sample Program for Applied Mathematics and Statistics Major

First Year			
MA131 Calculus I	3	MA132 Calculus II	3
PH131 Physics I	4	PH132 Physics II	4
CS141 Computer Science I	4	MA200 Math Modeling & Soft.	3
UNIV190 Clarkson Seminar	3	Knowledge Area Course	3
FY100 First-Year Seminar	1	Free Elective (CS142 rec.)	3
	15		16
Sophomore Year			
MA211 Discrete Math & Proof	3	MA231 Calculus III	3
MA232 Differential Equations	3	MA339 Applied Linear Algebra	3
Science Elective	3	STAT383 Probability & Stats.	3
Knowledge Area Course	3	Knowledge Area Course	3
Application Elective[1]	3	Application Elective[1]	3
	15		15
Junior Year			
MA377 Numerical Methods	3	MA363 Mathematical Modeling	3
MA/STAT Elective from list[2]	3	MA/STAT Elective from list[2]	3
KA/University Course	3	KA/University Course	3
Free Elective	3	MA451 or MA453	2
Application Elective[1]	3	Application Elective[1]	3
	15		14
Senior Year			
MA/STAT Elective	3	MA/STAT Elective from list[2]	3
Application Elective[1]	3	Free Elective	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
MA499 Professional Exp.	0		
	15		15

[1]Five Application Electives from the list on page 8

[2]Three of: MA331, MA332, STAT381, STAT382, STAT384

Sample Program for Data Science Major

First Year			
MA131 Calculus I	3	MA132 Calculus II	3
CS141 Computer Science I	4	CS142 Computer Science II	3
Science Course (with lab)	4	Science Course (with lab)	4
UNIV190 Clarkson Seminar	3	MA200 Math Model.&Soft.	3
FY100 First-Year Seminar	1	Knowledge Area Course	3
	15		16

Sophomore Year			
MA211 Discrete Math&Proof	3	MA231 Calculus III	3
STAT383 Probability & Stats.	3	MA339 Applied Linear Alg.	3
DS241 Intro to Data Science	3	CS344 Alg. & Data Struct.	3
IS314 Database Design&Mgt.	3	IS415 Data Warehousing	3
Knowledge Area Course	3	Knowledge Area Course	3
	15		15

Junior Year			
CS449 Computational Learning	3	STAT382 or STAT384[1]	3
STAT381 Probability	3	DS392 Ethics of Data Anal.	3
IS426 Big Data Architecture	3	KA/University Course	3
KA/University Course	3	Free Elective	3
Free Elective	3	Free Elective	3
	15		15

Senior Year			
STAT385 Bayesian Data Anal.	3	STAT 382 or STAT384[1]	3
Application Elective[2]	3	Application Elective[2]	3
Free Elective	3	STAT488 Statistics Project	2
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
MA499 Professional Exp.	0		
	15		14

[1]STAT382 and STAT384 are offered in alternate springs. Both are required—each year take the one which is offered.

[2]Two Application Electives as described on page 9

7   Emphasis Areas

Mathematics majors who want to focus their studies in a particular area should consider these groupings of courses. These groupings are simply suggestions from the faculty; they are not requirements.

Actuarial Science: AM&S major or MA major (Statistics Option) together with some of:

> MA300 Seminar in Actuarial Mathematics
> MA377 Numerical Methods
> EC150 Principles of Micro Economics
> EC151 Principles of Macro Economics
> EC311 Introduction to Econometrics
> EC465 Economics and Business Forecasting
> FN361 Corporate Finance
> FN462 Investments

Students interested in pursuing careers as actuaries are encouraged to speak with Professors Mondal and Meysami and to check out the website www.beanactuary.org for information on internships, courses, and the Actuarial Exams.

Applied Mathematics: MA or AM&S major and some of:

> MA315 Introduction to Complex Networks
> MA331 Fourier Series and Boundary Value Problems
> MA332 Intermediate Differential Equations
> MA362 Complex Analysis with Applications
> MA363 Mathematical Modeling
> MA377 Numerical Methods
> STAT381 Probability

You should also consider additional courses in Computer Science (beyond CS142) and in application areas of interest.

