

# Master of Science in Computer Science

## Plan Description

Our master's program gives you the opportunity to study different areas, including:

Design and analysis of algorithms

Operating and distributed systems

Computer architecture and networking

Computational geometry and robotics

Computer graphics and image processing

Programming languages and compiler construction

Artificial intelligence and expert systems

Database design, document analysis, and retrieval

Software engineering

For more information about your program including your graduate program handbook and learning outcomes please visit the Degree Directory.

## Plan Admission Requirements

Application deadlines

Applications available on the UNLV Graduate College website.

Applicants must submit the following to the Graduate College:

An application and official transcripts of all college level work with a minimum GPA of 3.00.

Two letters of recommendation concerning the student's potential for succeeding in the graduate program.

A set of official transcripts.

The results of the Graduate Record Examination current to within five years should be sent directly to the department. The preferred minimum score requirement is 297. The GRE requirement is waived for students participating in the Integrated BS-MS track.

In addition, applicants must have completed courses and their prerequisites equivalent to our

undergraduate Programming Languages (CS 326), Operating Systems (CS 370), Discrete Mathematics II (MATH 351), and Statistical Methods I (STAT 411) with an average grade of B or better.

The Computer Science Admission Committee may elect to admit an outstanding applicant who has not satisfied all of the background requirements on a conditional basis.

The student must complete these requirements before full admission to the program is granted.

Students who have not completed all the following courses (or equivalent courses) as part of their bachelor's degree may be required to complete them as a condition of their admission. If taken as part of their master's degree program, these courses may count toward the 30 credits required.

CS 656 Automata and Formal Languages

CS 677 Analysis of Algorithms

CS 660 Compiler Construction

Additional information about the Integrated BS-MS degree program:

Up to nine credit hours of approved graduate-level course work can be taken as technical electives for the grade of B or better during the senior year and those credit hours will be waived for the graduate degree.

The GRE requirement is waived for students participating in the Integrated BS-MS track.

The following conditions must be met to enroll in the Integrated BS-MS program:

A minimum of two semesters of full-time enrollment in B.S. of Computer Science program is required.

Applications are normally submitted with two semesters remaining in the senior year.

A minimum of 90 credit hours of course work applicable to the B.S. of Computer Science degree with a cumulative GPA of 3.3 or higher must be completed before beginning the joint degree program.

Students have to choose the thesis option in the MS degree. Students interested in this program and who also meet the credentials listed above should request a letter of nomination from a Computer Science faculty member. Submit this letter along with a short resume (no more than two pages) directly to the Department of Computer Science ([computerscience.gradcoord@unlv.edu](mailto:computerscience.gradcoord@unlv.edu)) as well as an application through the Grad Rebel Gateway.

All domestic and international applicants must review and follow the Graduate College Admission and Registration Requirements.

Students are accepted into a degree program as described in the Graduate Catalog. The faculty and corresponding sub-disciplines and sub-plans within the described programs are subject to change at any time.

## Plan Requirements

See Subplan Requirements below.

Subplan 1: Thesis Track

Subplan 2: Project Track

Subplan 3: Integrated BS-MS Track

Subplan 4: Exam Track - Foundations and Theory

Subplan 5: Exam Track - Cyber Security

Subplan 6: Exam Track - AI and Machine Learning

Subplan 7: Exam Track - Software Engineering

Subplan 8: Exam Track - Data Science and Big Data

Subplan 9: Exam Track - Database and Information Retrieval

Subplan 10: Exam Track - Graphics and Augmented Reality

Subplan 11: Exam Track - Programming Language and Systems

## Subplan 1 Requirements: Thesis Track

Total Credits Required: 30

## Course Requirements

### Computer Science Courses – Credits: 24

Complete 24 credits of 600- or 700- level Computer Science (CS) courses. Students may complete up to 3 credits outside of CS. Outside credits must be related to the student's research area and be approved by the department graduate committee.

### Thesis – Credits: 6

CS 791 Thesis

3 – 6

## Degree Requirements

The student must pass at least 30 credits of 600- and 700-level courses with grades of C or better.

Students must complete 12 credits of 700-level CS courses (excluding thesis).

