Each degree candidate will be required to pass, with an average of B or better, and not more than two grades below B, the following minimum number of credits, distributed to include core courses and electives.

Core courses (12 credits, 4 courses):
- COMP.5030 Algorithms
- One course from Group II
- One course from Group III
- One course from Group IV

Group I (Foundations):
- COMP.5000 Fundamentals of Computer Science
- COMP.5020 Foundations of Computer Science
- COMP.5030 Algorithms
- COMP.5310 Design of Programming Languages
- COMP.5340 Compiler Construction
- COMP.7100 Approximation Algorithms

Group II (Systems and Networks):
- COMP.5150 Operating Systems I
- COMP.5160 Operating Systems II
- COMP.5610 Computer & Network Security I
- COMP.5620 Computer & Network Security II
- COMP.5630 Data Communications I
- COMP.5640 Data Communications II
- COMP.5800 Developing Android Apps
- COMP.6610 Advanced Topics in Network Security

Group III (Human-Computer Interaction, Visualization, Robotics and AI):
- COMP.5230 Computer Vision I
- COMP.5300 Natural Language Processing
- COMP.5410 Data Visualization
- COMP.5430 Artificial Intelligence
- COMP.5440 Data Mining
COMP.5450 Machine Learning
COMP.5460 Computer Graphics I
COMP.5470 Computer Graphics II
COMP.5480 Robot Design
COMP.5490 Mobile Robots
COMP.5500 Topics: Advanced Robotics Development
COMP.5500 Topics: Multi-Touch Computing
COMP.5500 Advanced Topics in Computer Vision
COMP.6410 Advanced Topics in Visualization

**Group IV (Information Management and Analysis):**
COMP.5130 Internet and Web Systems I
COMP.5140 Internet and Web Systems II
COMP.5400 Visual Analytics
COMP.5400 Topics: Bioinformatics
COMP.5600 Topics: Big Data System Design
COMP.5730 Database I
COMP.5740 Database II
COMP.6730 Advanced Database Systems

**Electives** (18 credits, 6 courses in the COMP.5*** and COMP.6*** series or other courses approved by the department)

**Total:** 30 credits

**Master’s Thesis**
An optional master’s thesis can be substituted for at most six credits, and can be used to substitute for 2 courses as electives. Students who wish to do a thesis must file a *Proposed Thesis Committee* form with the Graduate Coordinator prior to beginning work on the thesis.