Business Applications: AM&S major, MA major (Statistics Option), or DS major, and:

> STAT381 Probability
> EC150 Principles of Micro Economics
> EC151 Principles of Macro Economics
> OM331 Operations/Production Management

You should also contact the School of Business to explore other course options and the possibility of completing a minor in a business-related field.

Statistics: MA major (Statistics Option) or AM&S major and:

> EC311 Introduction to Econometrics
> ES405 Design of Experiments
> OM485 Quality Systems Management
> PY356 Experimental Psychology

Information on careers in statistics is available from the website of the American Statistical Association.

Pure Mathematics: MA major (Math Option) and many of:

> MA311 Abstract Algebra
> MA312 Introduction to Differential Geometry
> MA313 Abstract Linear Algebra
> MA314 Number Theory and its Applications
> MA322 Advanced Calculus II
> MA332 Intermediate Differential Equations
> MA362 Complex Analysis with Applications
> STAT381 Probability

If you are planning to apply for graduate school in mathematics, completing an undergraduate research project will be a big plus. Also, remember that graduate courses are open to qualified seniors and juniors; taking one or more core graduate mathematics courses (such as MA511, MA512, MA514, MA521, MA522, MA525, MA531, MA571, MA573, or MA578) while an undergraduate will significantly strengthen your preparation for graduate school.

8 Double Majors

Sample Program for Double Major: Math and Computer Science

First Year			
MA131 Calculus I	3	MA132 Calculus II	3
CS141 Computer Science I	4	CS142 Computer Science II	3
PH131 Physics I	4	PH132 Physics II	4
UNIV190 Clarkson Seminar	3	MA200 Math Modeling & Soft.	3
FY100 First-Year Seminar	1	Knowledge Area Course	3
	15		16
Sophomore Year			
MA211 Discrete Math & Proof	3	MA231 Calculus III	3
MA232 Differential Equations	3	MA339 Applied Linear Algebra	3
CS242 Adv. Prog. Concepts	3	CS241 Computer Organization	3
Science Elective	4	CS344 Data Structures	3
Knowledge Area Course	3	Knowledge Area Course	3
	16		15
Junior Year			
MA321 Advanced Calculus I	3	STAT383 Probability & Stats.	3
CS341 Programming Lang.	3	CS444 Operating Systems	3
CS345 Automata Theory[1]	3	CS Elective	3
CS350 Software Design/Devel.	3	MA451 or MA453	2
KA/University Course	3	KA/University Course	3
	15		14
Senior Year			
MA311 or MA313[2]	3	MA312, MA314 or MA322[2]	3
MA/STAT Elective[1]	3	MA/STAT Elective[1]	3
CS Elective	3	CS Elective	3
CS Elective	3	CS Elective	3
Free Elective	3	Free Elective	3
MA499 Professional Exp.	0	CS499 Professional Exp.	0
	15		15

[1]CS courses double-listed as MA courses (e.g., CS/MA345, 442, 447, 449, and 456) count toward the required 44 credits of MA/STAT.
[2]These courses are offered in alternate years: take any two.

Sample Program for Double Major:
Applied Math & Statistics and Computer Science

First Year			
MA131 Calculus I	3	MA132 Calculus II	3
CS141 Computer Science I	4	CS142 Computer Science II	3
PH131 Physics I	4	PH132 Physics II	4
UNIV190 Clarkson Seminar	3	MA200 Math Model.&Soft.	3
FY100 First-Year Seminar	1	Knowledge Area Course	3
	15		16
Sophomore Year			
MA211 Discrete Math&Proof	3	MA231 Calculus III	3
MA232 Differential Equations	3	MA339 Applied Linear Alg.	3
CS242 Adv. Prog. Concepts	3	CS241 Computer Organiz.	3
Science Elective	4	CS344 Data Structures	3
Application Elective[1]	3	Application Elective[1]	3
		Knowledge Area Course	3
	16		18
Junior Year			
STAT383 Probability & Stats.	3	MA363 Math Modeling	3
CS341 Programming Lang.	3	MA/STAT Elective from list[2]	3
CS345 Automata Theory	3	CS444 Operating Systems	3
CS350 Software Design/Devel.	3	CS Elective	3
Application Elective[1]	3	MA451 or MA453	2
KA/University Course	3	KA/University Course	3
	18		17
Senior Year			
MA377 Numerical Methods	3	MA/STAT Elective from list[2]	3
MA/STAT Elective from list[2]	3	Application Elective[1]	3
CS Elective	3	CS Elective	3
CS Elective	3	CS Elective	3
Application Elective[1]	3	Knowledge Area Course	3
MA499 Professional Exp.	0	CS499 Professional Exp.	0
	15		15

