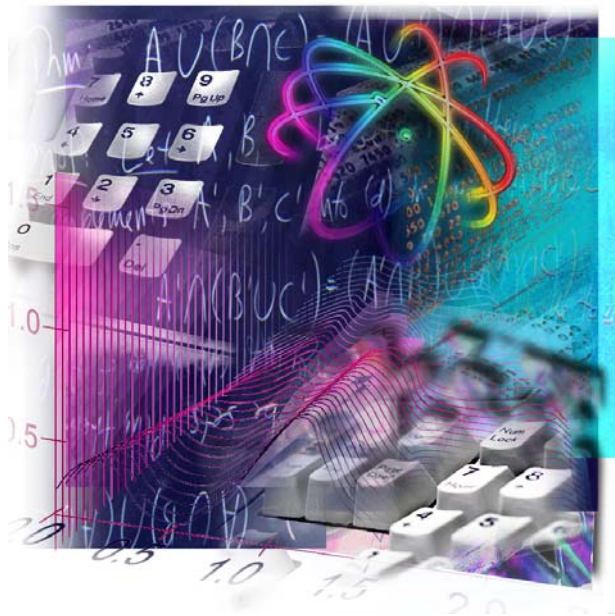


# Clarkson University



## Department of Mathematics

Student Handbook  
(Class of 2009 and earlier)  
March 2008



# Department of Mathematics

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This handbook has been prepared for advising purposes. It contains detailed requirements and advice for students majoring in Mathematics and Applied Mathematics & Statistics.

Note that the Clarkson Catalog (as amended), the Clarkson Regulations and the current edition of Courses remain the official references. As you plan your four years at Clarkson, keep in mind the special programs and general advice listed below.

**Co-op Program.** You may spend a 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 start planning in the fall of your sophomore year. Contact the Career Development Center. It's not too early.

**Semester Abroad.** Clarkson has agreements with universities in England, Australia, Sweden, and others for transfer of credits taken there. Usually done in the junior year. Contact the Career Development Center.

**Cross Registration.** The four local colleges have a cross registration program for transferring credit. For example, Potsdam State offers courses in foreign languages, fine arts, and education that are not available at Clarkson. Contact your advisor or SAS.

**Double Major.** In the last two years, 30% of Department students graduated having satisfied the requirements for two different majors. Mathematics and Computer Science was the most common. Also common was Math and Physics. Doubling with an engineering major usually requires overloading. See your advisor and the Chair of the second department.



**Master's degrees.** You can complete an MBA or MS in Management Systems at Clarkson in one additional year if you choose appropriate electives as an undergraduate. Visit the School of Business Graduate Office for details.

**Free Electives.** All Department programs include a fairly large number of free electives. You are strongly encouraged to use these electives in a meaningful way. You can use some of your free electives to take additional courses in your major. However, in the last two years, 70% of Department graduates used some of their free electives to earn either a minor or a second major. You are encouraged to follow their example; the knowledge and perspective gained through the study of a second discipline is invaluable. 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. Earning a minor or second major has the advantage of being recognized on your transcript.

**Minors.** The flexibility of the Department's programs makes it easy to add a minor to your major program of study. In the last two years, Department students satisfied the requirements for minors spanning 13 different disciplines, from Software Engineering and Digitally Mediated Communication to History and Political Science. See the Catalog for an up-to-date list of available minors. Then see your advisor and/or the department offering the minor.

#### **Sample Minors**

- Computational Science
- Computer Science
- Communications
- Physics
- Psychology

An application and sample requirements are at the back of this booklet.



