

***DEPARTMENT OF MATHEMATICS
ACADEMIC ADVISING HANDBOOK***

FALL 2013

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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* (<http://registrar.nd.edu/BOI/BOI1213UG.pdf>) or the College of Science web page (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 151 mathematics majors in the sophomore, junior and senior classes combined. Of a total of 48 graduating mathematics majors, the majority pursued the Mathematics Career Program. Numbers in the other programs were: Honors – 9, Life Science – 1, Business Administration – 8, and Education – 2. About one fourth of our seniors start various careers in business, most commonly as computer consultants, financial analysts, or actuaries. Many pursue advanced degrees in mathematics, medicine, statistics, fine arts, law, education and music. Others go into teaching, including working with the Alliance for Catholic Education.

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. In 2011, out of 200 occupations ranked in order of desirability by the Wall Street Journal, based on income, stress, physical demands, potential growth, job security and work environment, the top five are all mathematically based!

2. REQUIREMENTS

Students must satisfy requirements on 3 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 (10171 or 10181), and CHEM (10122, 10172 or 10182)
- MATH 10550–10560, (or MATH 10350–10360 for Biology, PreProfessional, and Science/Business majors)
- PHYS 10310–10320 (or PHYS 30210–30220 if two (2) semesters of General Biology with labs or Organic Chemistry with labs are also taken).
- 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 30000 or 40000 level mathematics course, beyond the required ones described on the next page, satisfies this requirement.
- Language proficiency through intermediate level.

The College of Science website contains a useful “frequently asked questions” page <http://science.nd.edu/undergraduate/frequently-asked-questions/> -

with detailed information on the College language requirement, science course sequences, and much more. For science electives, see http://www3.nd.edu/~ugcos/science_elective/index.htm. For academic rules and procedures, see <http://science.nd.edu/undergraduate/academic-rules-procedures/>.

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
- Linear Algebra: MATH 20610
- Introduction to Mathematical Reasoning: MATH 20630
- Algebra: MATH 30710
- Real Analysis: MATH 30750
- Mathematics Electives: 15 credit hours with 3 or more at the 40000 level

The approved math electives for all students with a math major or supplementary major are as follows:

- 1.¹ Any 3 credit 40000 level math course taken at ND, and up to three credits of Directed Readings - Math 46800.
- 2.² MATH/ACMS 20210 – Scientific Computing
MATH 30210 – Operations Research
MATH 30310 – Coding Theory
MATH 30530 – Probability
MATH/ACMS 30540 – Mathematical Statistics
MATH/ACMS 30610 – Introduction to Financial Mathematics

¹ In Spring 2012 and earlier, ACMS courses were approved as electives for individual students on a case by case basis. There is no restriction on the number of ACMS courses taken as math electives in this period.

² ACMS 30530 – Probability and ACMS 30600 – Statistical Methods and Data Analysis I are NOT approved math electives.

MATH/ACMS 40390 – Numerical Analysis
MATH/ACMS 40750 – Partial Differential Equations

3. From Fall 2013, at most one ACMS course not listed under 2. above is allowed, and must come from the following list:

ACMS 40212 – Advanced Scientific Computing
ACMS 40395 – Numerical Linear Algebra
ACMS 40485 – Applied Complex Analysis
ACMS 40630 – Nonlinear Dynamical Systems
ACMS – 40730 – Mathematical and Computational Modeling in
Biology and Physics
ACMS 40842 – Time Series Analysis
ACMS 40852 – Statistical Methods in the Biological and Health
Sciences