[1]Five Application Electives from the list on page 8
[2]Three of: MA331, MA332, STAT381, STAT382, STAT384

Sample Program for Double Major:
Data Science and Computer Science

First Year			
MA131 Calculus I	3	MA132 Calculus II	3
CS141 Computer Science I	4	CS142 Computer Science II	3
Science Sequence (with lab)	4	Science Sequence (with lab)	4
UNIV190 Clarkson Seminar	3	MA200 Math Modeling & Soft.	3
FY100 First-Year Seminar	1	Knowledge Area Course	3
	15		16
Sophomore Year			
MA211 Discrete Math & Proof	3	MA231 Calculus III	3
STAT383 Probability & Stats.	3	MA339 Applied Linear Algebra	3
CS242 Adv. Prog. Concepts	3	CS241 Computer Organization	3
DS241 Intro to Data Science	3	CS344 Alg. & Data Struct.	3
IS314 Database Design & Mgt.	3	IS415 Data Warehousing	3
	15		15
Junior Year			
STAT381 Probability	3	STAT382 or STAT384[1]	3
CS341 Programming Lang.	3	DS392 Ethics of Data Analytics	3
CS345 Automata Theory	3	CS444 Operating Systems	3
IS426 Big Data Architecture	3	CS Elective	3
Knowledge Area Course	3	Knowledge Area Course	3
	15		15
Senior Year			
STAT385 Bayesian Data Anal.	3	STAT382 or STAT384[1]	3
CS350 Software Design/Devel.	3	CS Elective	3
CS449 Computational Learning	3	CS Elective	3
Application Elective[2]	3	Application Elective[2]	3
KA/University Course	3	KA/University Course	3
Science Elective	4	STAT 488 Statistics Project	2
MA499 Professional Exp.	0	CS499 Professional Exp.	0
	19		17

[1]STAT382 and STAT384 are offered in alternate springs. Both are required – each year take the one which is offered.
[2]Two Application Electives as described on page 9

Sample Program for Double Major:
Mathematics and Digital Arts & Sciences

First Year			
MA131 Calculus I	3	MA132 Calculus II	3
DA110 Drawing	3	DA100 Intro: Time & Image	3
DA120 Elements of Design	3	DA140 Intro: Form & Code	3
UNIV190 Clarkson Seminar	3	MA200 Math Model.& Soft.	3
FY100 First-Year Seminar	1	KA/University Course[1]	3
	13		15
Sophomore Year			
MA211 Discrete Math&Proof	3	MA231 Calculus III	3
MA232 Differential Equations	3	MA339 Applied Linear Alg.	3
CS141 Computer Science I	4	CS142 Computer Science II	3
DA Elective (200 level)	3	DA Elective (300 level)	3
DA Elective	3	KA/University Course[1]	3
	16		15
Junior Year			
MA321 Advanced Calculus I	3	MA312, MA314 or MA322[2]	3
MA377 Numerical Methods	3	STAT383 Probability&Stats.	3
DA491 Professional Practice	3	CS452 Computer Graphics	3
PH131 Physics I	4	PH132 Physics II	4
Free Elective	3	MA451 or MA453	2
	16		15
Senior Year			
MA311 or MA313[2]	3	DA492 Senior Studies	3
MA/STAT Elective	3	MA/STAT Elective	3
Science Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
MA499 Professional Exp.	0		
	15		15

[1]The Knowledge Area and University courses must be chosen to cover three Knowledge Areas other than IA (which is covered by the courses DA100, DA110, and DA120).

