# MATHEMATICS (B.S.)

The B.S. in Mathematics program at Lehigh University provides a more extensive and intensive study of mathematics and its applications than the B.S. Students can choose concentrations in Applied Mathematical Modeling, Probability and Statistics, Theoretical Mathematics or develop a program based on their own interests. The program provides a solid foundation for those who want to pursue a mathematically oriented career or advanced study in any mathematically oriented field.

## REQUIREMENTS

***Three course calculus sequence:***
MATH 021, MATH 022, MATH 023                                          12
(may substitute honors calculus or use credit earned by AP or IB)

***Core mathematics courses:***

| | | |
|---|---|---|
| MATH 163 | Introduction to Mathematical Reasoning (Spring) | 3 |
| MATH 242 | Linear Algebra (Fall) | 4 |
| MATH 243 | Algebra (Spring) | 4 |
| MATH 301 | Principles of Analysis (Fall) | 4 |

Two approved computer science courses (minimum of 5 credits)        5-6
(These course must contain a significant programming component.)

***Advanced Mathematics Electives:***                                 24 - 32
At least 8 courses from the approved list; at least 4 must be at the 300 level; subject to department approval at most 2 courses from outside the department can be substituted.

*List of approved Advanced Mathematics electives:*
- MATH 208, MATH 229, MATH 230, MATH 234, MATH 252, MATH 263, MATH 264; (MATH 205, 214 and 231 do not count toward the major);
- All 300 level courses offered by the Mathematics Department except MATH 301 (required core course), MATH 371 (see below) and MATH 391 (see below);
- Notes:
  - Together, MATH 202 and MATH 203 (as a 3 credit combination), is accepted as one Advanced Mathematics elective;
  - With prior approval, one Advanced Mathematics elective (3 credits) may be replaced with three credits of (a combination of) MATH 271 (Readings), MATH 371 (Readings), MATH 291 (Undergraduate Research) or MATH 391 (Senior Thesis) completed over one or two semesters;
  - All 400 level (graduate) courses are accepted as Advanced Mathematics electives.

The College junior writing requirement is satisfied by MATH 243 or MATH 301.

# RECOMMENDED MATHEMATICS COURSE SEQUENCE

Students should complete the calculus sequence MATH 021, 022, 023 as well as MATH 163 as soon as possible. MATH 163 can be taken concurrently with MATH 022 or MATH 023 upon recommendation of a mathematics advisor. We strongly encourage students to start taking two mathematics courses each semester starting in the second year.

Recommended courses for students who have not yet completed MATH 163 are MATH 208 or 252 or 263 in fall and MATH 208 or 264 in spring. MATH 252, 263 and 264 can be taken prior to or concurrently with MATH 23.

**Students starting with MATH 021 in their first semester:**

| *Fall* | *Spring* |
|---|---|
| ***First year*** | |
| MATH 21 | MATH 22 |
| Possible Computer Science course | Possible Computer Science course |

| | |
|---|---|
| ***Second year*** | |
| MATH 23 | MATH 163 |
| MATH 252 or MATH 263 | MATH 208 or MATH 264 |
| Possible Computer Science course | Possible Computer Science course |

| | |
|---|---|
| ***Third year*** | |
| MATH 242 | MATH 243 |
| MATH 301 or Advanced Math Elective | Advanced Math Elective |

| | |
|---|---|
| ***Fourth year*** | |
| MATH 301 or  Advanced Math Elective | Advanced Math Elective |
| Advanced Math Elective | Advanced Math Elective |

Note: the sequence above provides for 7 Advanced Mathematics Electives. Therefore, one semester must contain three Mathematics courses to satisfy graduation requirement.

**Students entering with credit for MATH 021 (AP, IB or transfer**):
There are two options labelled "opt 1" (taking MATH 163 in the first year) or "opt 2" (taking MATH 163 in the second year).

| *Fall* | *Spring* |
|---|---|
| ***First year*** | |
| MATH 22 | MATH 23 |
| Consider MATH 252 | MATH 163 (opt 1) or consider MATH 264 (opt 2) |
| Possible Computer Science course | Possible Computer Science course |

| | |
|---|---|
| ***Second year*** | |
| MATH 242 (opt 1) or MATH 208 / 252 / 263 (opt 2) | MATH 243 (opt 1) or MATH 163 (opt 2) |
| Consider MATH 301 (opt 1)  or Advanced Math Elective | Advanced Math Elective (opt 1) or MATH 208 / 264 (opt 2) |
| Possible Computer Science course | Possible Computer Science course |

| | |
|---|---|
| ***Third year*** | |
| MATH 301 or Advanced Math Elective (opt 1) or MATH 242 (opt 2) | Advanced Math Elective (opt 1) or MATH 243 (opt 2) |
| Advanced Math Elective or consider MATH 301 (opt 2) | Advanced Math Elective |

| | |
|---|---|
| ***Fourth year*** | |
| MATH 301 (opt 2) or Advanced Math Elective | Advanced Math Elective |
| Advanced Math Elective | Advanced Math Elective |

Note: option 1 leaves 9 slots and option 2 leaves 8 slots for Advanced Mathematics Electives (without first year courses).

**Students entering with credit for MATH 021 and MATH 22 (AP, IB or transfer**):
Students should follow the table for students starting with MATH 021 above, but starting from the second year. The fourth year is available for Advanced Math Electives.

In all cases students should speak to an advisor in the mathematics department to appropriately match courses to interests and mathematical background. Courses beyond the second year should be planned in consultation with a major advisor.