- [1] Complete at least 120 credit hours and have a 2.0 cumulative average.
- [2] Students must achieve a cumulative QPA of at least 2.0 in the major field of study. The list of courses that constitute the major field is maintained by SAS. This list is also shown at the bottom of Sample Programs in this booklet.
- [3] All students must satisfy the requirements of the Foundation Curriculum. The Foundation Curriculum requirements can be found in the Clarkson Catalog and courses that fulfill the requirements can be found on-line at <http://www.clarkson.edu/sas/master/index.html>
- [4] The Liberal Arts Requirement has two parts. (a) The Foundation Curriculum requires 18 credit hours: LS 195 and LS 196 plus four elective courses. The four elective courses must be chosen so that at least one is a Humanities course (designated Hum) and at least one is a Social Science course (designated Soc). A course designated H/S can be counted either way. (b) The Department requires 6 additional credit hours\* in Liberal Arts, COMM, EC or PY courses.
- [5] FY 100: First-Year Seminar is **required** for all students entering as Freshmen.
- [6] Up to 12 credit hours of advanced (300- and 400-level) course work in aerospace studies or military science may count as free electives toward graduation requirements in Mathematics. (100- and 200-level AS and MS courses do **not** count toward graduation requirements.)
- [7] Some of the program requirements are electives that must be chosen from specified lists of courses. Some of these lists are reviewed and updated periodically. Check with your advisor or with the Division office for the most up-to-date list.

**\*Applied Math & Statistics majors must take at least 2 COMM courses.**



**Sample Program**

Freshman Year					
Course	Title	Cr.Hrs	Course	Title	Cr.Hrs
MA131	Calculus I	3	MA132	Calculus II	3
PH 131	Physics I	4	PH 132	Physics II	4
LS 195	Great Ideas I	3	LS 196	Great Ideas II	3
CS 141	Computer Science I	4		Free Elective	3
FY 100	First Year Seminar	1		Free Elective	3
	TOTAL	15		TOTAL	16
Sophomore Year					
MA211	Foundations	3	MA 231	Calculus III	3
MA232	Differential Equations	3	MA 339	Applied Linear Algebra	3
	Liberal Arts Elective	3	MA 383	Applied Statistics I	3
	Science Elective	3		Science Elective	3
	Bus/Eng Elective	3		Application Elective	3
	TOTAL	15		TOTAL	15
Junior Year					
MA3xx	Math & Stat Elective	3	MA 363	Mathematical Modeling	3
MA3xx	Math & Stat Elective	3	MA 3xx	Math & Stat Elective	3
	Liberal Arts Elective	3	MA 3xx	Math & Stat Elective	3
	Bus/Eng Elective	3		Liberal Arts Elective	3
	Application Elective	3		Application Elective	3
	TOTAL	15		TOTAL	15
Senior Year					
MA3xx	Math & Stat Elective	3	MA 3xx	Math & Stat Elective	3
	COMM Elective	3		COMM Elective	3
	Application Elective	3		Liberal Arts Elective	3
	Free Elective	3		Application Elective	3
	Free Elective	3		Free Elective	2
	TOTAL	15	MA 499	Prof. Requirements	0
				TOTAL	14
				GRAND TOTAL	120

**Application Electives:** At least five three-credit courses from one or more fields of applications chosen from the list: BY 314; CM 314; EC 311, 350; OM 331; ES 220, 222, 223, 250, 260, 330, 340; PH 221, 231, 322, 325, 331, 380; EE 264; CH 301, 302; CM 371, 372; and other courses as may be specified from time to time. **Math & Stat Electives:** at least four courses from MA 331, 332, 377, 381, 382, 384; and at least two more 3-credit MA courses at 300+ level.

*Major field of study list:* All MA courses MA 131 or higher except: MA 239, 282, 300-310, 351, 400-432, 488, 497-499.



