Mathematical Sciences (BS)

The Department of Mathematical Sciences offers courses in pure and applied mathematics to help students reach a wide variety of intellectual, academic, and career goals.

Many students come to the department to obtain the mathematical background needed to be successful in programs in the natural sciences, computer science, social sciences, and business. Such students may choose to supplement their major in their home department by obtaining a minor in mathematics.

Other students come to the department seeking a program leading to an undergraduate or graduate degree in one of the mathematical sciences. Undergraduate students majoring in mathematical sciences may choose one of seven areas of concentration:

- Actuarial Science
- Applied and Computational Mathematics
- Financial Mathematics
- Pure Mathematics
- Quantitative Analysis and Operations Research
- Statistics
- In consultation with a mathematics faculty advisor, undergraduate students may also create an individualized program of courses leading to a degree in mathematical sciences.

A thesis option is available to mathematics majors who wish to pursue an extended independent project related to a theoretical or applied focus of the program. Students would work under the guidance of a faculty mentor. At least 4 credits must be completed over one or two quarters prior to the thesis submission. Interested students are strongly encouraged to enroll in MAT 390 during their junior year.

Program Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Quarter Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liberal Studies Requirements</td>
<td>80</td>
</tr>
<tr>
<td>Major Requirements</td>
<td>32-36</td>
</tr>
<tr>
<td>Major Concentration Requirements</td>
<td>24-28</td>
</tr>
<tr>
<td>Open Electives</td>
<td>48-56</td>
</tr>
<tr>
<td><strong>Total hours required</strong></td>
<td><strong>192</strong></td>
</tr>
</tbody>
</table>

Learning Outcomes

Students will be able to:

- Construct valid logical arguments and analyze the reasoning of others.
- Implement a variety of mathematical structures to model and analyze complex problems.
- Apply general mathematical theory to solve problems in mathematics and in the sciences.
- Communicate mathematical ideas clearly, in verbal and visual form, by using appropriate mathematical terminology and notation.

College Core Requirements

Modern Language Requirements

Students who intend to graduate with the Bachelor of Arts (BA) degree will be required to demonstrate competence in a modern language equivalent to the proficiency attained from one year of college-level language study. Such competence may be demonstrated in one of several ways:

- completing the last course in the fourth-year high school sequence of any language
- completing the last course in the first-year college sequence of any language
- completing a college course beyond the first-year level in any language
- achieving a satisfactory score on any of the Modern Language placement examinations administered at DePaul
- achieving a satisfactory rating in a proficiency examination accepted by DePaul
- achieving a score of 3 or higher on the Advance Placement (AP) test for any language
- achieving a score of 5 or higher in the Language B assessment from a Standard or Higher Level International Baccalaureate (IB) program
- achieving a satisfactory score on the CLEP examination

Please note: Modern Languages courses with an E-designation are taught in English and may not be applied to the Modern Language Requirement.

For further information regarding satisfactory scores and possible credit from the DePaul placement, AP, CLEP, or IB examinations, please contact Student Records.

Students who complete an Inter-College Transfer (ICT) to the College of Science and Health will abide by the College of Science and Health Modern Language Requirement in place on the effective date of the ICT.

BA students who meet College requirements and wish to pursue further work in the language may elect the “Modern Language Option” of the Liberal Studies Program. While Bachelor of Science (BS) students are not required to demonstrate competency in a modern language, the “Modern Language Option” is available to them for language study at any level. Modern Languages courses with an E-designation are taught in English and may not be applied to the Modern Language Option.

Major Declaration Requirements

All students in the College are required to declare a major field prior to beginning their junior year. After researching College programs, the student should declare a major field by visiting Campus Connection and using the Declarations and Inter-College Transfer tool. The student will then be assigned a faculty advisor or staff advisor in the department or program and should make an appointment to see that advisor at his or her earliest convenience.