Courses in which the student earns a grade lower than C cannot be included in his or her program, and the student's total grade point average (GPA) must be 3.00 or higher while in the program. A student whose GPA falls below 3.00 will be placed on academic probation. That

student must have an overall GPA of at least 3.00 by the end of two subsequent semesters; otherwise the student will be separated from the graduate program. A student on probation will not be allowed to register for CS 690, CS 790, CS 791, CS 792, CS 799, or equivalent courses in another department.

In consultation with his/her advisor, a student will organize a thesis committee of at least three departmental members. In addition, a fourth member from outside the department, known as the Graduate College Representative, must be appointed. An additional committee member may be added at the student and department's discretion. Please see Graduate College policy for committee appointment guidelines.

The student must submit a thesis approved by their advisor and thesis committee and conforming to the specifications of the Graduate College and pass a final oral examination covering the thesis and relevant course work.

## Graduation Requirements

The student must submit all required forms to the Graduate College and then apply for graduation up to two semesters prior to completing his/her degree requirements.

The student must submit and successfully defend his/her thesis by the posted deadline. The defense must be advertised and is open to the public.

After the thesis defense, the student must electronically submit a properly formatted pdf copy of their thesis to the Graduate College for format check. Once the thesis format has been approved by the Graduate College, the student will submit the approved electronic version to ProQuest. Deadlines for thesis defenses, format check submissions, and the final ProQuest submission can be found here.

## Subplan 2 Requirements: Project Track

Total Credits Required: 30

## Course Requirements

### Computer Science Courses – Credits: 27

Complete 27 credits of 600- or 700- level Computer Science (CS) courses. Students may complete up to 3 credits outside of CS. Outside credits must be related to the student's research area and be approved by the department graduate committee.

## Project – Credits: 3

CS 790 Master's Project

1 – 3

### Degree Requirements

The student must pass at least 30 credits of 600- and 700-level courses with grades of C or better.

Students must complete 15 credits of 700-level CS courses (excluding the project).

Courses in which the student earns a grade lower than C cannot be included in his or her program, and the student's total grade point average (GPA) must be 3.00 or higher while in the program. A student whose GPA falls below 3.00 will be placed on academic probation. That student must have an overall GPA of at least 3.00 by the end of two subsequent semesters; otherwise the student will be separated from the graduate program. A student on probation will not be allowed to register for CS 690, CS 790, CS 791, CS 792, CS 799, or equivalent courses in another department.

In consultation with his/her advisor, a student will organize a project committee of at least three departmental members. In addition, a fourth member from outside the department, known as the Graduate College Representative, must be appointed. An additional committee member may be added at the student and department's discretion. Please see Graduate College policy for committee appointment guidelines.

The student must complete a computer science project and a report approved by his/her advisor and his/her project committee and pass a final oral examination over the project and relevant course work.

### Graduation Requirements

The student must submit all required forms to the Graduate College and then apply for graduation up to two semesters prior to completing his/her degree requirements.

The student must successfully complete a master's project. The student must submit and successfully defend his/her project by the posted deadline. The defense must be advertised and is open to the public.

### Subplan 3 Requirements: Integrated BS-MS Track

Total Credits Required: 30

## Course Requirements

### Required Courses - Credits: 9

Complete the following nine credits or other courses approved by the Graduate Coordinator.

CS 656 Automata and Formal Languages	3
CS 660 Compiler Construction	3
CS 677 Analysis of Algorithms	3

### Computer Science Courses – Credits: 15-21

Complete 15-21 credits of 600- or 700- level Computer Science (CS) courses. Students may complete up to 3 credits outside of CS. Outside credits must be related to the student's research area and be approved by the department graduate committee.

### Thesis – Credits: 6

CS 791 Thesis	3 – 6
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## Degree Requirements

The student must pass at least 30 credits of 600- and 700-level courses with grades of C or better.

Students must complete 12 credits of 700-level CS courses (excluding thesis).

Courses in which the student earns a grade lower than C cannot be included in his or her program, and the student's total grade point average (GPA) must be 3.00 or higher while in the program. A student whose GPA falls below 3.00 will be placed on academic probation. That student must have an overall GPA of at least 3.00 by the end of two subsequent semesters; otherwise the student will be separated from the graduate program. A student on probation will not be allowed to register for CS 690, CS 790, CS 791, CS 792, CS 799, or equivalent courses in another department.

