The Minor in Quantum Information Science and Engineering requires a minimum of 20 credit hours.

Courses below marked by * have prerequisites or corequisites. Students are required to double check course prerequisites and corequisites. Please see your advisor or consult the Undergraduate Course Catalog for more information about prerequisites and corequisites.

### I. Required courses (12 credit hours)
- MATH 2114 Intro to Linear Algebra or MATH 3144 Linear Algebra II
- PHYS 2254 Hello Quantum World!
- CHEM/PHYS 3684 Quantum Software I
- CHEM/PHYS 4684 Quantum Software II
- PHYS 4254 Quantum Information Technologies

### II. Select 3 credit hours from the list below:
- PHYS 4264 Quantum Optics and Qubit Processors
- CS 4134 Quantum Computation and Information Processing

### III. Select at least 3 credit hours from the list below:
- PHYS 3314 Intermediate Laboratory
- PHYS 3324 Modern Physics
- PHYS 3406 Intermediate Electricity and Magnetism
- MATH 3034 Introduction to Proofs
- MATH 3144 Linear Algebra II
- CS 1064 Introduction to Programming in Python
- CS 2064 Intermediate Programming in Python
- CS 2114 Software Design and Data Structures
- CS 3114 Data Structures and Algorithms
- CMDA/CS/STAT 3654 Introduction to Data Analytics and Visualization
- CHEM 3616 Physical Chemistry
- ECE 2024 Circuits and Devices
- ECE 2214 Physical Electronics
- ECE 2514 Computational Engineering
- ECE 2714 Signals and Systems
- ECE 3105 Electromagnetic Fields
- ECE 3134 Introduction to Optoelectronics
- ECE 3214 Semiconductor Device Fundamentals
- ECE 3604 Introduction to RF & Microwave Engineering
- ECE 3614 Introduction to Communication Systems
- ECE 3714 Introduction to Control Systems
- MSE 2054 Fundamentals of Materials Science
- MSE 3204 Fundamentals of Electronic Materials

### IV. Select at least 2 credit hours from the list below:
- PHYS 4264 Quantum Optics and Qubit Processors
- PHYS 4315 Modern Experimental Physics
- PHYS 4455 Introduction to Quantum Mechanics
- PHYS 4456 Introduction to Quantum Mechanics
- PHYS 4554 Introduction to Solid State Physics
- PHYS 5455 Quantum Mechanics
- CHEM 4404 Physical Inorganic Chemistry
- MATH 4175 Cryptography
- MATH 4176 Cryptography
- MATH 4445 Introduction to Numerical Analysis
- CS/MATH 4414 Issues in Scientific Computing
- CS 4104 Data and Algorithm Analysis
*CS 4134 Quantum Computation and Information Processing* △
*CMDA/CS/STAT 4654 Intermediate Data Analytics and Machine Learning
*CS/STAT 5525 Data Analytics
*CS/STAT 5526 Data Analytics
*ECE 4104 Microwave and RF Engineering
*ECE 4134 Photonics
*ECE 4424/CS 4824 Machine Learning
*ECE 4614 Telecommunication Networks
*ECE 4634 Digital Communications
*ECE 5634 Information Theory
*MSE/ECE 4234 Semiconductor Processing

Total credit hours: minimum 20 credit hours.

V. Notes

1. Minimum GPA
   Must have a 2.0 or higher for all courses used to complete this minor.

2. * Prerequisites and corequisites
   For the courses listed above marked by *, prerequisites and/or corequisites apply. Students are required to double check course prerequisites and corequisites. Please see your advisor or consult the Undergraduate Course Catalog for more information.

3. # This course can only count once. If taken in set I (Required courses), it cannot be counted as an elective from set III.

4. & This course can only count once. If taken in set II, it cannot be counted as an elective from set IV.