Restrictions

- Some, or all language requirements 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 credits are allowed toward the science degree.*
- Up to 3 credit hours total are allowed toward the science degree from activities (band, music lessons, debate, center for social concerns seminars, etc.), *but no more than 1 credit hour total from any of these courses per semester.*
- Up to 6 credit hours total are allowed toward the science degree from 30000–40000 ROTC courses.
- ACMS 30440 does not count toward the required 12 credit hours of 30000–40000 level math electives.
- Science courses specified by a major program must be taken at the University of Notre Dame. Prior approval from the Dean is required for transfer credits.
- The College of Science limits students to registering for a total of 18 credit hours in any given semester. ROTC and activity courses (band, center for social concerns 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 credits 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 3 semesters to complete. The thesis must be approved by the Undergraduate Studies Committee of the Department of Mathematics. The student will then receive the citation, "*Graduation with Senior Thesis*" on the transcript. See the Director of Undergraduate Studies for details.
- Up to 3 credits of the 15-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 1 or 2 credits, and if it will count toward the 15 credit elective requirement. A student may not count MATH 46800 or MATH 48900 toward the 15 credit elective requirement if the work done is toward the writing of a thesis. In this case, only a general elective credit(s) 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 must take MATH 10550–10560. Credit hours for MATH 10250–10260 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) should continue with MATH 10560. Permission from the Director of Undergraduate Studies is required. 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 10111-10112, the chemistry lab required of science students in CHEM 10171 is waived. 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 – C/C++ Programming may not take MATH 20210 – Scientific Computing as a 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.

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, re., 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
BUSA	Mathematics and Business Administration Program
CMPT	Mathematics and Computing Program
EDUC	Mathematics Education Program
EGSC	Mathematics and Engineering Science Program
HONS	Mathematics Honors Program
LFSC	Mathematics and Life Sciences Program

MACT	Mathematics Actuarial Science Minor
MTTH	Graduation with Senior Thesis
NONE	Mathematics Career 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 6 courses beyond the 2-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 4 or 5 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 1 degree, the Bachelor of Science, with 2 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 4 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. Students with majors in other Colleges may consider adding the mathematics second major (MTH2) or the actuarial sciences minor (MACT). The requirements for MTH2 are the requirements of the student's primary major plus the mathematics requirements of the mathematics career program. See the *Bulletin of Information* and the DUS, Matthew Dyer, for further information. The number of credit hours required for a concentration is typically 15, and for a minor, typically 12-15.

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 Prehealth Studies (APH2) or Computer Applications (CAP2). 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 Mathematics 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 course 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 number for the next web registration period. In fact, this is the only way a student can obtain his or her PIN number. 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 Current Students/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 2014

<i>Name</i>	<i>Advisor</i>	<i>Office Number</i>	<i>Phone Number</i>
A-G	Richard Hind	HAYE 216	631-6227
H-N	Arthur Lim	HAYE 250	631-6658
O-Z	Matthew Dyer	HAYE 140	631-6082
HONS (SC)	Liviu Nicolaescu	HAYE 224	631-3370
HONS (AL)	Samuel Evens	HAYE 222	631-7165
MTH2, MACT	Matthew Dyer	HAYE 140	631-6082

Class of 2015

<i>Name</i>	<i>Advisor</i>	<i>Office Number</i>	<i>Phone Number</i>
A-G	Gerard Misiolak	HAYE 218	631-4179
H-N	Roxana Smarandache	HURL 122	631-4862
O-Z	Fred Xavier	HAYE 214	631-6288
HONS (SC)	Liviu Nicolaescu	HAYE 224	631-3370
HONS (AL)	Samuel Evens	HAYE 222	631-7165
MTH2, MACT	Matthew Dyer	HAYE 140	631-6082

Class of 2016

<i>Name</i>	<i>Advisor</i>	<i>Office Number</i>	<i>Phone Number</i>
A-G	Anne Pilkington	HAYE 124	631-3369
H-N	Nancy Stanton	HURL 268	631-7436
O-Z	David Galvin	HAYE 248	631-4181
HONS (SC)	Liviu Nicolaescu	HAYE 224	631-3370
HONS (AL)	Samuel Evens	HAYE 222	631-7165
MTH2, MACT	Matthew Dyer	HAYE 140	631-6082

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

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
MATH 10850 - Honors Calculus I	4.0	MATH 10860 - Honors Calculus II	4.0
CHEM 10171 - Intro to Chem. Princ. ¹	4.0	CHEM 10172 - Org. Struct. & React. ¹	4.0
PHYS 10310 - General Physics I ¹	4.0	PHYS 10320 - General Physics II ¹	4.0
WR 13100 - Writing and Rhetoric	3.0	Philosophy or Theology ²	3.0
History or Social Science ²	3.0	History or Social Science ²	3.0
Physical Education or ROTC	0.0	Physical Education or ROTC	0.0
TOTAL	18.00	TOTAL	18.00