In consultation with his/her advisor, a student will organize a thesis committee of at least three departmental members. In addition, a fourth member from outside the department, known as the Graduate College Representative, must be appointed. An additional committee member may be added at the student and department's discretion. Please see Graduate College policy for committee appointment guidelines.

The student must submit a thesis approved by their advisor and thesis committee and conforming to the specifications of the Graduate College and pass a final oral examination covering the thesis and relevant course work. Students may be released from up to 9 credits of

classes towards completion of the M.S. degree as long as the average G.P.A for these classes taken as part of the undergraduate program is a 3.0 or above.

## Graduation Requirements

The student must submit all required forms to the Graduate College and then apply for graduation up to two semesters prior to completing his/her degree requirements.

The student must submit and successfully defend his/her thesis by the posted deadline. The defense must be advertised and is open to the public.

After the thesis defense, the student must electronically submit a properly formatted pdf copy of their thesis to the Graduate College for format check. Once the thesis format has been approved by the Graduate College, the student will submit the approved electronic version to ProQuest. Deadlines for thesis defenses, format check submissions, and the final ProQuest submission can be found here.

## Subplan 4 Requirements: Exam Track - Foundations and Theory

Total Credits Required: 30

## Course Requirements

### Required Courses - Credits: 9

Complete a total of 9 credits from the following courses.

CS 677 Analysis of Algorithms	3
CS 789 Topics in Advanced Computer Science	3 - 24
CS 758 Computational Geometry	3
CS 656 Automata and Formal Languages	3
CS 715 Advanced Analysis of Algorithms	3

### Computer Science Courses - Credits:21

Complete 21 credits of 600- or 700- level Computer Science (CS) courses. Students may complete up to 6 credits outside of CS. Outside credits must be related to computer applications and approved by CS graduate committee.

## Degree Requirements

1. The student must pass at least 30 credits of 600- and 700-level courses with grades of C or better.
2. Students must complete 18 credits of 700-level CS courses.
3. (Comprehensive Oral Exam on a Specialized Area) Students must choose one of the specialized areas covered by CS 600/700-level courses and approved by graduate affairs committee. They take 3 courses in the chosen specialized area. Students will form a committee (one chair, 2 other members from the department, and one from outside). The chair will assign a few papers/reading materials to the students, and the committee will give an oral exam to the students on the selected specialized area. Students will have only two attempts to pass the comprehensive oral exam.
4. Courses in which the student earns a grade lower than C cannot be included in his or her program, and the student's total grade point average (GPA) must be 3.00 or higher while in the program. A student whose GPA falls below 3.00 will be placed on academic probation. That student must have an overall GPA of at least 3.00 by the end of two subsequent semesters; otherwise the student will be separated from the graduate program. A student on probation will not be allowed to register for CS 690 or equivalent courses in another department.
5. Exam Track must be declared and approved before completing 19 credit hours of CS coursework.

## Graduation Requirements

1. The student must submit all required forms to the Graduate College and then apply for graduation up to two semesters prior to completing his/her degree requirements.
2. The student must pass a final comprehensive oral examination.

## Subplan 5 Requirements: Exam Track - Cyber Security

### Course Requirements

#### Required Courses - Credits: 9

Complete a total of 9 credits from the following courses.

CS 643 Information Assurance	3
CS 645 Internet Security	3
CS 648 Computer Security	3
CS 649 Computer and Network Forensics	3
CS 789 Topics in Advanced Computer Science	3 - 24
CS 665 Computer Networks I	3

#### Computer Science Courses - Credits:21



Complete 21 credits of 600- or 700- level Computer Science (CS) courses. Students may complete up to 6 credits outside of CS. Outside credits must be related to computer applications and approved by CS graduate committee.