**MA/CS REQUIRED** (45 hours)

COURSE	gr	cr	
MA131	___	___	
MA132	___	___	
CS 141	___	___	
MA211	___	___	
MA231	___	___	
MA232	___	___	
MA339	___	___	
MA363	___	___	
MA383	___	___	
MA___	___	___	(four courses from MA 331,
MA___	___	___	332, 377, 381, 382, 384)
MA___	___	___	
MA___	___	___	
MA___	___	___	(two three-credit courses at 300 level or above
MA___	___	___	excluding: MA 488, MA 497, or MA 498)
MA499	___	___	Professional Requirements

**SCIENCE REQUIREMENT** (12 credits minimum)

PH131	___	___	
PH132	___	___	
_____	___	___	(4 credits in PH, CM, BY or Science Foundation courses)

**LIBERAL ARTS** (24 credits including two COMM) **Note:** LA 050-051 do NOT count toward degree requirements!

LS195	___	___	
LS196	___	___	
_____	___	___	(hum) <b>Application Courses</b> (15 credits minimum)
_____	___	___	from approved list (may also count toward
_____	___	___	Science, Liberal Arts, Engineering, or
_____	___	___	Business requirements):
_____	___	___	
_____	___	___	

**OTHER FOUNDATION REQUIREMENTS** (7 hours)

FY 100	___	<u>1</u>	
_____	___	<u>3</u>	Engineering course
_____	___	<u>3</u>	Business course

**FREE ELECTIVES** (additional credits to sum to 120) (may include up to 12 credits AS/MS at 300-level or above).

_____	___	___	_____	___	___
_____	___	___	_____	___	___
_____	___	___	_____	___	___



### **MA 499, Professional Requirements**

This course records success in completing requirements other than course work for the major in Applied Mathematics and Statistics. Given Pass/No credit only. Specific requirements:

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 mathematics 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. Participate and make a presentation 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 Science.
- 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.

### **Suggestions**

Below are some groups of courses that focus on a particular area of Applied Mathematics and Statistics. These groupings are suggestions from the faculty; they are not requirements. Be sure to check prerequisites before you register for a course.

**Actuarial Science** Students should consider these additional courses (Sample program available, see Prof. Felland)

- MA377 Numerical Methods
- EC150, 151 Principles of Micro, Macro Economics
- EC369 Introduction to Econometrics
- EC465 Economics and Business Forecasting
- FN361 Corporate Finance
- FN462 Investments

**Statistics** Students should consider these additional courses (See Prof. Alhakim)

- EC369 Introduction to Econometrics
- ES405 Design of Experiments
- OM485 Quality Systems Management
- PY356 Experimental Psychology



**Sample Program**

<b>Freshman Year</b>					
Course	Title	Cr.Hrs	Course	Title	Cr.Hrs
MA131	Calculus I	3	MA132	Calculus II	3
PH 131	Physics I	4	PH 132	Physics II	4
LS 195	Great Ideas I	3	LS 196	Great Ideas II	3
CS 141	Computer Science I	4		Free Elective	3
FY 100	First Year Seminar	1		(CS142 rec)	
	<b>TOTAL</b>	<b>15</b>		Free Elective	3
				<b>TOTAL</b>	<b>16</b>
<b>Sophomore Year</b>					
MA211	Foundations	3	MA 231	Calculus III	3
MA232	Differential Equations	3	MA 339	Applied Linear Algebra	3
	Liberal Arts Elective	3	MA 383	Applied Statistics I	3
	Science Elective	3		Science Elective	3
	Free Elective	3		Liberal Arts Elective	3
	<b>TOTAL</b>	<b>15</b>		<b>TOTAL</b>	<b>15</b>
<b>Junior Year</b>					
MA321	Advanced Calculus I	3	MA/CS	Math/CS Elective	3
MA311	Abstract Algebra	3	MA 322	Advanced Calculus II	3
	(or MA 313)		MA 3xx	(or MA 314)	
	Liberal Arts Elective	3		Bus/Eng Elective	3
	Bus/Eng Elective	3		Liberal Arts Elective	3
	Free Elective	3		Free Elective	3
	<b>TOTAL</b>	<b>15</b>		<b>TOTAL</b>	<b>15</b>
<b>Senior Year</b>					
MA/CS	Math/CS Elective	3	MA/CS	Math/CS Elective	3
MA/CS	Math/CS Elective	3		Liberal Arts Elective	3
	Liberal Arts Elective	3		Free Elective	3
	Free Elective	3		Free Elective	3
	Free Elective	3		Free Elective	2
	<b>TOTAL</b>	<b>15</b>		<b>TOTAL</b>	<b>14</b>
				<b>GRAND TOTAL</b>	<b>120</b>

*Major field of study list:* All MA courses MA 131 or higher except: MA 239, 282, 300-310, 351, 400-432, 488, 497-499.



