**Physics - Professional Emphasis**

**Freshman Year**

**Fall Semester**
- Math 1371 Calculus I (placement into course, or pre-req)
- Phys 1301W Intro Physics I (*&Math 1371)
- CSE 1001 1st Yr Experience
- Liberal Education course
- Liberal Education course or Writ 1301

**Spring Semester**
- Math 1372 Calculus II (1371)
- Phys 1302W Intro Physics II (1301, & Math 1372)
- Liberal Education course
- Liberal Education course or Writ 1301

**Sophomore Year**

**Fall Semester**
- Math 2373 Lin Alg/Diff Eq (1372)
- Phys 2503 Phys III: Waves, Optics (1302, Math 1372)
- Phys 2201 Thermo & Stat Phys (1302, Math 1372)
- Technical Elective I (recommend CSCI 1103/1113/1133)
- Phys 3605W Modern Phys Lab previously 2605 (&2503)

**Spring Semester**
- Math 2374 Multivariable Calc (1372)
- Phys 2601 Quantum Physics (2503, &3605, &Math 2373)
- Phys 3041 Math for Physics* (1302, Math 1373)
- Technical Elective IV
- Phys 3605W Modern Phys Lab

*Not required for students admitted prior to Fall 2017; recommend as UD Math Elective.

**Junior Year**

**Fall Semester**
- Phys 4001 Analytical Mech (2503 or 2601, 3041, Math 2374)
- Phys 4051 Experimental Phys I (3605 or equiv lab exp or instr consent)
- Technical Elective II
- Liberal Education course

**Spring Semester**
- Phys 4101 Quantum Mech (2503 or 2601 or Chem 4501 or 4502)
- Phys 4052W Experimental Phys II (4051)
- Technical Elective III
- Liberal Education course

**Senior Year**

**Fall Semester**
- Phys 4002 Elect & Magnetism (2503 or 2601, 3041, Math 2374)
- Phys 4201 Stat Therm Phys (2601)
- Open Elective (If needed to reach 120 credits)

**Spring Semester**
- Technical Elective IV
- Phys 4303 Electrodynamics (4002)
- Open Elective (If needed to reach 120 credits)

**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 may take either the CSE-only or University-wide versions of math courses (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**
Physics

POSSIBLE POSITIONS

- **Data analyst**: Analyzes problems and comes up with creative solutions.
- **Field test engineer**: Performs electro-optical (EO) or infrared (IR) measurements, both on site and at field test sites as part of a small team. Develop/upgrade instrumentation and software for control and analysis, document test procedures and experimental setups, and analyze and document the results of the tests.
- **Lab analyst**: Conducts experiments, runs laboratory tests and analyzes results.
- **Physicist**: Conducts research into the phases of physical phenomena, develops theories/laws on the basis of observation and experiments, and devises methods to apply laws/theories to industry and other fields.
- **Professor/teacher**: Develops and teaches physics curriculum, which includes scientific experiments.
- **Researcher**: Conducts experiments, analyzes findings, operates necessary equipment, develops and tests theories.
- **Thin film deposition engineer**: Conducts product development on thin film deposition using vacuum systems, including operation/maintenance of a vacuum system; designing and constructing part of the system as needed; analysis of the deposited thin film; and designing of experiments, analyzing results, and reporting.

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

INDUSTRIES

- Aerospace/aeronautical
- Automotive
- Biomedical
- Consulting
- Educational institutions
- Engineering consulting
- Government agencies
- Information technology
- Materials supply
- Nuclear plants
- Observatories
- Optics/electronics
- Petroleum/mining
- Research and development
- Telecommunications

EMPLOYERS

- 3M
- Accenture
- Amazon
- Boom Lab
- Carl Zeiss Industrial Metrology
- Deloitte
- Epic Systems
- General Mills
- Google
- Intel Corporation
- Meditech
- Micron Technology, Inc
- Minco Products
- Orbital ATK
- Proto Labs Inc
- RFA Engineering
- Seagate Technology
- Siemens
- Thomson Reuters
- Vascular Solutions

CSE Career Outcomes

Average Starting Salary: $**

Post-graduation Outcomes:*  

**cohort size too small to report data due to privacy regulations**

INDUSTRIES

- Aerospace/aeronautical
- Automotive
- Biomedical
- Consulting
- Educational institutions
- Engineering consulting
- Government agencies
- Information technology
- Materials supply
- Nuclear plants
- Observatories
- Optics/electronics
- Petroleum/mining
- Research and development
- Telecommunications

EMPLOYERS

- 3M
- Accenture
- Amazon
- Boom Lab
- Carl Zeiss Industrial Metrology
- Deloitte
- Epic Systems
- General Mills
- Google
- Intel Corporation
- Meditech
- Micron Technology, Inc
- Minco Products
- Orbital ATK
- Proto Labs Inc
- RFA Engineering
- Seagate Technology
- Siemens
- Thomson Reuters
- Vascular Solutions

More Information

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

*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.