## Degree Requirements

1. The student must pass at least 30 credits of 600- and 700-level courses with grades of C or better.
2. Students must complete 18 credits of 700-level CS courses.
3. (Comprehensive Oral Exam on a Specialized Area) Students must choose one of the specialized areas covered by CS 600/700-level courses and approved by graduate affairs committee. They take 3 courses in the chosen specialized area. Students will form a committee (one chair, 2 other members from the department, and one from outside). The chair will assign a few papers/reading materials to the students, and the committee will give an oral exam to the students on the selected specialized area. Students will have only two attempts to pass the comprehensive oral exam.
4. Courses in which the student earns a grade lower than C cannot be included in his or her program, and the student's total grade point average (GPA) must be 3.00 or higher while in the program. A student whose GPA falls below 3.00 will be placed on academic probation. That student must have an overall GPA of at least 3.00 by the end of two subsequent semesters; otherwise the student will be separated from the graduate program. A student on probation will not be allowed to register for CS 690 or equivalent courses in another department.
5. Exam Track must be declared and approved before completing 19 credit hours of CS coursework.

## Graduation Requirements

1. The student must submit all required forms to the Graduate College and then apply for graduation up to two semesters prior to completing his/her degree requirements.
2. The student must pass a final comprehensive oral examination.

## Subplan 6 Requirements: Exam Track - AI and Machine Learning

### Course Requirements

#### Required Courses - Credits: 9

Complete a total of 9 credits from the following courses.

CS 682 Artificial Intelligence	3
CS 781 Automated Deduction	3
CS 782 Expert System Construction	3
CS 783 Genetic Algorithms and Neural Networks	3
CS 789 Topics in Advanced Computer Science	3 - 24

## Computer Science Courses - Credits:21

Complete 21 credits of 600- or 700- level Computer Science (CS) courses. Students may complete up to 6 credits outside of CS. Outside credits must be related to computer applications and approved by CS graduate committee.

## Degree Requirements

1. The student must pass at least 30 credits of 600- and 700-level courses with grades of C or better.
2. Students must complete 18 credits of 700-level CS courses.
3. (Comprehensive Oral Exam on a Specialized Area) Students must choose one of the specialized areas covered by CS 600/700-level courses and approved by graduate affairs committee. They take 3 courses in the chosen specialized area. Students will form a committee (one chair, 2 other members from the department, and one from outside). The chair will assign a few papers/reading materials to the students, and the committee will give an oral exam to the students on the selected specialized area. Students will have only two attempts to pass the comprehensive oral exam.
4. Courses in which the student earns a grade lower than C cannot be included in his or her program, and the student's total grade point average (GPA) must be 3.00 or higher while in the program. A student whose GPA falls below 3.00 will be placed on academic probation. That student must have an overall GPA of at least 3.00 by the end of two subsequent semesters; otherwise the student will be separated from the graduate program. A student on probation will not be allowed to register for CS 690 or equivalent courses in another department.
5. Exam Track must be declared and approved before completing 19 credit hours of CS coursework.

## Graduation Requirements

1. The student must submit all required forms to the Graduate College and then apply for graduation up to two semesters prior to completing his/her degree requirements.
2. The student must pass a final comprehensive oral examination.

## Subplan 7 Requirements: Exam Track - Software Engineering

## Course Requirements

### Required Courses - Credits: 9

Complete a total of 9 credits from the following courses.

CS 620 Human-Computer Interaction

3

CS 672 Software Product Design and Development I	3
CS 682 Artificial Intelligence	3
CS 772 Software Architecture	3
CS 789 Topics in Advanced Computer Science	3 - 24

## Computer Science Courses - Credits:21

Complete 21 credits of 600- or 700- level Computer Science (CS) courses. Students may complete up to 6 credits outside of CS. Outside credits must be related to computer applications and approved by CS graduate committee.

## Degree Requirements

1. The student must pass at least 30 credits of 600- and 700-level courses with grades of C or better.
2. Students must complete 18 credits of 700-level CS courses.
3. (Comprehensive Oral Exam on a Specialized Area) Students must choose one of the specialized areas covered by CS 600/700-level courses and approved by graduate affairs committee. They take 3 courses in the chosen specialized area. Students will form a committee (one chair, 2 other members from the department, and one from outside). The chair will assign a few papers/reading materials to the students, and the committee will give an oral exam to the students on the selected specialized area. Students will have only two attempts to pass the comprehensive oral exam.
4. Courses in which the student earns a grade lower than C cannot be included in his or her program, and the student's total grade point average (GPA) must be 3.00 or higher while in the program. A student whose GPA falls below 3.00 will be placed on academic probation. That student must have an overall GPA of at least 3.00 by the end of two subsequent semesters; otherwise the student will be separated from the graduate program. A student on probation will not be allowed to register for CS 690 or equivalent courses in another department.
5. Exam Track must be declared and approved before completing 19 credit hours of CS coursework.

