Department of Mathematics
Academic Advising Handbook

Fall 2009 (last updated: March 19, 2009)

Contents

This handbook provides students and their academic advisors with easy access to basic advising information for programs in the Department of Mathematics. It is intended as a summary of, not a replacement for, the more authoritative sources of information such as the *Bulletin of Information* or the College of Science web pages `www.science.nd.edu`.

1 Why Mathematics?

The main reason for choosing mathematics as your major is, of course, because you like mathematics! Anyone who has done well in calculus and enjoys working out mathematical problems should consider pursuing a program in mathematics. And there are many other good reasons.

The mathematics programs at Notre Dame are designed to provide you with a first-class mathematical education and give you a good start on any one of a number of career directions. There are currently about 150 mathematics majors in the sophomore, junior and senior classes combined. To give you an idea of the kind of students in mathematics and what they do when they graduate, here is a summary of the programs and career plans of a recent senior class. Of a total of 42 graduating mathematics majors, more than a third (17) pursued the Mathematics Career Program. Numbers in the other programs were: Honors 6, Life Science 6, Business Administration 5, Education 5, and Computing 3. In addition, one of the students in the Honors program also completed the Computing program, while another student in the Computing program also completed the Applied Mathematics program. About one fourth of these seniors started various careers in business, most commonly as computer consultants or actuaries. Fourteen pursued advanced degrees, in mathematics, medicine, statistics, fine arts, law, education and music. Five went into teaching, including one working with the Alliance for Catholic Education. Three entered the Air Force, and two did volunteer social work for a year.

For those who pursue careers in industry, the average starting salaries of mathematics majors are competitive with most majors in engineering or business and are usually higher than majors in arts and letters.

The training and analytical skills acquired in studying mathematics are precisely what many companies and professional schools are looking for.

Jobs of a mathematical nature are attractive for reasons other than income too. Of 250 occupations ranked in order of desirability by the 1999 publication *Jobs Rated Almanac*, based on income, stress, physical demands, potential growth, job security and work environment, the top six are all mathematically based!

2 Requirements

Students must satisfy requirements on three levels: university requirements, college requirements, and departmental requirements, each of which is summarized below. It is important to remember that a student needs a minimum of 124 total credit hours to graduate from the College of Science with a minimum of 60 of those in science. Certain restrictions on credit hours may apply, see below. It is ultimately the student's responsibility to make sure that he or she has completed all the degree requirements described in the copy of the Undergraduate Bulletin of Information published the year the student entered the University.

University Requirements

- Composition
- Theology* (6 credit hours)
- Philosophy* (6 credit hours)
- History*
- Social Science*
- Fine Arts or Literature*

  *One of these courses must be a University Seminar 180

Science Requirements

- CHEM 10117–10118^{+}
- MATH 10550–10560 (or 10350–10360 for Biology, Preprofessional, and Science-Business majors)
- PHYS 10310 - 10320 (or PHYS 30210–30220 if two semesters of General Biology with labs or Organic Chemistry with labs are also taken). [Students who had already taken PHYS 127 were able to fulfill this requirement by completing the sequence PHYS 127–128–229 in the 2000/2001 academic year.]
- An additional science *or mathematics* elective course. **Not all courses offered in the College of Science satisfy this requirement.** They have to be at the major's level in the College of Science. See the section on University and College Requirements in the College of Science section of the Bulletin. Any 30- or 40-level Mathematics course, beyond the required ones described on the next page, satisfies this requirement.
- Language proficiency through intermediate level.

$^{+}$For students entering the University after 2006-2007, the requirement is CHEM (10171 or 10181) and CHEM (10182 or 10122).

Mathematics Requirements

Mathematics Honors Program

- Calculus: MATH 10850–10860, 20850–20860
- Linear and Abstract Algebra: MATH 20810–20820, 30810–30820
- Real Analysis: MATH 30850–30860
- Mathematics Electives: 12 credit hours with 6 or more at the 40000 level

Mathematics Career Program (and most other programs)

- Calculus: MATH 10550–10560–20550
- Ordinary Differential Equations: MATH 20750 (formerly MATH 226)
- Linear Algebra: MATH 20610
- Introduction to Mathematical Reasoning: MATH 20630
- Algebra: MATH 30710
- Real Analysis: MATH 30750
- Computer Programming: MATH 20210
- Mathematics Electives: 12 credit hours with 3 or more at the 40- level

Restrictions

- Some or even all of the language requirement can be satisfied by passing an appropriate placement exam. Students should consult with the appropriate department and the First Year of Studies. Regardless of the credit hours awarded for language placement, *a maximum of 6 credit hours of placement credit are allowed toward the science degree.*
- Up to 3 credit hours total are allowed toward the science degree from activities (Band, music lessons, Debate, Social Concerns seminars, etc.), *but no more than one credit hour total from any of these courses per semester.*
- Up to 6 credit hours total are allowed toward the science degree from 3000–4000 ROTC courses.
- MATH 30440 (Intro to Probability and Statistics) does not count toward the required twelve credit hours of 30- 40-level math electives.
- Science courses specified by a major program must be taken at Notre Dame. Prior approval from the Dean is required for transfer credit.