MATHEMATICS (MATH OPTION)

**MA/CS REQUIRED** (45 hours)

COURSE	gr	cr	
MA131	___	___	
MA132	___	___	
CS 141	___	___	
MA211	___	___	
MA231	___	___	
MA232	___	___	
MA321	___	___	
MA339	___	___	
MA383	___	___	
MA___	___	___	(two courses from MA 311,
MA___	___	___	313, 314, 322)
MA___	___	___	
MA___	___	___	
MA___	___	___	(Plus 11 credits of MA/CS)
MA___	___	___	

**SCIENCE REQUIREMENT** (12 credits minimum)

PH131	___	___	
PH132	___	___	
_____	___	___	(4 credits in PH, CM, BY, or Science Foundation course)

**LIBERAL ARTS** (24 credits) **Note:** LA 050-051 do NOT count toward degree!

LS195	___	___	
LS196	___	___	
_____	___	___	(hum)
_____	___	___	(soc)
_____	___	___	(hum/soc)
_____	___	___	(hum/soc)
_____	___	___	
_____	___	___	

**OTHER FOUNDATION REQUIREMENTS** (7 hours)

FY 100	___	<u>1</u>	
_____	___	<u>3</u>	Engineering course
_____	___	<u>3</u>	Business course

**FREE ELECTIVES** (additional credits to sum to 120) (may include up to 12 credits AS/MS at 300-level or above).

_____	___	___	_____	___	___	_____	___	___
_____	___	___	_____	___	___	_____	___	___
_____	___	___	_____	___	___	_____	___	___



**Sample Program**

<b>Freshman Year</b>					
Course	Title	Cr.Hrs	Course	Title	Cr.Hrs
MA131	Calculus I	3	MA132	Calculus II	3
PH 131	Physics I	4	PH 132	Physics II	4
LS 195	Great Ideas I	3	LS 196	Great Ideas II	3
CS 141	Computer Science I	4		Free Elective	3
FY 100	First Year Seminar	1		(CS142 rec)	
	<b>TOTAL</b>	<b>15</b>		Free Elective	3
				<b>TOTAL</b>	<b>16</b>
<b>Sophomore Year</b>					
MA211	Foundations	3	MA 231	Calculus III	3
MA232	Differential Equations	3	MA 339	Applied Linear Algebra	3
	Liberal Arts Elective	3	MA 383	Applied Statistics I	3
	Science Elective	3		Science Elective	3
	Free Elective	3		Liberal Arts Elective	3
	<b>TOTAL</b>	<b>15</b>		<b>TOTAL</b>	<b>15</b>
<b>Junior Year</b>					
MA321	Advanced Calculus I	3	MA 382	Mathematical Statistics	3
MA381	Probability	3	MA 384	Applied Statistics II	3
	Liberal Arts Elective	3		Bus/Eng Elective	3
	Bus/Eng Elective	3		Liberal Arts Elective	3
	Free Elective	3		Free Elective	3
	<b>TOTAL</b>	<b>15</b>		<b>TOTAL</b>	<b>15</b>
<b>Senior Year</b>					
MA488	Statistics Project	1-3	MA/CS	Math/CS Elective	3
MA/CS	Math/CS Elective	2-4		Liberal Arts Elective	3
	Liberal Arts Elective	3		Free Elective	3
	Free Elective	3		Free Elective	3
	Free Elective	3		Free Elective	3
	<b>TOTAL</b>	<b>14</b>		<b>TOTAL</b>	<b>15</b>
				<b>GRAND TOTAL</b>	<b>120</b>

*Major field of study list:* All MA courses MA 131 or higher except: MA 239, 282, 300-310, 351, 400-432, 488, 497-499.