[2]These courses are offered in alternate years: take any two of these four (in either your junior or senior year).

Sample Program for Double Major:
Applied Mathematics & Statistics and Digital Arts & Sciences

First Year			
MA131 Calculus I	3	MA132 Calculus II	3
DA110 Drawing	3	DA100 Intro: Time & Image	3
DA120 Elements of Design	3	DA140 Intro: Form & Code	3
UNIV190 Clarkson Seminar	3	MA200 Math Modeling & Soft.	3
FY100 First-Year Seminar	1	KA/University Course[1]	3
	13		15
Sophomore Year			
MA211 Discrete Math & Proof	3	MA231 Calculus III	3
MA232 Differential Equations	3	MA339 Applied Linear Algebra	3
CS141 Computer Science I	4	CS142 Computer Science II	3
DA Elective (200 level)	3	DA Elective (300 level)	3
DA Elective	3	STAT383 Probability & Stats.	3
	16		15
Junior Year			
MA377 Numerical Methods	3	MA363 Math Modeling	3
MA/STAT Elective from list[2]	3	MA/STAT Elective from list[2]	3
DA491 Professional Practice	3	CS452 Computer Graphics	3
PH131 Physics I	4	PH132 Physics II	4
Application Elective[3]	3	MA451 or MA453	2
	16		15
Senior Year			
MA/STAT Elective	3	MA/STAT Elective from list[2]	3
Science Elective	3	DA492 Senior Studies	3
Application Elective[3]	3	Application Elective[3]	3
Application Elective[3]	3	Application Elective[3]	3
KA/University Course[1]	3	Free Elective	3
MA499 Professional Exp.	0		
	15		15

[1]The Knowledge Area and University courses must be chosen to cover three Knowledge Areas other than IA (which is covered by the courses DA100, DA110, and DA120).
[2]Three of: MA331, MA332, STAT381, STAT382, STAT384
[3]Five Application Electives from the list on page 8

Sample Program for Double Major: Mathematics and Physics

First Year			
MA131 Calculus I	3	MA132 Calculus II	3
PH131 Physics I	4	PH132 Physics II	4
PH121 Physics FR Seminar[1]	1	MA200 Math Model.&Soft.	3
CS141 Computer Science I	4	Free Elective (CS142 rec.)	3
UNIV190 Clarkson Seminar	3	Knowledge Area Course	3
FY100 First-Year Seminar	1		
	16		16
Sophomore Year			
MA211 Discrete Math&Proof	3	MA231 Calculus III	3
MA232 Differential Equations	3	MA339 Applied Linear Alg.	3
PH231 Modern Phy. w. Lab	4	PH221 Theoretical Mechanics	3
CM131 Chemistry I	4	PH327 Experimental Phy. I	3
Knowledge Area Course	3	CM132 Chemistry II	4
	17		16
Junior Year			
MA321 Advanced Calculus I	3	MA312, MA314 or MA322[2]	3
STAT383 Probability&Stats.	3	MA331 Fourier Series&BVPs	3
PH325 Thermal Physics	3	PH331 Quantum Physics I	3
PH380 Electromag Theory I	3	Knowledge Area Course	3
Biology Elective	3	MA451 or MA453	2
	15		14
Senior Year			
MA311 or MA313[2]	3	MA/STAT Elective	3
MA/STAT Elective	3	Free Elective	3
PH Elective (PH432 rec.)	3	Free Elective	3
PH Professional Elective	3	Free Elective	3
KA/University Course	3	KA/University Course	3
PH435 Senior Seminar	1	MA499 Professional Exp.	0
	16		15

[1]If the Physics major is declared after the first year, PH121 may be replaced by a PH elective in the Junior or Senior year.
[2]These courses are offered in alternate years: take any two of these four (in either your junior or senior year).