- The College of Science limits students to registering for a total of 18 credit hours in any given semester. ROTC and activity courses (Band, CSC seminars, etc.) do not count toward this limit. Students may request special permission from the dean to register for more than 18 credit hours—an "overload"—but such requests are not considered until the first class day of the semester.

- It is possible that not all advanced placement credit showing on the transcript can be counted towards a particular degree.

- Any Mathematics major can choose to write a senior thesis. This demanding but rewarding project generally takes three semesters to complete. The final product must be approved by the Undergraduate Studies Committee of the Department of Mathematics, and the student will receive the citation "Graduation with Senior Thesis" on the transcript. See the Director of Undergraduate Studies for details.

- Up to 3 credits of the 12-credit elective requirement can come from MATH 46800, Directed Readings. A student may propose to take MATH 46800 more than once. After consultation with the instructor, the Director of Undergraduate Studies will decide if the proposed course will count for one or two credits, and if it will count toward the 12 credit elective requirement. A student may not count Math 46800 (or Math 48900) toward the 12-credit elective requirement if the work done is toward the writing of a thesis. In this case only general elective credit will be given.

Changing Majors to Mathematics

For students changing majors to mathematics from another department the following guidelines apply:

- Students who have taken MATH 10250–10260/10270 must take MATH 10550–10560. Credit hours for MATH 10250–10260/10270 will remain on the transcript but will not be counted towards the credit hours needed for graduation.

- Students who have taken MATH 10350 or MATH 10450 (or MATH 10350–10360, MATH 10450–10460, respectively), with the permission of the Director of Undergraduate Studies, may continue with MATH 10560. This transition only applies to students changing their major to mathematics. MATH 10350 or MATH 10450 may not normally be substituted for MATH 10550. Credit hours for MATH 10360 or MATH 10460, if applicable will remain on the transcript but will not be counted towards the credit hours needed for graduation.

- For students changing from engineering who have taken CHEM 10115 and EG 120, or CHEM 10115 and EG 111-112 the chemistry lab required of science students in CHEM 10117 is waived.

- For students changing from engineering, the sequence MATH 20580–30650 may be substituted for MATH 20610–20750, required of mathematics majors.
- Students changing from engineering who have taken CSE 20232, Advanced Programming, are not required to take MATH 20210, Computer Programming and Problem Solving, but must instead take an additional mathematics elective.
- When a change of majors involves a change in college, the dean of the new college may adjust how credit hours are applied toward the new degree. For example, mathematics courses taken off-campus may be counted toward a degree in the College of Engineering but not in the College of Science.

Math Majors in the College of Science

The College of Science website contains a very useful "frequently asked questions" page

http://science.nd.edu/academic/faq.htm

with detailed information on the College language requirement, science math electives, and much more.

3 Choosing a Program

The Mathematics Career Program leads to a degree in the College of Science. This program is designed for students who want to use mathematics as a tool in science or industry and emphasizes problem-solving while still providing a grounding in theory. The Mathematics Career Program is one of several programs that may be selected by students majoring in mathematics. Most of the other programs have the same basic mathematics requirements as the Mathematics Career Program but add required courses from a particular area (or group of related areas) as free electives and may also make certain requirements among the mathematics electives.

The Mathematics Honors Program may be completed either in the College of Science or in the College of Arts and Letters. This is a rigorous program aimed at students who thrive on challenge and enjoy mathematics for its own sake. Students interested in the Mathematics Honors Program should consult with the Director of Undergraduate Studies in Mathematics.

Selection of the mathematics major is normally made in the spring semester of the first year. A student may declare a program any time thereafter by filling out the appropriate forms with the Director of Undergraduate Studies. The default program is the Mathematics Career Program. Programs may be changed at any time. It is also possible to pursue more than one program. For example, to major in mathematics in the Mathematics Honors Program and also complete the Computing Program.

The programs in mathematics have the following official designations:

Designation	*Program*
HONS	Mathematics Honors Program
NONE	Mathematics Career Program
APPL	Applied Mathematics Program
BUSA	Mathematics and Business Administration Program
CMPT	Mathematics and Computing Program
EDUC	Mathematics Education Program
EGSC	Mathematics and Engineering Science Program
LFSC	Mathematics and Life Sciences Program
SOSC	Mathematics and Social Science Program

Second Majors and Minors

Students pursuing mathematics as a first major may add a second major in the College of Arts and Letters or in the College of Science. Requirements for arts and letters second majors vary—for example, a second major in philosophy requires six courses beyond the two-course university requirement (18 credit hours) and a second major in psychology requires a minimum of 30 credit hours. A second major in science is extremely challenging and requires that the student meet *all* requirements of the mathematics program and the chosen science program. Only students of superior scholastic ability should consider

this as an option, since such a double major program can entail taking four or five mathematics and science courses at a time and total credit hours well over the college minimum of 124. For all such double major programs, the student receives one degree, the Bachelor of Science, with two majors. This is distinct from programs leading to dual degrees—for example, a Bachelor of Science *and* a Bachelor of Arts—which require 30 or more extra credit hours and commonly take more than four years to complete.