Other Mathematics Programs

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
MATH 10850 - Honors Calculus I	4.0	MATH 10560 - Calculus II	4.0
CHEM 10171 - Intro to Chem. Princ. ¹	4.0	CHEM 10172 - Org. Struct. & React. ¹	4.0
PHYS 10310 - General Physics I ¹	4.0	PHYS 10320 - General Physics II ¹	4.0
WR 13100: Writing and Rhetoric	3.0	Philosophy or Theology ²	3.0
History or Social Science ²	3.0	History or Social Science ²	3.0
Physical Education or ROTC	0.0	Physical Education or ROTC	0.0
TOTAL	18.0	TOTAL	18.0

¹ See Page 4, Science Requirements.

² Students should take 3 general requirement courses during the first year, including 1 course that is designated a University Seminar. It is recommended that 1 course in history or social science be taken in the first year, and 1 philosophy and 1 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 page 10), the example schedule below consists of a total of 124-semester hour credits.

Sophomore Year

Fall	Credits	Spring	Credits
MATH 20810 - Honors Algebra I	3.0	MATH 20820 - Honors Algebra II	3.0
MATH 20850 - Honors Calculus III	4.0	MATH 20860 - Honors Calculus IV	4.0
Language ¹	3.0	Language ¹	3.0
Science Elective ²	3.0	Philosophy or Theology	3.0
		Elective	3.0
TOTAL	13.0	TOTAL	16.0

Junior Year

Fall	Credits	Spring	Credits
MATH 30810 - Honors Algebra III	3.0	MATH 30820 - Honors Algebra IV	3.0
MATH 30850 - Honors Analysis I	3.0	MATH 30860 - Honors Analysis II	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
TOTAL	15.0	TOTAL	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
TOTAL	15.0	TOTAL	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 page 4 – 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 40000 level.

⁴ Students in the Honors concentration have the option of writing a senior thesis, based on 3 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 page 10), the example schedule below consists of a total of 124-semester hour credits.

Sophomore Year

Fall	Credits	Spring	Credits
MATH 20610 – Linear Algebra	3.0	Elective	3.0
MATH 20550 – Calculus III	3.5	MATH 20630 – Intro. to Math Reason.	3.0
Science Elective ¹	3.0	MATH 20750 – Ordinary Diff. Equa.	3.5
Language	3.0	Language ²	3.0
Philosophy or Theology	3.0	Philosophy or Theology	3.0
TOTAL	15.5	TOTAL	15.5

Junior Year

Fall	Credits	Spring	Credits
MATH 30710 - Algebra	3.0	MATH 30750 – Real Analysis	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	Mathematics Elective	3.0
Elective	3.0	Elective	3.0
TOTAL	15.0	TOTAL	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		
TOTAL	15.0	TOTAL	12.0

¹ See page 4, 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 40000 level.

Actuarial Science Minor (MACT)

This program is designed to prepare students for a career in the actuarial profession. Including the 36-semester hour credits from the first year (see page 12), the example schedule below consists of a total of 124-semester hour credits. Note: ECON 10010 – Principles of Microeconomics is a required course, usually taken in the first year.

Actuary Minor (MACT) and Mathematics Business Concentration (MATH/BUS) Waiting List

There is a heavy demand for Business courses and a quota system has been implemented for the College of Science Actuary Minor and Mathematics Business Concentration.

- Any student requesting the MACT or MATH/BUS will be put on the waiting list once the quota is reached.
- If you would like more information about the program or intend to add the minor, please make an appointment to see the advisor and Director of Undergrads, Matthew Dyer – HAYE 140 – dyer.1@nd.edu - 1-6082.
- It is essential that you talk to Matthew Dyer to plan your courses of study. Since there is a heavy demand on the business courses, there is no guarantee that they will be available and there is no guarantee that you can finish all the requirements in time for graduation. Careful planning is absolutely essential. You should begin your planning while on the waiting list by talking to him.
- Sophomore, Junior and Senior Transfer students are not eligible for transfer into this minor/concentration.
- To put yourself on the waiting list, see https://www3.nd.edu/~ugcos/science_business/index.htm.