To change major fields, or to declare a minor or concentration, the student must use the Declarations and Inter-College Transfer tool described above. However, for the purpose of exploring the possibility of changing a major field, the student should consult an academic advisor in the College or an academic advisor in the Office for Academic Advising Support.
Liberal Studies Requirements

Honors program requirements can be found in the individual Colleges & Schools section of the University Catalog. Select the appropriate college or school, followed by Undergraduate Academics and scroll down.

First Year Program

<table>
<thead>
<tr>
<th>Hours</th>
<th>Chicago Quarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>DISCOVER CHICAGO or EXPLORE CHICAGO</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hours</th>
<th>Focal Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>FOCAL POINT SEMINAR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Writing</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>COMPOSITION AND RHETORIC I</td>
</tr>
<tr>
<td>4</td>
<td>COMPOSITION AND RHETORIC II</td>
</tr>
</tbody>
</table>

Quantitative Reasoning
Not Required

Sophomore Year
Race, Power, and Resistance
LSP 200 SEMINAR ON RACE, POWER, AND RESISTANCE

Junior Year
Experiential Learning
Required

Senior Year
Capstone
MAT 398 SENIOR CAPSTONE SEMINAR

1 Students must earn a C- or better in this course.
2 Students with a primary major in Mathematics are required to complete the Capstone offered by the Mathematics department. Students double majoring or pursuing dual degrees with the primary major or primary degree in Mathematics are required to complete the Capstone offered by the Mathematics department. Mathematics students in the University Honors Program shall take the University Honors Capstone. They are not expected to take both the Honors Capstone and the primary major or primary degree Capstone.

Learning Domains

Arts and Literature (AL)
- 3 Courses Required

Historical Inquiry (HI)
- 2 Courses Required

Math and Computing (MC)
- Not Required

Philosophical Inquiry (PI)
- 2 Courses Required

Religious Dimensions (RD)
- 2 Courses Required

Scientific Inquiry (SI)
- 1 Lab Course Required

Social, Cultural, and Behavioral Inquiry (SCBI)
- 3 Courses Required

Notes
Courses offered in the student’s primary major cannot be taken to fulfill LSP Domain requirements. If students double major, LSP Domain courses may double count for both LSP credit and the second major. Students who choose to take an experiential learning course offered by the major may count it either as a general elective or the Experiential Learning requirement.

In meeting learning domain requirements, no more than one course that is outside the student’s major and is cross-listed with a course within the student’s major, can be applied to count for LSP domain credit. This policy does not apply to those who are pursuing a double major or earning BFA or BM degrees.

Major Requirements

Course Requirements

Common Core

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Quarter Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>12-18</td>
</tr>
</tbody>
</table>

Select one of the following three-course Calculus sequences:

Sequence One

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Quarter Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 150</td>
<td>CALCULUS I</td>
<td></td>
</tr>
<tr>
<td>MAT 151</td>
<td>CALCULUS II</td>
<td></td>
</tr>
<tr>
<td>MAT 152</td>
<td>CALCULUS III</td>
<td></td>
</tr>
</tbody>
</table>

Sequence Two

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Quarter Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 147</td>
<td>CALCULUS WITH INTEGRATED PRECALCULUS I</td>
<td></td>
</tr>
<tr>
<td>MAT 148</td>
<td>CALCULUS WITH INTEGRATED PRECALCULUS II</td>
<td></td>
</tr>
<tr>
<td>MAT 149</td>
<td>CALCULUS WITH INTEGRATED PRECALCULUS III</td>
<td></td>
</tr>
</tbody>
</table>

Sequence Three

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Quarter Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 160</td>
<td>CALCULUS FOR MATHEMATICS AND SCIENCE MAJORS I</td>
<td></td>
</tr>
<tr>
<td>MAT 161</td>
<td>CALCULUS FOR MATHEMATICS AND SCIENCE MAJORS II</td>
<td></td>
</tr>
<tr>
<td>MAT 162</td>
<td>CALCULUS FOR MATHEMATICS AND SCIENCE MAJORS III</td>
<td></td>
</tr>
</tbody>
</table>