Students who have the interest in a second major but do not have the time to devote to a particular program may wish to consider a concentration or minor program in the College of Arts and Letters. (The College of Engineering has available one minor program, in Geological Sciences; there are no minor programs in the College of Science.) The number of credit hours required for a concentration is typically 15 and for a minor typically 12.

Students interested in any of the above possibilities should consult both the Bulletin of Information and the offering department for details. The proposed program must be formally accepted by the departments and the dean of the College of Science.

Restrictions

College of Science students are not allowed to add as a second major Arts and Letters Preprofessional Studies (ALPP) or Computer Applications (CAPP). The College of Science does not allow the double counting of second major, minor, or concentration requirements toward University requirements. Any double counting rules developed in the College of Arts and Letters for first and second majors do not apply to College of Science students. While most College of Science programs are allowed as a second major with mathematics, there are some combinations that are forbidden including: Preprofessional Studies (SCPP), any of the Collegiate Sequences, and parallel programs such as Mathematics and Life Sciences and Biological Sciences.

Mathematics as a Second Major

Students in the College of Business Administration or the College of Arts and Letters may pursue a second major in mathematics by completing all mathematics courses required for the Mathematics Career Program (13 courses/42 credit hours). (Students majoring in finance and business economics may reduce the number of mathematics courses by one, by taking MATH 30530, 30540 and 60850.) In order to list mathematics as a second major on the transcript, the student must satisfy all of the requirements for a major in some department of the Colleges of Business Administration or Arts and Letters.

4 Getting Advice

Every mathematics major is assigned to a member of the mathematics faculty who will be the student's academic advisor until graduation. Students may also meet with the Director of Undergraduate Studies for academic advice. The purpose of an academic advisor is:

- To advise students in choosing an academic program and to assist them in selecting appropriate courses.
- To help students find information about career opportunities.
- To help students find information regarding academic scholarships, undergraduate research or other special opportunities.
- To advise students about graduate school.
- To give general advice to students about their academic life at Notre Dame.

The advisor will meet with each of his students at least once per semester to monitor the student's academic progress in his or her chosen program. The advisor will also provide the student's PIN for the next Web Registration period. In fact, this is the only way a student can obtain his or her PIN. Appointments are usually arranged a week before registration begins with sign-up sheets posted on the advisor's door, but other arrangements are possible, for example, through e-mail.

Although academic advisors can give advice on a wide range of topics, students should be aware of the many other sources of information and counseling available on campus such as Career and Placement Services, Campus Ministry, the University Counseling Center, the Office of Student Financial Services, and the University Health Center. See the Notre Dame web pages (`www.nd.edu`) under Administration/Student Affairs for more information.

Some good off-campus sources of information for mathematics majors include:

- American Mathematical Society (`www.ams.org`)
- Mathematical Association of America (`www.maa.org`)
- Society of Industrial and Applied Mathematics (`www.siam.org`)
- Society of Actuaries (`www.soa.org`)

These organizations all maintain excellent web sites with special sections for students and career opportunities in the mathematical sciences.

Mathematics Advisors

Mathematics majors in the College of Science are assigned to advisors alphabetically by class year, *except students in the Mathematics Honors Program.* See the Director of Undergraduate Studies if you are interested in this program. Also, students pursuing a *second major in mathematics* (MTH2) should see the Director of Undergraduate Studies for advice. All room numbers given below are in the Hayes-Healy-Hurley complex.

Class of 2010

Name	*Advisor*	*Office*	*Tel.*
Women: A–R	Claudia Polini	272 H	631–8849
Women: S–Z	Arthur Lim	250 HH	631–6658
Men: A–G	Arthur Lim	250 HH	631–6658
Men: H–Z	Xiabo Liu	132 HH	631–8711
HONS/HONR	Liviu Nicolaescu	224 HH	631–3370
HNRS only	Sam Evens	222 HH	631-7165
MTH2	Michael Gekhtman	128 HH	631-7131

Class of 2011

Name	*Advisor*	*Office*	*Tel.*
A–G	Stephan Stolz	166A H	631–5545
H–N	Fred Xavier	214 HH	631–6288
O–Z	Nancy Stanton	268 H	631–7436
HONS/HONR	Liviu Nicolaescu	224 HH	631–3370
HNRS only	Sam Evens	222 HH	631-7165
MTH2	Michael Gekhtman	128 HH	631-7131

Class of 2012

Name	*Advisor*	*Office*	*Tel.*
A–G	David Galvin	248 HH	631–4181
H–N	Pit-Mann Wong	232 HH	631–7586
O–Z	Michael Gekhtman (before August 2009)	128 HH	631-7131
O–Z	Annette Pilkington (starting August 2009)	124 HH	631-3369
HONS/HONR	Liviu Nicolaescu	224 HH	631–3370
HNRS only	Sam Evens	222 HH	631-7165
MTH2	Michael Gekhtman	128 HH	631-7131

5 Sample Schedules

The following pages contain sample schedules detailing the special requirements for each of the programs in mathematics. Since the first year schedules are similar for all programs, they are given first. The four-year schedule for the Mathematics Honors Program in the College of Arts and Letters is given last. It is important to keep in mind that these are example schedules only, and the exact order in which courses are taken in many cases may be altered.