Sophomore Year

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
MATH 30530 – Intro. To Probability	3.0	MATH 20630 – Intro. to Math Reason.	3.0
MATH 20550 – Calculus III	3.5	MATH 20610 – Linear Algebra	3.0
BASC 20100 – Accountancy I ¹	3.0	BASC 20150 – Corp. Financial Mgmt.	3.0
Philosophy or Theology	3.0	Science Elective	3.0
Language ²	3.0	Language ²	3.0
TOTAL	15.5	TOTAL	15.0

Junior Year

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
MATH 20750 – Ord. Diff. Equations	3.0	MATH 30750 – Real Analysis	3.0
MATH 30710 – Algebra	3.0	ACMS 30540 – Mathematical Stats.	3.0
FIN 30600 – Investment Theory	3.0	Philosophy or Theology	3.0
Literature or Fine Arts	3.0	MATH 30610 – Intro. To Fin. Math.	3.0
TOTAL	12.0	TOTAL	12.0

Senior Year

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
FIN 30220 – Macroeconomic Analysis	3.0	MATH 40570 – Math Meth In Fin Econ	3.0
Elective	3.0	ECON 30331 - Econometrics	3.0
Philosophy or Theology	3.0	Elective	3.0
		Elective	3.0
TOTAL	9.0	TOTAL	12.0

¹ You may register for BASC 20100 or BASC 20150 without approval from Mendoza. Registration for other business courses will require approval by Mendoza.

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. The following math electives are required: MATH 30530, ACMS 30540, and MATH 30610. As with the Career Program, one more elective at the 30000 or 40000 level (MATH 40570 – Mathematical Methods in Financial Economics is recommended, but not required). In addition, 4 courses from Business (BASC 20100, BASC 20150 or FIN 20150, FIN 30220, FIN 30600), and 2 courses from Arts & Letters (ECON 10010 and ECON 30331) are required.

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 page 10), the example schedule below consists of a total of 124-semester hour credits.

Sophomore Year

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
MATH 20610 – Linear Algebra	3.0	Elective	3.0
MATH 20550 – Calculus III	3.5	MATH 20630 – Intro. to Math Reason.	3.0
Philosophy or Theology	3.0	MATH 20750 – Ord. Diff. Equations	3.0
ECON 10010 ¹ – Princ. Of Microeconom.	3.0	Science Elective ²	3.0
Language ³	3.0	Language ³	3.0
TOTAL	15.5	TOTAL	15.0

Junior Year

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
BASC 20100 – Accountancy I ⁵	3.0	BASC 20150 – Corp. Financial Mgmt. ⁵	3.0
MATH 30530 – Intro. to Probability	3.0	MATH 30540 – Math. Statistics	3.0
MATH 30710 - Algebra	3.0	MATH 30750 – Real Analysis	3.0
MATH 30210 – Intro. to Op. Research	3.0	Philosophy or Theology	3.0
Language ³	3.0	Literature or Fine Arts	3.0
TOTAL	15.0	TOTAL	15.0

Senior Year

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
Business Elective ⁴ ⁵	3.0	MARK 20100 – Princ. of Marketing ⁵	3.0
Mathematics 40000 Elective	3.0	MGT 20200 – Princ. of Management ⁵	3.0
Philosophy or Theology	3.0	Mathematics Elective	3.0
Elective	3.0	Elective	3.0
Elective	3.0		
TOTAL	15.0	TOTAL	12.0

¹ ECON 10010, 20010, or 20011 are acceptable alternatives.

² See page 4, Science Requirements. PHYS 20330 is a recommended elective.

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 1 course from the following list: ACCT 20200, FIN 30210, FIN 30220, FIN 30600, or MGT 40750.

⁵ The following equivalent classes are acceptable: ACCT 20100 = BASC 20100, FIN 20150 = BASC 20150, MARK 20100 = BAUG 20008, MGT 20200 = BAUG 20006, and ACCT 20200 = BAUG 20002. You may register for BASC 20100 or BASC 20150 without approval from Mendoza. Registration for other business courses will require approval from Mendoza.

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 page 10), the example schedule below consists of a total of 125-semester hour credits.