MATHEMATICS (STATISTICS OPTION)

**MA/CS REQUIRED** (45 hours)

COURSE	gr	cr
MA131	___	___
MA132	___	___
CS 141	___	___
MA211	___	___
MA231	___	___
MA232	___	___
MA321	___	___
MA339	___	___
MA381	___	___
MA382	___	___
MA383	___	___
MA384	___	___
MA488	___	(1-3 credit hours)
MA___	___	(Plus 5-7 credits of MA/CS)
MA___	___	___

.....  
**SCIENCE REQUIREMENT** (12 credits minimum)

PH131	___	___
PH132	___	___
_____	___	___ (4 credits in PH, CM, BY, or Science Foundation courses)

**LIBERAL ARTS** (24 credits) **Note:** LA 050-051 do NOT count toward degree!

LS195	___	___
LS196	___	___
_____	___	___ (hum)
_____	___	___ (soc)
_____	___	___ (hum/soc)
_____	___	___ (hum/soc)
_____	___	___
_____	___	___

**OTHER FOUNDATION REQUIREMENTS** (7 hours)

FY 100	___	<u>1</u>
_____	___	<u>3</u> Engineering course
_____	___	<u>3</u> Business course

**FREE ELECTIVES** (additional credits to sum to 120) (may include up to 12 credits AS/MS at 300-level or above).

_____	___	___	_____	___	___	_____	___	___
_____	___	___	_____	___	___	_____	___	___
_____	___	___	_____	___	___	_____	___	___



### **Suggestions**

Mathematics majors who want to focus their studies in a particular area should consider these groupings of courses. The following are suggestions, not requirements:

**Actuarial Science** Students should take the Statistics Option and consider these additional courses (Sample program available, see Prof. Felland)

- MA377 Numerical Methods
- EC150, 151 Principles of Micro, Macro Economics
- EC311 Introduction to Econometrics
- EC465 Economics and Business Forecasting
- FN361 Corporate Finance
- FN462 Investments

### **Applied Mathematics**

- MA331 Fourier Series and Boundary Value Problems
- MA332 Intermediate Differential Equations
- MA362 Complex Analysis with Applications
- MA363 Mathematical Modeling
- MA377 Numerical Methods
- MA381 Probability
- CS452 Computer Graphics

### **Business Applications**

- MA381 Probability
- EC 150 Principles of Micro Economics
- EC 151 Principles of Macro Economics
- OM 331 Operations/Production Management

**Statistics** Students should take the Statistics Option and consider these additional courses (See Prof. Alhakim)

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

**Pure Mathematics**

MA311 Abstract Algebra  
MA313 Abstract Linear Algebra  
MA314 Number Theory and its Applications  
MA322 Advanced Calculus II  
MA332 Intermediate Differential Equations  
MA362 Complex Analysis with Applications  
MA381 Probability

**Activities****Modeling Contest**

Interested in solving real world problems in a team environment? We are currently looking for students to compete in the International Mathematical Contest in Modeling (MCM). See <http://www.comap.com/undergraduate/contests/> for more details or contact Prof. Fowler at [kfowler@clarkson.edu](mailto:kfowler@clarkson.edu). Look for flyers posted around campus soon!

**Pi Mu Epsilon**

Pi Mu Epsilon is a national mathematics honor society. Membership is honorary, based on scholastic achievement; however, most activities are open to all interested students and faculty. Contact Prof. Fulton ([fulton@clarkson.edu](mailto:fulton@clarkson.edu)) for information.

