# Astrophysics

## Freshman Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 1371 Calculus I (placement into course or pre-reg)</td>
<td>Math 1372 Calculus II (1371)</td>
</tr>
<tr>
<td>Phys 1301W Intro Phys I (Math 1371)</td>
<td>Math 2373 Lin Alg/Diff Eq (1372)</td>
</tr>
<tr>
<td>CSE 1001 1st Yr Experience</td>
<td>Phys 2503 Phys III: Waves, Optics (1302, Math 1372)</td>
</tr>
<tr>
<td>Liberal Education course or Writ 1301</td>
<td>Phys 2201 Thermo &amp; Stat Phys (1302, Math 1372)</td>
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<tr>
<td>Liberal Education course</td>
<td>Liberal Education course</td>
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## Sophomore Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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<tr>
<td>Phys 1302W Intro Phys II (1301, &amp;Math 1372)</td>
<td>Math 2374 Multivariable Calc (1372)</td>
</tr>
<tr>
<td>Liberal Education course or Writ 1301</td>
<td>Phys 2601 Quantum Phys (2503, &amp;2605, &amp;Math 2373)</td>
</tr>
<tr>
<td>Liberal Education course</td>
<td>Phys 3041 Math for Physics* (1302, Math 2373)</td>
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## Junior Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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<tbody>
<tr>
<td>Phys 4001 Analytical Mech (2503 or 2601, 3041, Math 2374)</td>
<td>Ast 4994W Senior Thesis (4002)</td>
</tr>
<tr>
<td>Ast 4xxx or 5xxx</td>
<td>Technical Elective IV</td>
</tr>
<tr>
<td>Phys 3605W Modern Phys Lab previously 2605 (&amp;2503)</td>
<td>Technical Elective III</td>
</tr>
<tr>
<td>Technical Elective I</td>
<td>Open Elective (If needed to reach 120 credits)</td>
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## Senior Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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<tbody>
<tr>
<td>Ast 4xxx or 5xxx</td>
<td>Phys 4002 Elect &amp; Magnetism (2503 or 2601, 3041, Math 2374)</td>
</tr>
<tr>
<td>Technical Elective II</td>
<td>Technical Elective IV</td>
</tr>
<tr>
<td>Open Elective (If needed to reach 120 credits)</td>
<td>Open Elective (If needed to reach 120 credits)</td>
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## About This Plan

- This plan is not a contract. Curriculum can change. The APAS is the official method for tracking completion of University degree requirements.
- Shaded courses are only offered in the indicated semester.
- Course pre-requisites and co-requisites (designated by &) are listed below the course number and title.
- Students can take either the CSE-only or University-wide version of the math course (Math 1371/1271, 1372/1272, 2373/2243, 2374/2263).

## Applying to your Major

Students who have completed the required courses for admission to this major (indicated with double boxes on plan) and have a 3.2 UM-TC technical GPA at the end of the fall semester will be guaranteed admission. All other students who have completed the required courses will be considered for admission on a space-available basis. Admission following the spring semester is only based on space availability. The major application database is available at z.umn.edu/csemajorapp.

## Total Credits Needed for Degree: 120

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## Department Contact Information

- Website: www.astro.umn.edu/undergrad/
- Main Phone: 612-624-4811
- Main Office: Tate Hall 285
- Director of Undergraduate Studies: Dr. Liliya Williams
- Departmental Contact: Professor Bob Gehrz; gehrz@astro.umn.edu

## University Degree Requirements

All students must complete the following Writing & Liberal Education requirements, as noted on their APAS report. See link for full Core & Theme names: z.umn.edu/liberaleducation

### Writing Requirements:

**University Writing:**
Writ 1301/1401 or equivalent

**Writing Intensive (WI):**
Two: 1xxx or 2xxx level **
One: 3/4/5xxx level (in major)*
One: 3/4/5xxx level (any dept.)*

Requirements with an (*) will be fulfilled by taking courses at UM-TC required for this major.

### Liberal Education

<table>
<thead>
<tr>
<th>CORES:</th>
<th>THEMES:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio</td>
<td>4 of 5:</td>
</tr>
<tr>
<td>Phy*</td>
<td>Env</td>
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<tr>
<td>His</td>
<td>GP</td>
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<td>SocS</td>
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<td>AH</td>
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<td>Mth*</td>
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Astrophysics

POSSIBLE POSITIONS

- **Astronomer**: Solves problems in navigation, space flight, and satellite communications and develops instrumentation and techniques used to observe and collect astronomical data.
- **Data analyst**: Analyzes problems and comes up with creative solutions.
- **Instrument designer**: Uses CAD programming for satellite and rocket projects.
- **Physicist**: Conducts research into the phases of physical phenomena, develops theories and laws on the basis of observation and experiments, and devises methods to apply laws and theories to industry and other fields.
- **Professor/teacher**: Develops and teaches astronomy/astrophysics curriculum, which includes scientific experiments.
- **Research scientist**: Conducts experiments, analyzes findings, operates necessary equipment, develops and tests theories.
- **Support astronomer**: Provides instruction, assistance, and scientific guidance to observers on the use of the observatory’s telescopes and instruments.
- **Telescope engineer**: Assists with the design, development, fabrication, and commissioning of telescopes.

**Some of these positions may require an advanced degree.**

INDUSTRIES

- Government
- Institutes
- Military
- Museums
- Planetariums
- Research and development
- Teaching
- Universities

EMPLOYERS

- 3M
- Honeywell
- Intel Corporation
- Lawrence Livermore National Lab
- Lincoln Laboratory
- Los Alamos National Laboratory
- MIT
- NASA
- Orbital ATK
- SAIC
- Smithsonian Astrophysical Observatory
- Space Telescope Science Institute
- The Aerospace Corporation
- UMN Polar Geospatial Center
- UMN Observational Cosmology Group

More Information

Career Center: cse.umn.edu/career
Salary Information: z.umn.edu/csesalary
More Information on Undergraduate Majors: cse.umn.edu/majors

CSE Career Outcomes

Post-graduation Outcomes:*  

Grad School: 37.5%  
Employed: 62.5%

*Salary and Career Outcomes gathered from the 2016-2017 CSE Graduation Survey
Post-graduation outcomes reflect the percentage of students who were employed full-time in their field or were enrolled in a graduate program.