## Graduation Requirements

1. The student must submit all required forms to the Graduate College and then apply for graduation up to two semesters prior to completing his/her degree requirements.
2. The student must pass a final comprehensive oral examination.

## Subplan 8 Requirements: Exam Track - Data Science and Big Data

## Course Requirements

## Required Courses - Credits: 9

Complete a total of 9 credits from the following courses.

CS 657 Database Management Systems	3
CS 658 Introduction to Data Mining	3
CS 769 Advanced Data Base Management	3
CS 783 Genetic Algorithms and Neural Networks	3
CS 672 Software Product Design and Development I	3
CS 682 Artificial Intelligence	3

## Computer Science Courses - Credits:21

Complete 21 credits of 600- or 700- level Computer Science (CS) courses. Students may complete up to 6 credits outside of CS. Outside credits must be related to computer applications and approved by CS graduate committee.

## Degree Requirements

1. The student must pass at least 30 credits of 600- and 700-level courses with grades of C or better.
2. Students must complete 18 credits of 700-level CS courses.
3. (Comprehensive Oral Exam on a Specialized Area) Students must choose one of the specialized areas covered by CS 600/700-level courses and approved by graduate affairs committee. They take 3 courses in the chosen specialized area. Students will form a committee (one chair, 2 other members from the department, and one from outside). The chair will assign a few papers/reading materials to the students, and the committee will give an oral exam to the students on the selected specialized area. Students will have only two attempts to pass the comprehensive oral exam.
4. Courses in which the student earns a grade lower than C cannot be included in his or her program, and the student's total grade point average (GPA) must be 3.00 or higher while in the program. A student whose GPA falls below 3.00 will be placed on academic probation. That student must have an overall GPA of at least 3.00 by the end of two subsequent semesters; otherwise the student will be separated from the graduate program. A student on probation will not be allowed to register for CS 690 or equivalent courses in another department.
5. Exam Track must be declared and approved before completing 19 credit hours of CS coursework.

## Graduation Requirements

1. The student must submit all required forms to the Graduate College and then apply for graduation up to two semesters prior to completing his/her degree requirements.
2. The student must pass a final comprehensive oral examination.

## Subplan 9 Requirements: Exam Track - Database and Information Retrieval

### Course Requirements

#### Required Courses - Credits: 9

Complete a total of 9 credits from the following courses.

CS 657 Database Management Systems	3
CS 658 Introduction to Data Mining	3
CS 682 Artificial Intelligence	3
CS 769 Advanced Data Base Management	3

#### Computer Science Courses - Credits:21

Complete 21 credits of 600- or 700- level Computer Science (CS) courses. Students may complete up to 6 credits outside of CS. Outside credits must be related to computer applications and approved by CS graduate committee.

### Degree Requirements

1. The student must pass at least 30 credits of 600- and 700-level courses with grades of C or better.
2. Students must complete 18 credits of 700-level CS courses.
3. (Comprehensive Oral Exam on a Specialized Area) Students must choose one of the specialized areas covered by CS 600/700-level courses and approved by graduate affairs committee. They take 3 courses in the chosen specialized area. Students will form a committee (one chair, 2 other members from the department, and one from outside). The chair will assign a few papers/reading materials to the students, and the committee will give an oral exam to the students on the selected specialized area. Students will have only two attempts to pass the comprehensive oral exam.
4. Courses in which the student earns a grade lower than C cannot be included in his or her program, and the student's total grade point average (GPA) must be 3.00 or higher while in the program. A student whose GPA falls below 3.00 will be placed on academic probation. That student must have an overall GPA of at least 3.00 by the end of two subsequent semesters; otherwise the student will be separated from the graduate program. A student on probation will not be allowed to register for CS 690 or equivalent courses in another department.
5. Exam Track must be declared and approved before completing 19 credit hours of CS coursework.

### Graduation Requirements

1. The student must submit all required forms to the Graduate College and then apply for graduation up to two semesters prior to completing his/her degree requirements.

- The student must pass a final comprehensive oral examination.

## Subplan 10 Requirements: Exam Track - Graphics and Augmented Reality

### Course Requirements

#### Required Courses - Credits: 9

Complete a total of 9 credits from the following courses.