First Year

During the first year of studies, students intending to major in mathematics should have received credit for courses as outlined in one of the following two sequences.

Mathematics Honors Program

Fall	*Credits*	*Spring*	*Credits*
MATH 10850: H Calculus	4.0	MATH 10860: H Calculus	4.0
CHEM 10117: Chemistry[1]	4.0	CHEM 10118: Chemistry[1]	4.0
PHYS 10310: Physics[1]	4.0	PHYS 10320: Physics[1]	4.0
FYC 13100: Composition	3.0	Philosophy or Theology[2]	3.0
History or Social Science[2]	3.0	History or Social Science[2]	3.0
Phys Ed or ROTC	0.0	Phys Ed or ROTC	0.0
	18.0		18.0

Other Mathematics Programs

Fall	*Credits*	*Spring*	*Credits*
MATH 10550: Calculus	4.0	MATH 10560: Calculus	4.0
CHEM 10117: Chemistry[1]	4.0	CHEM 10118: Chemistry[1]	4.0
PHYS 10310: Physics[1]	4.0	PHYS 10320: Physics[1]	4.0
FYC 13100: Composition	3.0	Philosophy or Theology[2]	3.0
History or Social Science[2]	3.0	History or Social Science[2]	3.0
Phys Ed or ROTC	0.0	Phys Ed or ROTC	0.0
	18.0		18.0

[1] See p.2, Science Requirements.

[2] Students should take three general requirement courses during the first year, including one course that is designated a University Seminar. It is recommended that one course in history or social science be taken in the first year, and one philosophy and one theology course be taken by the end of the sophomore year.

Mathematics Honors Program (HONS)

The Honors Mathematics Sequence is designed for students anticipating graduate work in one of the mathematical sciences. Including the 36 semester hour credits from the first year (see p.10), the example schedule below consists of a total of 124 semester hour credits.

Sophomore Year

Fall	*Credits*	*Spring*	*Credits*
MATH 20810: H Linear Algebra	3.0	MATH 20820: H Linear Algebra	3.0
MATH 20850: H Calculus	4.0	MATH 20860: H Calculus	4.0
Language[1]	3.0	Language[1]	3.0
Science Elective[2]	3.0	Philosophy or Theology	3.0
		Elective	3.0
	13.0		16.0

Junior Year

Fall	*Credits*	*Spring*	*Credits*
MATH 30810: H Algebra	3.0	MATH 30820: H Algebra	3.0
MATH 30850: H Analysis	3.0	MATH 30860: H Analysis	3.0
Language[1]	3.0	Philosophy or Theology	3.0
Philosophy or Theology	3.0	Literature or Fine Arts	3.0
Elective	3.0	Elective	3.0
	15.0		15.0

Senior Year

Fall	*Credits*	*Spring*	*Credits*
Mathematics Elective[3,4]	3.0	Mathematics Elective[3,4]	3.0
Mathematics Elective[3]	3.0	Mathematics Elective[3]	3.0
Elective	3.0	Elective	3.0
Elective	3.0	Elective	3.0
Elective	3.0	Elective	2.0
	15.0		14.0

[1]The recommended languages for the honors concentration are French, German, or Russian. Credit for an intermediate level language course is required. See the section on University and College Requirements in the College of Science section of the Bulletin for a detailed discussion.

[2]See p.3, Science Requirements. PHYS 20330 is a recommended elective.

[3]In the honors concentration, at least 6 credits of the mathematics electives must be at the 40- level.

[4]Students in the honors concentration have the option of writing a senior thesis, based on three semesters of directed readings.

Mathematics Career Program

This program is designed to give students a general background in mathematics. Including the 36 semester hour credits from the first year (see p.10), the example schedule below consists of a total of 124 semester hour credits.

Sophomore Year

Fall	*Credits*	*Spring*	*Credits*
MATH 20610: Linear Alg	3.0	MATH 20210: Programming	3.0
MATH 20550: Calculus	3.5	MATH 20630: Intro Math Reas	3.0
Science Elective[1]	3.0	MATH 20750: ODE	3.5
Language[2]	3.0	Language[2]	3.0
Philosophy or Theology	3.0	Philosophy or Theology	3.0
	15.5		15.5

Junior Year

Fall	*Credits*	*Spring*	*Credits*
MATH 30710: Algebra[4]	3.0	MATH 30750: Real Analysis[4]	3.0
Mathematics Elective[3]	3.0	Philosophy or Theology	3.0
Language[2]	3.0	Literature or Fine Arts	3.0
Elective	3.0	Elective	3.0
Elective	3.0	Elective	3.0
	15.0		15.0

Senior Year

Fall	*Credits*	*Spring*	*Credits*
Mathematics Elective[3]	3.0	Mathematics Elective[3]	3.0
Mathematics Elective[3]	3.0	Elective	3.0
Elective	3.0	Elective	3.0
Elective	3.0	Elective	3.0
Elective	3.0		
	15.0		12.0

[1] See p.3, Science Requirements. PHYS 20330 is a recommended elective.