**AWM**

We are happy to announce the newly formed chapter of the Association for Women in Mathematics. 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 the varied career options in mathematics, to network with professional mathematicians, and to develop leadership skills. In addition we plan math related activities for the department, university, and community. Contact Prof. Fowler if you are interested in joining or tutoring ([kfowler@clarkson.edu](mailto:kfowler@clarkson.edu)).



**Sample Schedule for Double Major in  
Mathematics and Computer Science**

Freshman Year					
Course	Title	Cr.Hrs	Course	Title	Cr.Hrs
MA131	Calculus I	4	MA132	Calculus II	3
CS 141	Computer Science I	3	CS 142	Computer Science II	3
PH 131	Physics I	4	PH 132	Physics II	4
LS 195	Great Ideas I	3	LS 196	Great Ideas II	3
FY 100	First Year Seminar	1		Free Elective	3
	<b>TOTAL</b>	<b>15</b>		<b>TOTAL</b>	<b>16</b>
Sophomore Year					
MA211	Foundations	3	MA231	Calculus III	3
MA232	Differential Equations	3	MA339	Applied Linear Algebra	3
CS 242	Adv. Prog. Concepts	3	CS 241	Computer Organization	3
	Science Elective	3	CS 344	Data Structures	3
	Liberal Arts Elective	3		Science Elective	3
	<b>TOTAL</b>	<b>15</b>		<b>TOTAL</b>	<b>15</b>
Junior Year					
MA321	Advanced Calculus I	3	MA383	Applied Statistics I	3
CS 341	Programming Lang.	3	CS 444	Operating Systems	3
CS 345	Automata Theory	3	CS 445	Compiler Construction	3
	Liberal Arts Elective	3		Business Elective	3
	Free Elective	3		Free Elective	3
	<b>TOTAL</b>	<b>15</b>		<b>TOTAL</b>	<b>15</b>
Senior Year					
MA311 /313	Abstract Algebra or Linear Algebra	3	MA322 /314	Advanced Calculus II or Number Theory	3
MA377	Numerical Methods*	3		CS/EE Elective	3
	CS Elective	3		Liberal Arts Elective	3
	Liberal Arts Elective	3		Liberal Arts Elective	3
	Liberal Arts Elective	3		Free Elective	3
	<b>TOTAL</b>	<b>15</b>		<b>TOTAL</b>	<b>15</b>
				<b>GRAND TOTAL</b>	<b>120</b>

\*Recommended.



**Sample Schedule for Double Major in  
Applied Mathematics and Statistics and Computer Science**

<b>Freshman Year</b>					
Course	Title	Cr.Hrs	Course	Title	Cr.Hrs
MA131	Calculus I	4	MA132	Calculus II	3
CS 141	Computer Science I	3	CS 142	Computer Science II	3
PH 131	Physics I	4	PH 132	Physics II	4
LS 195	Great Ideas I	3	LS 196	Great Ideas II	3
FY 100	First Year Seminar	1		Free Elective	3
	<b>TOTAL</b>	<b>15</b>		<b>TOTAL</b>	<b>16</b>
<b>Sophomore Year</b>					
MA211	Foundations	3	MA231	Calculus III	3
MA232	Differential Equations	3	MA339	Applied Linear Algebra	3
CS 242	Adv. Prog. Concepts	3	CS 241	Computer Organization	3
	Science/Appl Elective	3	CS 344	Data Structures	3
	Appl/L.A. Elective	3		Science/Appl Elective	3
	<b>TOTAL</b>	<b>15</b>		<b>TOTAL</b>	<b>15</b>
<b>Junior Year</b>					
MA383	Applied Statistics	3	MA363	Math Modeling	3
CS 341	Programming Lang.	3	CS 444	Operating Systems	3
CS 345	Automata Theory	3	CS 445	Compiler Construction	3
	Liberal Arts Elective	3		Business Elective	3
	Appl. Elective	3		COMM Elective	3
	<b>TOTAL</b>	<b>15</b>		<b>TOTAL</b>	<b>15</b>
<b>Senior Year</b>					
MA3xx	Math/Stat Elective	3	MA 3xx	Math/Stat Elective	3
MA377	Numerical Methods	3	MA 3xx	Math/Stat Elective	3
	CS Elective	3		CS/EE Elective	3
	COMM Elective	3		Liberal Arts Elective	3
	Appl. Elective	3		Appl. Elective	3
	<b>TOTAL</b>	<b>15</b>	MA 499	Prof. Req.	0
				<b>TOTAL</b>	<b>15</b>
				<b>GRAND TOTAL</b>	<b>120</b>