CS 669 Introduction to Digital Image Processing	3
CS 680 Computer Graphics	3
CS 682 Artificial Intelligence	3
CS 689 Advanced Computer Science Topics	3

#### Computer Science Courses - Credits:21

Complete 21 credits of 600- or 700- level Computer Science (CS) courses. Students may complete up to 6 credits outside of CS. Outside credits must be related to computer applications and approved by CS graduate committee.

### Degree Requirements

- The student must pass at least 30 credits of 600- and 700-level courses with grades of C or better.
- Students must complete 18 credits of 700-level CS courses.
- (Comprehensive Oral Exam on a Specialized Area) Students must choose one of the specialized areas covered by CS 600/700-level courses and approved by graduate affairs committee. They take 3 courses in the chosen specialized area. Students will form a committee (one chair, 2 other members from the department, and one from outside). The chair will assign a few papers/reading materials to the students, and the committee will give an oral exam to the students on the selected specialized area. Students will have only two attempts to pass the comprehensive oral exam.
- Courses in which the student earns a grade lower than C cannot be included in his or her program, and the student's total grade point average (GPA) must be 3.00 or higher while in the program. A student whose GPA falls below 3.00 will be placed on academic probation. That student must have an overall GPA of at least 3.00 by the end of two subsequent semesters; otherwise the student will be separated from the graduate program. A student on probation will not be allowed to register for CS 690 or equivalent courses in another department.
- Exam Track must be declared and approved before completing 19 credit hours of CS coursework.

## Graduation Requirements

1. The student must submit all required forms to the Graduate College and then apply for graduation up to two semesters prior to completing his/her degree requirements.
2. The student must pass a final comprehensive oral examination.

## Subplan 11 Requirements: Exam Track - Programming Language and Systems

### Course Requirements

#### Required Courses - Credits: 9

Complete a total of 9 credits from the following courses.

CS 656 Automata and Formal Languages	3
CS 771 Concurrent Computation	3
CS 789 Topics in Advanced Computer Science	3 - 24

#### Computer Science Courses - Credits:21

Complete 21 credits of 600- or 700- level Computer Science (CS) courses. Students may complete up to 6 credits outside of CS. Outside credits must be related to computer applications and approved by CS graduate committee.

### Degree Requirements

1. The student must pass at least 30 credits of 600- and 700-level courses with grades of C or better.
2. Students must complete 18 credits of 700-level CS courses.
3. (Comprehensive Oral Exam on a Specialized Area) Students must choose one of the specialized areas covered by CS 600/700-level courses and approved by graduate affairs committee. They take 3 courses in the chosen specialized area. Students will form a committee (one chair, 2 other members from the department, and one from outside). The chair will assign a few papers/reading materials to the students, and the committee will give an oral exam to the students on the selected specialized area. Students will have only two attempts to pass the comprehensive oral exam.
4. Courses in which the student earns a grade lower than C cannot be included in his or her program, and the student's total grade point average (GPA) must be 3.00 or higher while in the program. A student whose GPA falls below 3.00 will be placed on academic probation. That student must have an overall GPA of at least 3.00 by the end of two subsequent semesters; otherwise the student will be separated from the graduate program. A student on probation will not be allowed to register for CS 690 or equivalent courses in another department.

5. Exam Track must be declared and approved before completing 19 credit hours of CS coursework.

## Graduation Requirements

1. The student must submit all required forms to the Graduate College and then apply for graduation up to two semesters prior to completing his/her degree requirements.
2. The student must pass a final comprehensive oral examination.

## Plan Graduation Requirements

Refer to your subplan for Graduation Requirements.

Subplan 1: Thesis Track

Subplan 2: Project Track

Subplan 3: Integrated BS-MS Track

Subplan 4: Exam Track - Foundations and Theory

Subplan 5: Exam Track - Cyber Security

Subplan 6: Exam Track - AI and Machine Learning

Subplan 7: Exam Track - Software Engineering

Subplan 8: Exam Track - Data Science and Big Data

Subplan 9: Exam Track - Database and Information Retrieval

Subplan 10: Exam Track - Graphics and Augmented Reality

Subplan 11: Exam Track - Programming Language and Systems