[2] Credit for an intermediate level language course is required. See the section on University and College Requirements in the College of Science section of the Bulletin for a detailed discussion.

[3] At least 3 credits of the mathematics electives must be at the 40- level.

[4] Students who have taken MATH 30705, Algebraic Structures, must take MATH 30745-30755 instead of MATH 30710-30750. Starting with Fall, 2005, students can take MATH 30710-30750 in either order.

Applied Mathematics Program (APPL)

This program is designed for students interested in the area of applied mathematics. Including the 36 semester hour credits for the first year (see p.10), the example schedule below consists of a total of 124 semester hour credits.

Sophomore Year

Fall	*Credits*	*Spring*	*Credits*
MATH 20610: Linear Alg	3.0	MATH 20210: Program.	3.0
MATH 20550: Calculus	3.5	MATH 20630: Math Reas	3.0
Science Elective[1]	3.0	MATH 20750: ODE	3.5
Language[2]	3.0	Language[2]	3.0
Philosophy or Theology	3.0	Philosophy or Theology	3.0
	15.5		15.5

Junior Year

Fall	*Credits*	*Spring*	*Credits*
MATH 30710: Algebra[4]	3.0	MATH 30750: Real Anal.[4]	3.0
Mathematics Elective[3]	3.0	Mathematics Elective[3]	3.0
Language[2]	3.0	Literature or Fine Arts	3.0
Philosophy or Theology	3.0	Elective	3.0
Elective	3.0	Elective	3.0
	15.0		15.0

Senior Year

Fall	*Credits*	*Spring*	*Credits*
Mathematics Elective[3]	3.0	Mathematics Elective[3]	3.0
Mathematics Elective[3]	3.0	Elective	3.0
Elective	3.0	Elective	3.0
Elective	3.0	Elective	3.0
Elective	3.0		
	15.0		12.0

[1] See p.3, Science Requirements. PHYS 20330 is a recommended elective.

[2] Credit for an intermediate level language course is required. See the section on University and College Requirements in the College of Science section of the Bulletin for a detailed discussion.

[3] Students in the Applied Mathematics Program must take 15 credits, including 6 at the 40- level, from among the following courses: MATH 30210, MATH 30390, MATH 30530, MATH 30540, MATH 40210, MATH 40390, MATH 40480, MATH 40730, MATH 40750, and MATH 40710. Credit is not given for both MATH 30390 and MATH 40390.

[4] Students who have taken MATH 30705, Algebraic Structures, must take MATH 30745-30755 instead of MATH 30710-30750. Starting with Fall, 2005, students can take MATH 30710-30750 in either order.

Business Administration Program (BUSA)

This program is designed to prepare students for a career in business or in the actuarial profession. Including the 36 semester hour credits from the first year (see p.10), the example schedule below consists of a total of 124 semester hour credits.

Sophomore Year

Fall	*Credits*	*Spring*	*Credits*
MATH 20610: Linear Alg	3.0	MATH 20210: Program.	3.0
MATH 20550: Calculus	3.5	MATH 20630: Math Reas	3.0
Science Elective[1]	3.0	MATH 20750: ODE	3.5
ECON 12101: Economics[2]	3.0	Philosophy or Theology	3.0
Language[3]	3.0	Language[3]	3.0
	15.5		15.5

Junior Year

Fall	*Credits*	*Spring*	*Credits*
ACCT 20100: Accounting[6]	3.0	FIN 20100: Finance[6]	3.0
MATH 30530: Probability	3.0	MATH 30540: Statistics	3.0
MATH 30710: Algebra[5]	3.0	MATH 30750: Real Anal.[5]	3.0
MATH 30210: Op Res.	3.0	Philosophy or Theology	3.0
Language[3]	3.0	Literature or Fine Arts	3.0
	15.0		15.0

Senior Year

Fall	*Credits*	*Spring*	*Credits*
Business Elective[4,6]	3.0	MARK 20100: Marketing[6]	3.0
Mathematics 400 Elective	3.0	MGT 20200: Management[6]	3.0
Philosophy or Theology	3.0	Elective	3.0
Elective	3.0	Elective	3.0
Elective	3.0		
	15.0		12.0

[1]See p.3, Science Requirements. PHYS 20330 is a recommended elective.

[2]ECON 10010, 20010, 115, 225 or [ECON 223 and 224] are acceptable alternatives.

[3]Credit for an intermediate level language course is required. See the section on University and College Requirements in the College of Science section of the Bulletin.