Sample Program for Double Major:
Applied Mathematics & Statistics and Physics

First Year			
MA131 Calculus I	3	MA132 Calculus II	3
PH131 Physics I	4	PH132 Physics II	4
PH121 Physics FR Seminar[1]	1	MA200 Math Modeling & Soft.	3
CS141 Computer Science I	4	Free Elective (CS142 rec.)	3
UNIV190 Clarkson Seminar	3	Knowledge Area Course	3
FY100 First-Year Seminar	1		
	16		16
Sophomore Year			
MA211 Discrete Math & Proof	3	MA231 Calculus III	3
MA232 Differential Equations	3	MA339 Applied Linear Algebra	3
PH231/2 Modern Physics/Lab	4	PH221 Theoretical Mechanics	3
CM131 Chemistry I	4	PH327 Experimental Physics I	3
Knowledge Area Course	3	CM132 Chemistry II	4
	17		16
Junior Year			
MA377 Numerical Methods	3	MA363 Math Modeling	3
STAT383 Probability & Stats.	3	MA331 Fourier Series & BVPs	3
PH325 Thermal Physics	3	PH331 Quantum Physics I	3
PH380 Electromag Theory I	3	Knowledge Area Course	3
Biology Elective	3	MA451 or MA453	2
	15		14
Senior Year			
MA/STAT Elective from list[2]	3	MA/STAT Elective from list[2]	3
MA/STAT Elective	3	Free Elective	3
PH Elective (PH432 rec.)	3	Free Elective	3
PH Professional Elective	3	Free Elective	3
KA/University Course	3	KA/University Course	3
PH435 Senior Seminar	1	MA499 Professional Exp.	0
	16		15

[1]If the Physics major is declared after the first year, PH121 may be
replaced by a PH elective in the Junior or Senior year.
[2]Two of: MA332, STAT381, STAT382, STAT384

9 Faculty

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Brian Helenbrook (Engineering)
Christopher Lynch (Comp. Sci.)
Christino Tamon (Comp. Sci.)
Katie Kavanagh (STEM Edu.)
Benjamin Galluzzo (STEM Edu.)

Emeritus Faculty:
Abdul Jerri, Professor
David Powers, Professor
Michael Felland, Instructor
Scott Fulton, Professor

MA 499 Completion Sheet

Student Name:_____ **Student No:**_____

MA 499, **Professional Experience**
This course records success in completing requirements other than course work for the major. Given Pass/No credit only. Specific requirements (complete one from each category):

1. Demonstrate skill in computer applications by one of the following:
    a. Complete a course from this list: MA 377, CS 452, EE 468 or other courses as may be specified from time to time.
    b. Complete a project requiring the effective use of professional level software such as SAS, Matlab, Maple or other software such as that used in the courses mentioned in item a.

2. Demonstrate skill in communication by at least one of the following:
    a. Serve satisfactorily as tutor or undergraduate recitation leader in a math course for at least one semester.
    b. Make a presentation at a regional, national or international mathematics meeting.
    c. Write a paper on a mathematical subject that is accepted for publication in a national or international mathematics, science or engineering journal.
    d. Make a presentation about his or her work in a mathematics seminar at Clarkson.
    e. Present for evaluation by the Department faculty an acceptable portfolio of writings and/or other communications on mathematical subjects.

3. Demonstrate understanding of the profession by one or more of the following:
    a. Serve as an active officer in a student chapter of a professional or honorary society.
    b. Complete an internship or a co-op experience in a professional capacity.
    c. Participate in an undergraduate research project or a summer research experience for undergraduates.
    d. Take part in a mathematics or statistics consulting experience.
    e. Attend a meeting of a mathematics or statistics society.
    f. Join a professional mathematics or statistics society.

The student must present documentary evidence of satisfying these requirements to the Chairman of the Department of Mathematics .   Any courses presented to satisfy these requirements may also be counted toward course requirements for graduation.

Requirement satisfied by:

1._____

_____ Date:_____
      Instructor Signature (where appropriate) or attach documentation

2._____

_____ Date:_____
      Instructor Signature (where appropriate) or attach documentation

3._____

_____ Date:_____
      Instructor Signature (where appropriate) or attach documentation

Submit completed form to Math/Computer Science Office in SC 357.