MSCS-ALIGN students come from a wide variety of backgrounds—with undergraduate majors ranging from math, biology, history, engineering, and classics. In this program, students have an opportunity to acquire both the knowledge needed to transition into a new career and the practical skills to build the next great app. In this program, students may learn to:

- Develop the ability to recognize and solve problems arising in modern computing
- Assimilate ideas and concepts from theoretical studies and hands-on design and programming
- Acquire skills in software and application design, network infrastructure, and other dynamic and emerging computer science areas

**Program Requirements**
Complete all courses and requirements listed below unless otherwise indicated.

### Required Course Work

#### Fundamentals
- **CS 5001** and **CS 5003**
  Intensive Foundations of Computer Science and Recitation for CS 5001  
  **Total Credit:** 4

#### Discrete Structures
- **CS 5002**
  Discrete and Data Structures  
  **Total Credit:** 4

#### Object-Oriented Design
- **CS 5004** and **CS 5005**
  Object-Oriented Design and Recitation for CS 5004  
  **Total Credit:** 4

#### Other Foundation Courses
- **CS 5006**
  Algorithms  
  **Total Credit:** 2
- **CS 5007**
  Computer Systems  
  **Total Credit:** 2

#### Development
- **CS 5500**
  Managing Software Development (a grade of B or higher is required)  
  **Total Credit:** 4
- **or CS 5600**
  Computer Systems  
  **Total Credit:** 4

#### Algorithms
- **CS 5800**
  Algorithms (a grade of B or higher is required)  
  **Total Credit:** 4

### Electives
Complete 8 semester hours from one of the specializations areas listed below.

Complete 4 semester hours from the following:

- **CS 5100** to **CS 5850**
- **CS 6110** to **CS 6810**
- **CS 8674**
  Master’s Project
- **CS 8982**
  Readings

### Specializations
Complete 8 semester hours from the following:

#### Artificial Intelligence
- **CS 5100**
  Foundations of Artificial Intelligence
- **CS 5335**
  Robotic Science and Systems

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 6110</td>
<td>Knowledge-Based Systems</td>
</tr>
<tr>
<td>CS 6120</td>
<td>Natural Language Processing</td>
</tr>
<tr>
<td>CS 6140</td>
<td>Machine Learning</td>
</tr>
<tr>
<td>CS 7140</td>
<td>Advanced Machine Learning</td>
</tr>
<tr>
<td>CS 7170</td>
<td>Seminar in Artificial Intelligence</td>
</tr>
<tr>
<td>CS 7180</td>
<td>Special Topics in Artificial Intelligence</td>
</tr>
</tbody>
</table>

#### Computer-Human Interface
- **CS 5340**
  Computer/Human Interaction
- **CS 5350**
  Applied Geometric Representation and Computation
- **CS 6350**
  Empirical Research Methods
- **CS 7140**
  Advanced Machine Learning

#### Database Management
- **CS 5200**
  Database Management Systems
- **CS 6140**
  Machine Learning
- **CS 6200**
  Information Retrieval
- **CS 6220**
  Data Mining Techniques
- **CS 6240**
  Parallel Data Processing in MapReduce
- **CS 7270**
  Seminar in Database Systems
- **CS 7280**
  Special Topics in Database Management

#### Graphics
- **CS 5310**
  Computer Graphics
- **CS 5320**
  Digital Image Processing
- **CS 5330**
  Pattern Recognition and Computer Vision
- **CS 5520**
  Mobile Application Development
- **CS 6310**
  Computational Imaging
- **CS 7370**
  Seminar in Graphics/Image Processing
- **CS 7380**
  Special Topics in Graphics/Image Processing

#### Information Security
- **CS 5770**
  Software Vulnerabilities and Security
- **CS 6540**
  Foundations of Formal Methods and Software Analysis
- **CS 6740**
  Network Security
- **CS 6750**
  Cryptography and Communications Security
- **CS 6760**
  Privacy, Security, and Usability
- **CS 7580**
  Special Topics in Software Engineering