Sophomore Year

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
MATH 20610 – Linear Algebra	3.0	MATH 20630 – Intro. to Math Reason.	3.0
MATH 20550 – Calculus III	3.5	MATH 20750 – Ord. Diff. Equations	3.5
CSE 20211 - Fund. of Computing I ¹	3.0	CSE 20212 – Fund. Of Computing II ¹	3.0
Science Elective ²	3.0	Philosophy or Theology	3.0
Language ³	3.0	Language ³	3.0
TOTAL	15.5	TOTAL	15.5

Junior Year

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
MATH 30710 - Algebra	3.0	MATH 30750 – Real Analysis	3.0
CSE Elective ⁴	3.0	CSE Elective ^{4 6}	3.0
Mathematics Elective ^{5 6}	3.0	Mathematics Elective ^{5 6}	3.0
MATH 30210 – Intro. To Op. Research	3.0	Philosophy or Theology	3.0
Language ³	3.0	Literature or Fine Arts	3.0
TOTAL	15.0	TOTAL	15.0

Senior Year

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
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		
TOTAL	15.0	TOTAL	12.0

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

² See page 4, 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 CSE 20212, students in the Mathematics and Computing program are required to complete one of the following 4 sequences:

- (Software design option) CSE 20110, CSE 30331, CSE 30246, fourth CSE elective;
- (Theory option) CSE 20110, CSE 30331 or CSE 30151 (but see footnote ⁶ below), CSE 40243;
- (Theory and Compilers option) CSE 20110, CSE 30331, CSE 40411 or CSE 30151 (but see footnote 6 below), CSE 40243;
- (Computer Architecture option) CSE 20221, CSE 30321, CSE 40322, fourth CSE elective.

⁵ At least 3 credits of the mathematics electives must be at the 40000 level.

⁶ MATH 40710 may be substituted for CSE 30151. Note that MATH 40710 cannot count as both a CSE elective and as a MATH elective.

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 page 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 Algebra	3.0	Philosophy or Theology	3.0
MATH 20550 – Calculus III	3.5	MATH 20630 – Intro To Math Reason.	3.0
Science Elective ¹	3.0	MATH 20750 – Ord. Diff. Equations	3.5
EDUC 201 – Fndtns.Tch In MulticulSoc ²	3.0	EDUC 220 – Applied Media&InstrTech	3.0
Language ²	3.0	Language ²	3.0
TOTAL	15.5	TOTAL	15.5.

Junior Year

Fall	Credits	Spring	Credits
MATH 30530 – Intro. to Probability	3.0	MATH 30540 – Mathematical Stats.	3.0
MATH 30710 - Algebra	3.0	MATH 30750 – Real Analysis	3.0
EDUC 345 – Curr & Assess. In Mid. HS	3.0	EDUC 350 – Educ Psy: Human Growth	3.0
Philosophy or Theology	3.0	EDUC 346 – Inst Strat & Clsm Mgt ²	3.0
Language ²	3.0	Mathematics Elective	3.0
TOTAL	15.0	TOTAL	15.0

Senior Year

Fall	Credits	Spring	Credits
Geometry Elective ^{3 4}	3.0	EDUC 475 – Student Tch High School	12.0
EDUC 356 – Ed. Psy – Excep Learners ⁵	3.0		
EDUC 451 – Tch Math-Mid/High School	3.0		
Mathematics Elective ⁴	3.0		
Philosophy or Theology	3.0		
TOTAL	15.0	TOTAL	12.0

¹ See page 4, Science Requirements. PHYS 20330 is a recommended elective.

² 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.

³ MATH 40510, 40740, 40760, 40960 or SMC MATH 361 are acceptable.

⁴ At least 3 credits of the mathematics electives must be at the 40000 level.

⁵ For MATH/EDUC majors only, this course will satisfy the literature/fine arts requirement.

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 page 10), the example schedule below consists of a total of 124-semester hour credits.

Sophomore Year

Fall	Credits	Spring	Credits
MATH 20610 – Linear Algebra	3.0	Elective	3.0
MATH 20550 – Calculus III	3.5	MATH 20630 – Intro To Math Reason.	3.0
Science Elective ¹	3.0	MATH 20750 – Ord. Diff. Equations	3.5
Language ²	3.0	Language ²	3.0
Philosophy or Theology	3.0	Philosophy or Theology	3.0
TOTAL	15.5	TOTAL	15.5