[4]Students in the business concentration must take one course from the following list: ACCT 20200, FIN 30210, FIN 30220, FIN 30600, MGT 30610, MGT 473, MARK 30110.

[5]Students who have taken MATH 30705, Algebraic Structures, must take MATH 30745-30755 instead of MATH 30710-30750. Students can take MATH 30710-30750 in either order.

[6]The following BAUG equivalent classes are acceptable: ACCT 20100 = BAUG 20001, FIN 20100 = BAUG 20005, MARK 20100 = BAUG 20008, MGT 20200 = BAUG 20006, ACCT 20200 = BAUG 20002.

Computing Program (CMPT)

This program is designed for students interested in pursuing graduate study or industrial careers in computing science. Including the 36 semester hour credits from the first year (see p.10), the example schedule below consists of a total of 125 semester hour credits.

Sophomore Year

Fall	*Credits*	*Spring*	*Credits*
MATH 20610: Linear Alg	3.0	MATH 20630: Math Reas	3.0
MATH 20550: Calculus	3.5	MATH 20750: ODE	3.5
CSE 20211: Comp. I[1,7]	4.0	CSE 20212: Comp. II[1,7]	3.0
Science Elective[2]	3.0	Philosophy or Theology	3.0
Language[3]	3.0	Language[3]	3.0
	16.5		15.5

Junior Year

Fall	*Credits*	*Spring*	*Credits*
MATH 30710: Algebra[8]	3.0	MATH 30750: Analysis[8]	3.0
CSE Elective[4,6]	3.0	CSE Elective[4,6]	3.0
Mathematics Elective[5,6]	3.0	Mathematics Elective[5,6]	3.0
Language[3]	3.0	Philosophy or Theology	3.0
Philosophy or Theology	3.0	Literature or Fine Arts	3.0
	15.0		15.0

Senior Year

Fall	*Credits*	*Spring*	*Credits*
Mathematics Elective[5,6]	3.0	Mathematics Elective[5,6]	3.0
Mathematics Elective[5,6]	3.0	CSE Elective[4,6]	3.0
CSE Elective[4,6]	3.0	Elective	3.0
Elective	3.0	Elective	3.0
Elective	3.0		
	15.0		12.0

[1]MATH 20210 may not be used as an alternative to CSE 20211 or 20212.

[2]See p.3, Science Requirements. PHYS 20330 is a recommended elective.

[3]Credit for an intermediate level language course is required. See section on University and College Requirements in the College of Science section of the Bulletin for a detailed discussion.

[4]Besides CSE 20211 and 20212, students in the Mathematics and Computing Program are required to complete one of the following four sequences:
(Software design option) CSE 20110, CSE 30331, CSE 30246, 4th CSE elective;
(Theory option) CSE 20110, CSE 30331, CSE 40411 or 30151 (but see # 6 below), CSE 40113;
(Theory and Compilers option) CSE 20110, CSE 30331, CSE 40411 or 30151 (but see # 6 below), CSE 40243;
(Computer Architecture option) CSE 20221, CSE 30321, CSE 30322, 4th CSE elective.

[5]At least 3 credits of the mathematics electives must be at the 400 level.

[6]MATH 40710 may be substituted for CSE 40411 or 30151. Note that MATH 40710 cannot count both as a CSE elective and as a Mathematics elective.

[7]Students who have already taken CSE 20232 *prior to Fall 2003* can replace the sequence CSE 20211-20212 by CSE 20232.

[8]Students who have taken MATH 30705 must take MATH 30745-30755 instead of MATH 30710-30750. Starting with Fall, 2005, students can take MATH 30710-30750 in either order.

Education Program (EDUC)

This program is designed for students who plan a career in secondary education. Including the 36 semester hour credits from the first year (see p.10), the example schedule below consists of a total of 124 semester hour credits. All education courses are taken at Saint Mary's College (SMC).

Sophomore Year

Fall	*Credits*	*Spring*	*Credits*
MATH 20610: Linear Alg	3.0	MATH 20210: Program.	3.0
MATH 20550: Calculus	3.5	MATH 20630: Math Reas	3.0
Science Elective[1]	3.0	MATH 20750: ODE	3.5
EDUC 201: Teaching[2]	3.0	EDUC 220	3.0
Language[2]	3.0	Language[2]	3.0
	15.5		15.5

Junior Year

Fall	*Credits*	*Spring*	*Credits*
MATH 30530: Probability	3.0	MATH 30540: Statistics	3.0
MATH 30710: Algebra[6]	3.0	MATH 30750: Real Anal.[6]	3.0
EDUC 345: Curr. and Assess.	3.0	EDUC 350: Psych	3.0
Phil. or Theo.	3.0	EDUC 346: Instr Tech[2]	3.0
Language[2]	3.0	Philosophy or Theology	3.0
	15.0		15.0

Senior Year

Fall	*Credits*	*Spring*	*Credits*
Geometry Elective[4,5]	3.0	EDUC 475: Teaching	12.0
EDUC 356: Ed. Psych[3]	3.0		
EDUC 451: Teach Math	3.0		
Mathematics Elective[5]	3.0		
Philosophy or Theology	3.0		
	15.0		12.0

[1] See p.3, Science Requirements. PHYS 20330 is a recommended elective.