#### Networks
- **CS 5700**
  Fundamentals of Computer Networking
- **CS 5750**
  Social Computing
- **CS 6710**
  Wireless Network
- **CS 6740**
  Network Security
- **CS 6750**
  Cryptography and Communications Security
- **CS 6760**
  Privacy, Security, and Usability
- **CS 7770**
  Seminar in Computer Networks
- **CS 7775**
  Seminar in Computer Security
- **CS 7780**
  Special Topics in Networks
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 5400</td>
<td>Principles of Programming Language</td>
</tr>
<tr>
<td>CS 6410</td>
<td>Compilers</td>
</tr>
<tr>
<td>CS 6412</td>
<td>Semantics of Programming Language</td>
</tr>
<tr>
<td>CS 6510</td>
<td>Advanced Software Development</td>
</tr>
<tr>
<td>CS 6515</td>
<td>Software Development</td>
</tr>
<tr>
<td>CS 7470</td>
<td>Seminar in Programming Languages</td>
</tr>
<tr>
<td>CS 7480</td>
<td>Special Topics in Programming Language</td>
</tr>
<tr>
<td>CS 7570</td>
<td>Seminar in Software Development</td>
</tr>
<tr>
<td>CS 5610</td>
<td>Web Development</td>
</tr>
<tr>
<td>CS 6510</td>
<td>Advanced Software Development</td>
</tr>
<tr>
<td>CS 6520</td>
<td>Methods of Software Development</td>
</tr>
<tr>
<td>CS 6530</td>
<td>Analysis of Software Artifacts</td>
</tr>
<tr>
<td>CS 6535</td>
<td>Engineering Reliable Software</td>
</tr>
<tr>
<td>CS 6540</td>
<td>Foundations of Formal Methods and Software Analysis</td>
</tr>
<tr>
<td>CS 7575</td>
<td>Seminar in Software Engineering</td>
</tr>
<tr>
<td>CS 7580</td>
<td>Special Topics in Software Engineering</td>
</tr>
<tr>
<td>CS 5620</td>
<td>Computer Architecture</td>
</tr>
<tr>
<td>CS 5650</td>
<td>High Performance Computing</td>
</tr>
<tr>
<td>CS 6610</td>
<td>Parallel Computing</td>
</tr>
<tr>
<td>CS 6740</td>
<td>Network Security</td>
</tr>
<tr>
<td>CS 7670</td>
<td>Seminar in Computer Systems</td>
</tr>
<tr>
<td>CS 7680</td>
<td>Special Topics in Computer Systems</td>
</tr>
<tr>
<td>CS 6610</td>
<td>Parallel Computing</td>
</tr>
<tr>
<td>CS 6750</td>
<td>Cryptography and Communications Security</td>
</tr>
<tr>
<td>CS 6800</td>
<td>Application of Information Theory</td>
</tr>
<tr>
<td>CS 6810</td>
<td>Distributed Algorithms</td>
</tr>
<tr>
<td>CS 7805</td>
<td>Theory of Computation</td>
</tr>
<tr>
<td>CS 7870</td>
<td>Seminar in Theoretical Computer Science</td>
</tr>
<tr>
<td>CS 7880</td>
<td>Special Topics in Theories of Computer Science</td>
</tr>
<tr>
<td>CS 5150</td>
<td>Game Artificial Intelligence</td>
</tr>
<tr>
<td>CS 5310</td>
<td>Computer Graphics</td>
</tr>
<tr>
<td>CS 5340</td>
<td>Computer/Human Interaction</td>
</tr>
<tr>
<td>CS 5850</td>
<td>Building Game Engines</td>
</tr>
<tr>
<td>CS 7140</td>
<td>Advanced Machine Learning</td>
</tr>
</tbody>
</table>

**Program Credit/GPA Requirements**

44 total semester hours required  
Minimum 3.000 GPA required