**Sample Schedule for Double Major in  
Mathematics and Digital Arts & Science**

Freshman Year					
Course	Title	Cr.Hrs	Course	Title	Cr.Hrs
CS 141	Computer Science I	4	CS 142	Computer Science II	3
MA131	Calculus I	3	MA132	Calculus II	3
DA 205	Painting and Drawing	3	DA100	Digital Studio I	3
LS 195	Great Ideas I	3	LS 196	Great Ideas II	3
FY 100	First Year Seminar	1		Free Elective	3
	<b>TOTAL</b>	<b>14</b>		<b>TOTAL</b>	<b>15</b>
Sophomore Year					
CS 242	Adv. Prog. Concepts	3	MA231	Calculus III	3
PH 131	Physics I	4	COMM	Digital Imagery	3
COMM	Mass Media & Soc.	3	321		
310			COMM	Intro to Web Design	3
MA232	Differential Eqs.	3	341		
FILM	Hist Art Film Anima.	3	PH 132	Physics II	4
344			DA 200	Digital Studio II	3
	<b>TOTAL</b>	<b>16</b>		<b>TOTAL</b>	<b>16</b>
Junior Year					
MA377	Numerical Methods	3	MA 339	Appl Linear Algebra	3
COMM	Digital Video I	3	COMM	Digital Video II	3
327		3	427		
MA211	Foundations	3	CS 452	Computer Graphics	3
PH 323	Optics* (or Sci. Elect)	3/1	DA 300	Digital Studio III	3
	BUS or Soc. Sci.	3	MA 383	Applied Statistics	3
	<b>TOTAL</b>	<b>16</b>		<b>TOTAL</b>	<b>15</b>
Senior Year					
DA 491	DA&S Portfolio Dev.	2	DA 492	DA&S Portfolio	3
COMM	Info Architecture	3	MA322	MA 322 <b>or</b> MA 314	3
345				COMM Elective	3
MA321	Advanced Calculus I	3		Soc Sci <b>or</b> BUS	3
MA311	<b>or</b> MA 313	3		Free Elective	2
	Liberal Arts Elective	3		<b>TOTAL</b>	<b>15</b>
	<b>TOTAL</b>	<b>14</b>			
				<b>GRAND TOTAL</b>	<b>120</b>

\*The Mathematics Major requires 12 credit hours of Science. Students who choose PH 323 therefore need one more hour of science which could be a directed study. Alternatively a 4-credit science course could be taken.