Junior Year

Fall	Credits	Spring	Credits
MATH 30710 – Algebra	3.0	MATH 30750 – Real Analysis	3.0
Mathematics Elective ³	3.0	Engineering Elective ⁴	3.0
AME 20221 – Mechanics I	3.0	Engineering Elective ⁴	3.0
Philosophy or Theology	3.0	AME 20231 - Thermodynamics	3.0
Language ²	3.0	Literature or Fine Arts	3.0
TOTAL	15.0	TOTAL	15.0

Senior Year

Fall	Credits	Spring	Credits
Mathematics Elective ³	3.0	Mathematics Elective ³	3.0
Engineering Elective ⁴	3.0	Mathematics Elective ³	3.0
Mathematics Elective	3.0	Elective	3.0
Elective	3.0	Elective	3.0
Elective	3.0		
TOTAL	15.0	TOTAL	12.0

¹ See page 4, 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 Mathematics and Engineering Science Program must take one of MATH 40480, MATH 40390, or MATH 40750.

⁴ 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 30331, AME 30334; (Structures and Design option) AME 20241, CE 30200, CE 30210.

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 page 10), the example schedule below consists of a total of 124-semester hour credits.

Sophomore Year

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
MATH 20610 – Linear Algebra	3.0	Elective	3.0
MATH 20550 – Calculus III	3.5	MATH 20630 – Intro To Math Reason.	3.0
BIOS 20201 – General Biology A ¹	3.0	MATH 20750 – Ord. Diff. Equations	3.5
BIOS 21201 – General Biology A Lab ¹	1.0	BIOS 20202 – General Biology B ¹	3.0
Philosophy or Theology	3.0	BIOS 21202 – General Biology B Lab ¹	1.0
Language ²	3.0	Language ²	3.0
TOTAL	16.5	TOTAL	16.5

Junior Year

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
MATH 30710 – Algebra	3.0	MATH 30750 – Real Analysis	3.0
CHEM 20273 – Org. Reactions & Apps.	3.0	CHEM 20274 – Chem across Per. Tbl.	3.0
CHEM 21273 – Reactions & Apps. Lab	1.0	CHEM 21274 – Across Period Tbl. Lab	1.0
Philosophy or Theology	3.0	BIOS 20303 – Fund. of Genetics ³	3.0
Language ²	3.0	BIOS 21303 – Fund. of Genetic Lab	1.0
Elective	3.0	Elective	3.0
TOTAL	16.0	TOTAL	14.0

Senior Year

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
MATH 30530 – Intro. to Probability	3.0	MATH 30540 – Math. Statistics	3.0
Mathematics 400 Elective	3.0	Literature or Fine Arts	3.0
Philosophy or Theology	3.0	Mathematics Elective ⁵	3.0
Elective ⁴	4.0	Elective ⁵	3.0
TOTAL	13.0	TOTAL	12.0

¹ (BIOS 10161 and Lab 11161) and (BIOS 10162 and Lab 11162) is an acceptable alternative.

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 BIOS 20303 is offered only in the spring semester.

⁴ BIOS 30312, BIOS 30341, BIOS 30401, and CHEM 40420 are recommended electives.

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

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
MATH 10850 – Honors Calculus I	4.0	MATH 10860 – Honors Calculus II	4.0
WR 13100 – Writing and Rhetoric	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
Physical Education	0.0	Physical Education	0.0
TOTAL	16.0	TOTAL	16.0

Sophomore Year

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
MATH 20810 – Honors Algebra I	3.0	MATH 20820 – Honors Algebra II	3.0
MATH 20850 – Honors Calculus III	4.0	MATH 20860 – Honors Calculus IV	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
TOTAL	16.0	TOTAL	16.0

Junior Year

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
MATH 30810 – Honors Algebra III	3.0	MATH 30820 – Honors Algebra IV	3.0
MATH 30850 – Honors Analysis I	3.0	MATH 30860 – Honors Analysis II	3.0
Philosophy or Theology	3.0	Philosophy or Theology	3.0
History or Social Science	3.0	English/American Literature	3.0
Elective	3.0	Elective	3.0
TOTAL	15.0	TOTAL	15.0

Senior Year

<i>Fall</i>	<i>Credits</i>	<i>Spring</i>	<i>Credits</i>
Mathematics 40000 Elective	3.0	Mathematics 40000 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
TOTAL	15.0	TOTAL	15.0