[2] Credit for an intermediate level language course is required. See the section on University and College Requirements in the College of Science section of the Bulletin for a detailed discussion.

[3] For MATH/EDUC majors only this course will satisfy the Literature/Fine Arts requirement.

[4] MATH 40510, 40960, 40760, 40740 or SMC MATH 30810 are acceptable.

[5] At least 3 credits of the mathematics electives must be at the 400 level.

[6] Students who have taken MATH 30705, Algebraic Structures, must take MATH 30745-30755 instead of MATH 30710-30750. Starting with Fall, 2005, students can take MATH 30710-30750 in either order.

Engineering Science Program (EGSC)

This program is designed for students interested in applied or industrial mathematics. Including the 36 semester hour credits from the first year (see p.10), the example schedule below consists of a total of 124 semester hour credits.

Sophomore Year

Fall	*Credits*	*Spring*	*Credits*
MATH 20610: Linear Alg	3.0	MATH 20210: Program.	3.0
MATH 20550: Calculus	3.5	MATH 20630: Math Reas	3.0
Science Elective[1]	3.0	MATH 20750: ODE	3.5
Language[2]	3.0	Language[2]	3.0
Philosophy or Theology	3.0	Philosophy or Theology	3.0
	15.5		15.5

Junior Year

Fall	*Credits*	*Spring*	*Credits*
MATH 30710: Algebra[5]	3.0	MATH 30750: Real Anal.[5]	3.0
Mathematics Elective[4]	3.0	Engineering Elective[3]	3.0
AME 20221: Mechanics	3.0	Engineering Elective[3]	3.0
AME 20231: Thermo I	3.0	Philosophy or Theology	3.0
Language[2]	3.0	Literature or Fine Arts	3.0
	15.0		15.0

Senior Year

Fall	*Credits*	*Spring*	*Credits*
Mathematics Elective[4]	3.0	Mathematics Elective[4]	3.0
Engineering Elective[3]	3.0	Mathematics Elective[4]	3.0
Elective	3.0	Elective	3.0
Elective	3.0	Elective	3.0
Elective	3.0		
	15.0		12.0

[1] See p.3, Science Requirements. PHYS 20330 is a recommended elective.

[2] Credit for an intermediate level language course is required. See the section on University and College Requirements in the College of Science section of the Bulletin for a detailed discussion.

[3] Besides AME 20221 and AME 20231, students in the Mathematics and Engineering Science Program are required to complete one of the following two sequences: (Thermal option) AME 20222, AME 30031, AME 30334; (Structures and design option) CE 20170, CE 30200, CE 30210.

[4] Students in the Mathematics and Engineering Science Program must take one of MATH 40480, MATH 40390, or MATH 40750.

[5] Students who have taken MATH 30705, Algebraic Structures, must take MATH 30745-30755 instead of MATH 30710-30750. Starting with Fall, 2005, students can take MATH 30710-30750 in either order.

Life Sciences Program (LFSC)

This program is designed for mathematics majors who are interested in careers oriented towards the life sciences. In particular, it satisfies the University's recommended criteria for application to medical school. Including the 36 semester hour credits from the first year (see p.10), the example schedule below consists of a total of 124 semester hour credits.

Sophomore Year

Fall	*Credits*	*Spring*	*Credits*
MATH 20610: Linear Alg	3.0	MATH 20210: Program.	3.0
MATH 20550: Calculus	3.5	MATH 20630: Math Reas	3.0
BIOS 20201: Biology[6]	3.0	MATH 20750: ODE	3.5
BIOS 21201: Lab[6]	1.0	BIOS 20202: Biology[6]	3.0
Philosophy or Theology	3.0	BIOS 21202: Lab[6]	1.0
Language[1]	3.0	Language[1]	3.0
	16.5		16.5

Junior Year

Fall	*Credits*	*Spring*	*Credits*
MATH 30710: Algebra[4]	3.0	MATH 30750: Real Anal.[4]	3.0
CHEM 20223: Organic[5]	3.0	CHEM 20224: Organic[5]	3.0
CHEM 21223: Lab	1.0	CHEM 21224: Lab	1.0
Philosophy or Theology	3.0	BIOS 20303: Genetics[2]	3.0
Language[1]	3.0	BIOS 21303: Lab	1.0
Elective	3.0	Elective	3.0
	16.0		14.0

Senior Year

Fall	*Credits*	*Spring*	*Credits*
MATH 30530: Probability	3.0	MATH 30540: Statistics	3.0
Mathematics 400 Elective	3.0	Literature or Fine Arts	3.0
Philosophy or Theology	3.0	Elective[3]	3.0
Electives[3]	4.0	Elective[3]	3.0
	13.0		12.0

[1]Credit for an intermediate level language course is required. See the section on University and College Requirements in the College of Science section of the Bulletin for a detailed discussion.

[2]BIOS 20303 is offered only in the spring semester.

[3]BIOS 30312, BIOS 30341, BIOS 30401, CHEM 40420 are recommended electives.

[4]Students who have taken MATH 30705, Algebraic Structures, must take MATH 30745-30755 instead of MATH 30710-30750. Starting with Fall, 2005, students can take MATH 30710-30750 in either order.

[5]For students entering after 2006-2007, CHEM 20223-20224 will be replaced by CHEM 20283-20284.

[6](BIOS 10161 and lab 11161) and (BIOS 10162 and lab 11162) is an acceptable alternative.

Social Sciences Program (SOSC)

This program is designed for students interested in pursuing graduate study or a career in one of the social sciences with a strong mathematics and statistics background. Including the 36 semester hour credits from the first year (see p.10), the example schedule below consists of a total of 124 semester hour credits.

Sophomore Year

Fall	*Credits*	*Spring*	*Credits*
MATH 20610: Linear Alg	3.0	MATH 20210: Program.	3.0
MATH 20550: Calculus	3.5	MATH 20630: Math Reas	3.0
Science Elective[1]	3.0	MATH 20750: ODE	3.5
Language[2]	3.0	Language[2]	3.0
Philosophy or Theology	3.0	Philosophy or Theology	3.0
	15.5		15.5

Junior Year

Fall	*Credits*	*Spring*	*Credits*
MATH 30530: Probability	3.0	MATH 30540: Statistics	3.0
MATH 30710: Algebra[5]	3.0	MATH 30750: Real Anal.[5]	3.0
MATH 30210: Op Res.[3]	3.0	Philosophy or Theology	3.0
Social Science Elective[4]	3.0	Social Science Elective[4]	3.0
Language[2]	3.0	Literature or Fine Arts	3.0
	15.0		15.0

Senior Year

Fall	*Credits*	*Spring*	*Credits*
SOC 30902: Methods	3.0	Mathematics 400 Elective	3.0
Social Science Elective[4]	3.0	Social Science Elective[4]	3.0
Social Science Elective[4]	3.0	Elective	3.0
Elective	3.0	Elective	3.0
Elective	3.0		
	15.0		12.0

[1]See p.3, Science Requirements. PHYS 20330 is a recommended elective.

[2]Credit for an intermediate level language course is required. See the section on University and College Requirements in the College of Science section of the Bulletin for a detailed discussion.

[3]This can also be taken in the Spring semester.

[4]Students in the Mathematics and Social Sciences Program must take *introductory* Courses in *three* of the social sciences, for example, ANTH 10109, 30103, or 30101, ECON 10015, 20020, 20010, or 20015, GOVT 140, 141, 242, or 243, PSY 10000 or 20000, SOC 10002, 10722, 214, or 20720. One of these courses will fulfill the University social science requirement. Students must also take *two* courses in *one* social science at the 300 or 400 level.

[5]Students who have taken MATH 30705 must take MATH 30745-30755 instead of MATH 30710-30750. Starting with Fall, 2005, students can take MATH 30710-30750 in either order.

Mathematics Honors Program in Arts and Letters

This program is designed for students interested in pursuing graduate work in mathematics. The example schedule below consists of a total of 124 semester hour credits.

First Year

Fall	*Credits*	*Spring*	*Credits*
MATH 10850: H Calculus	4.0	MATH 10860: H Calculus	4.0
FYC 13100: Composition	3.0	Philosophy or Theology	3.0
Science	3.0	Science	3.0
History or Social Science	3.0	History or Social Science	3.0
Language	3.0	Language	3.0
Phys Ed	0.0	Phys Ed	0.0
	16.0		16.0

Sophomore Year

Fall	*Credits*	*Spring*	*Credits*
MATH 20810: H Linear Alg	3.0	MATH 20820: H Linear Alg	3.0
MATH 20850: H Calculus	4.0	MATH 20860: H Calculus	4.0
Philosophy or Theology	3.0	Philosophy or Theology	3.0
Language	3.0	Elective	3.0
Fine Arts	3.0	Elective	3.0
	16.0		16.0

Junior Year

Fall	*Credits*	*Spring*	*Credits*
MATH 30810: H Algebra	3.0	MATH 30820: H Algebra	3.0
MATH 30850: H Analysis	3.0	MATH 30860: H Analysis	3.0
Philosophy or Theology	3.0	Philosophy or Theology	3.0
History or Soc Science	3.0	English/American Lit	3.0
Elective	3.0	Elective	3.0
	15.0		15.0

Senior Year

Fall	*Credits*	*Spring*	*Credits*
Mathematics 400 Elective	3.0	Mathematics 400 Elective	3.0
Mathematics Elective	3.0	Mathematics Elective	3.0
Elective	3.0	Elective	3.0
Elective	3.0	Elective	3.0
Elective	3.0	Elective	3.0
	15.0		15.0