**Sample Schedule for Double Major in  
Mathematics and Physics**

<b>Freshman Year</b>					
Course	Title	Cr.Hrs	Course	Title	Cr.Hrs
CS 141	Computer Science I	4	CS 142	Computer Science II	3
MA131	Calculus I	3	MA132	Calculus II	3
PH 131	Physics I	4	PH 132	Physics II	4
LS 195	Great Ideas I	3	LS 196	Great Ideas II	3
FY 100	First Year Seminar	1		Liberal Arts Elective	3
	<b>TOTAL</b>	<b>15</b>		<b>TOTAL</b>	<b>16</b>
<b>Sophomore Year</b>					
CM131	Chemistry I	4	MA231	Calculus III	3
MA211	Foundations	3	MA339	Applied Linear Algebra	3
MA232	Differential Eqs.	3	PH 221	Theoretical Mechanics	3
PH231/2	Modern Physics	4	CM 132	Chemistry II	4
	Liberal Arts Elective	3		COMM Elective	3
	<b>TOTAL</b>	<b>17</b>		<b>TOTAL</b>	<b>16</b>
<b>Junior Year</b>					
MA321	Advanced Calculus I	3	MA383	Applied Statistics I	3
MA377	Numerical Methods	3	MA 331	Fourier Series	3
PH 325	Thermal Physics	3	PH 327	Experimental Phys I	3
PH 380	Electromag Thy I	3	PH 331	Quantum Physics I	3
	Biology Elective	3		Business Elective	3
	<b>TOTAL</b>	<b>15</b>		<b>TOTAL</b>	<b>15</b>
<b>Senior Year</b>					
MA311/3	Abstr Algebra/Linear	3	MA	MA 314 or MA 322	3
PH 432	Quantum Physics II	3	MA 3xx	MA Elective	3
PH 435	Senior Seminar	3	PH 381	Electromag Thy II	3
	Liberal Arts Elective	3		Liberal Arts Elective	3
	ENG Elective	3		COMM Elective	3
	<b>TOTAL</b>	<b>15</b>		<b>TOTAL</b>	<b>15</b>
				<b>GRAND TOTAL</b>	<b>120</b>



### Sample Minors

#### Examples of basic requirements for a minor are:

*For complete requirements—contact department offering the minor (plus all university requirements for a minor must be met).*

#### **Computational Science Minor**

MA277 Introduction to Computational Science

MA377 Numerical Methods

#### **At least two of**

MA232 Differential Equations

MA239/339 Elementary/Applied Linear Algebra

MA282/383 General/Applied Statistics

**Application area electives** to make a total of 21 credits.

#### **Computer Science Minor**

##### **Core courses**

CS141 Introduction to Computer Science I

CS142 Introduction to Computer Science II

MA211 Foundations

CS344 Algorithms and Data Structures

##### **Electives**

Three additional CS courses, one numbered 200 or higher, one numbered 300 or higher, and one numbered 400 or higher. Each course must be worth at least three credits.

#### **Information Technology**

two courses in problem solving and programming:

CS141 *or* EE261, **and** CS142 *or* EE361

one course in computer systems

CS241 *or* EE360

one course in database administration

IS414

one course in computer networks

CS 454 *or* CS 455/EE407

Two courses concerned with web technologies and administration: COMM 442 **and** COMM 444.

**Contact department offering the Minor for a complete list of requirements for the minor you are interested in!**

# Undergraduate Declared Minor Form

Date Initiated \_\_\_\_\_

1. Student Name \_\_\_\_\_ Student Number \_\_\_\_\_

Local Box \_\_\_\_\_ Local Phone \_\_\_\_\_

Class Year \_\_\_\_\_ Musician's Name \_\_\_\_\_

In addition to my major in \_\_\_\_\_ and second major (if applicable) in \_\_\_\_\_  
I request that I be registered for a minor in \_\_\_\_\_

I UNDERSTAND THAT the University has no responsibility to offer or schedule courses in order to assure the achievement of the minor. If I decide to drop my minor, I will inform Student Administrative Services in writing. Further, I understand that all requirements for completion of the minor must be complete at the time of graduation from Clarkson University in order to be a registered part of my degree program.

Student: \_\_\_\_\_ Date: \_\_\_\_\_  
Signature

## 2. Approvals

Approval: \_\_\_\_\_ Date: \_\_\_\_\_  
Chair/Director, 1st Named Major

1st Major Advisor's Name: \_\_\_\_\_

Approval: \_\_\_\_\_ Date: \_\_\_\_\_  
Chair/Director, 2nd Named Major

2nd Major Advisor's Name: \_\_\_\_\_

Approved: \_\_\_\_\_ Date: \_\_\_\_\_  
Chair/Director, Minor Department

Distribution: Chair/Director, 1st Major  
Chair/Director, 2nd Major  
Chair/Director, Minor