Sequence Four

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Quarter Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 170</td>
<td>CALCULUS FOR LIFE SCIENCES I</td>
<td></td>
</tr>
<tr>
<td>MAT 171</td>
<td>CALCULUS FOR LIFE SCIENCES II</td>
<td></td>
</tr>
</tbody>
</table>
the following:

### Data Analysis Requirement

Which can be satisfied via one of the following:

- MAT 398
- CSC 241
- MAT 215
- MAT 262

Sequence Five

- MAT 155 SUMMER CALCULUS I
- MAT 156 SUMMER CALCULUS II
- MAT 260 MULTIVARIABLE CALCULUS I
- MAT 261 MULTIVARIABLE CALCULUS II
- MAT 262 LINEAR ALGEBRA

**MAT 215**

- INTRODUCTION TO MATHEMATICAL REASONING
- DISCRETE MATHEMATICS I

**CSC 241**

- INTRODUCTION TO COMPUTER SCIENCE I (or a more advanced course in any programming language)

**MAT 398**

- SENIOR CAPSTONE SEMINAR (Liberal Studies Program Capstone)

Select four courses from any of the following: 16

- Natural Sciences
- Computer Sciences:
  - All CSC courses may apply
- Data Science:
  - All DSC courses may apply
- Game Development:
  - GAM 244 GAME DEVELOPMENT I
  - GAM 245 GAME DEVELOPMENT II
  - GAM 350 PHYSICS FOR GAME DEVELOPERS
  - GAM 353 TOOL PROGRAMMING FOR GAME DEVELOPMENT

GAM 368 through GAM 391

GAM 394 through GAM 398

- Information Technology:
  - IT 223 DATA ANALYSIS
  - IT 278 COMMUNITY-BASED TECHNOLOGY PROJECTS
  - IT 231 through IT 240
- IT 263 APPLIED NETWORKS AND SECURITY
- IT 313 through IT 373

IT topics courses may only be accepted with advanced approval from the chair

- Software Engineering:
  - All SE courses may apply
Select one of the following:

- GEO 241 GEOGRAPHIC INFORMATION SYSTEMS I: DIGITAL MAPPING
- GEO 243 EARTH OBSERVATION
- GEO 345 PROGRAMMING IN PYTHON FOR GIS

Data Analysis Requirement, which can be satisfied via one of the following:

- AP Statistics credit (score of 3 or better)

An applied statistics or data analysis course from this list: MAT 137, MAT 242, MAT 341, MAT 348, IT 223, PSY 240, BIO 206, ENV 260, SOC 279, MAT 353, HON 180. Other data analysis courses may satisfy the requirement with departmental approval. Note that this course may be taken as one of the four Natural or Computer Science courses required for the BS, as part of the major, or as an open elective.

### The following concentration areas will automatically satisfy the data analysis requirement:


1 This Calculus sequence is offered only during the summer, in two 6-credit hour courses. Students successfully completing MAT 131, MAT 147, MAT 150 or MAT 160 should enroll in MAT 155; students who successfully complete MAT 148, MAT 151 or MAT 161 should enroll in MAT 156. Students who successfully complete MAT 155 may enroll in either MAT 151 or MAT 156.

2 Except CSC 382.

3 Courses may only be accepted with advanced approval from the chair.

### Concentration Requirements

Students must also complete the requirements from one of the following concentrations: Pure Mathematics; Statistics; Actuarial Science; Financial Mathematics; Quantitative Analysis and Operations Research; Applied and Computational Mathematics; or Individualized.

If the student chooses to declare more than one Mathematical Sciences concentration, then the student must complete the requirements for each concentration, and take at least three additional 300-level courses overall. For example, a student earning two concentrations would have taken at least nine 300-level courses, and a student earning three concentrations would have taken at least twelve 300-level courses.

Students are advised to talk with their advisor before double majoring, because some major combinations are prohibited. No more than 50% of the credits that apply to one major may be drawn from another major.

Concentrations, tracks and specializations provide focus to the major. In addition to any college core requirements, liberal studies requirements and major requirements, students are required to choose one of the following: