Accelerated Bachelor of Science/Master of Science in Computer Science

Dual Degree Program

Definitions
The discussion below uses the following terms:

- **Accelerated BS/MS (4+1) program**: The complete accelerated Bachelor of Science/Master of Science in Computer science Dual Degree Program, at the completion of which a student receives both a BS in Computer Science and an MS in Computer Science. A student enrolled in this program takes 12 credits less in order to receive both degrees than the number of credits required when obtaining the degrees separately.

- **BS/MS year**: This is normally the student’s senior year. During the BS/MS year, the student who is accepted into the program enrolls in 12 credits of graduate Computer Science courses, as specified below. During this year the student completes the necessary requirements for the BS.

- **MS/BS year**: This is the student’s “+1” year. During this year the student completes the requirements for the graduate degree.

Procedures Overview
Procedures for applying and fulfilling the requirements of the BS/MS are listed below:

<table>
<thead>
<tr>
<th>Step</th>
<th>Date</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Student’s second semester of junior year, after completing 75 credits</td>
<td>Student applies to the Department of Computer Science for accelerated BS/MS dual degree program. See procedures below.</td>
</tr>
<tr>
<td>2</td>
<td>Upon acceptance into the BS/MS program</td>
<td>Graduate Computer Science Program Coordinator and student fill out a 4+1 matriculation form. Student is enrolled in BS/MS year of the program.</td>
</tr>
<tr>
<td>3</td>
<td>Senior year</td>
<td>Student will let the Graduate Computer Science Program Coordinator know which graduate classes they want to take. This must be done both semesters of BS/MS (senior) year!</td>
</tr>
<tr>
<td>4</td>
<td>When student has completed requirements for BS degree</td>
<td>4+1 transition form completed by student and approved by Graduate Computer Science Program Coordinator and Department Chair before being submitted to the Graduate School office. Student is enrollment into MS/BS year of the program.</td>
</tr>
<tr>
<td>5</td>
<td>When student has met all requirements of both BS and MS degree</td>
<td>Student applies for graduation for both degrees.</td>
</tr>
</tbody>
</table>

Program Details
This program allows highly motivated students to begin taking graduate courses in their senior year, accelerating their graduate studies while still at the undergraduate level and while paying undergraduate tuition and fees. The program is also known as the accelerated BS/MS or the 4+1 degree because it allows interested and qualified students to complete the department’s Bachelors of Science and Master of Science degrees in five years rather than the normal six.
**Requirements for Application**
To apply to the program, student has to:
- Be enrolled in the BS Computer Science Degree Program at Rowan University.
- Have completed at least 75 credits towards the BS in Computer Science.
- Have completed at least 24 credits of undergraduate Computer Science courses at Rowan University with an average Computer Science GPA of at least 3.5.
- Obtain two letters of recommendation from faculty members in the Rowan Computer Science Department.

**Application**
Admission to the program will be based on the student meeting the above-listed criteria and an application packet. This application packet, which will include the letters of recommendation and a BS/MS in Computer Science application form, must be submitted to the Graduate Program Coordinator of the Computer Science Department. This application packet can be obtained from the Computer Science Department website.

**Application Deadlines**
Deadlines for applying to the program are the following:
- Fall - May 1st
- Spring - December 1st

**Admission**
Final admission decisions will be made by a Graduate Admissions Committee chaired by the Graduate Computer Science Program Coordinator.

**Satisfactory Progress towards Graduation**
In order to graduate from the BS/MS Computer Science program all students must meet the following requirements:

1. Completion of all the requirements for the BS in CS by the end of senior year: Up to 6 semester hours of graduate CS courses taken by the student each semester of their senior year (BS/MS year of program) may count as undergraduate CS restricted elective credits towards the BS in CS.

2. Completion of all requirements for the MS in CS.

3. Full-time status:
   a. Maintain full-time status each semester as an undergraduate student (minimum enrollment of 12 semester hours) during their BS/MS year of the Program.
   b. Maintain full-time status each semester as a graduate student (minimum enrollment of 9 semester hours of graduate Computer Science courses) during their MS/BS (+1) year of the Program.
   c. A student who fails to maintain full-time status during any semester of the Program (except the semester in which the student expects to complete the Program) will be dismissed from the Program at the end of that semester. Moreover, any student who has not completed requirement 1 above will be readmitted back into the BS Computer Science Degree Program subject to the requirements of that program.
   d. Students with extenuating circumstances may request an exception to requirements (a)-(c) above by obtaining written approval of the Graduate Computer Science Program Coordinator, Computer Science Department.
Chair/Headperson, and any other approvals that are required under university policy.

4. Satisfactory progress:
   a. Completion of at least 2 graduate Computer Science courses by the end of the BS/MS year of the Program.
   b. Earn at least a grade of B in all graduate courses taken during the BS/MS year of the Program.
   c. Completion of the Program by the end of the +1 year of the Program.

Any student who fails to maintain satisfactory progress as described in parts (a)-(c) above may be dismissed from the Program.

Students with extenuating circumstances may request an exception to this requirement by obtaining written approval of the Graduate Computer Science Program Coordinator, Computer Science Department Chair/Headperson, and any other approvals that are required under university policy. At any time while the student is in the accelerated program they may submit a written request to revert to the BS program. If all the requirements of the BS in Computer Science degree are met, the student will be able to apply for graduation with the BS in CS degree.

Dismissal from the Program
If a student does not fulfill the requirements for satisfactory progress towards graduation and is dismissed from the program the following applies:

• If the student has not already earned the BS Computer Science Degree at this point, then they will be re-admitted back into the BS Computer Science Degree Program subject to the requirements of that program.
• If the student has completed the requirements for the BS degree, they will be awarded the BS in Computer Science degree and are eligible for applying for readmission to the MS in Computer Science program. In this case, Senior Privilege transfer policies apply, under which up to 6 eligible graduate credits can be transferred to the graduate transcript.

Graduation
After completion of all requirements listed in 1-4 under Satisfactory Progress towards Graduation, students must apply to receive simultaneously the Bachelor of Science in Computer Science and the Master of Science in Computer Science. These are awarded as separate diplomas.

Tuition Costs
Students enrolled in the BS/MS year of the program will pay undergraduate tuition and fees for all courses—whether the courses are undergraduate or graduate—until they are accepted into the MS/BS year. Upon transition into the MS/BS year, students will pay graduate tuition and fees for all courses and all graduate requirements apply. Under no circumstances are students allowed to take more than 12 graduate credits while they are enrolled into BS/MS program as undergraduate students (or more than 6 credits per semester).

Structure of Program
The BS/MS in CS Dual Degree is structured so that students first complete requirements for the BS in CS Degree Program, but begin to take graduate courses required for the MS in CS
Degree Program in the first semester of their senior year. In particular, the number of graduate CS courses that each student should enroll in each semester is listed in the table below:

<table>
<thead>
<tr>
<th>Semester of BS/MS in CS</th>
<th>Number of graduate CS courses student should enroll in</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st (Fall/first semester of Senior Year)</td>
<td>2</td>
</tr>
<tr>
<td>2nd (Spring/second semester of Senior Year)</td>
<td>2</td>
</tr>
<tr>
<td>3rd (Fall/first semester of Graduate Year)</td>
<td>3</td>
</tr>
<tr>
<td>4th (Spring/second semester Graduate Year)</td>
<td>3</td>
</tr>
</tbody>
</table>

**BS Requirements**

**MS Computer Science Degree Program**

The MS in Computer Science is a 30 credit-hour program with an optional thesis track. All students must complete a 12-credit **core** of required courses. Students in the thesis track must take 12 additional credits of restricted electives and the 6-credit thesis sequence or 9 additional credits of restricted electives and the 9-credit thesis sequence. Students choosing the non-thesis track must take 18 additional credits of restricted electives, 6 credits of which must be classified as **project intensive**.

The 12-credit **core** must be selected from the following list:

- CS 04.530 Advanced Database Systems: Theory and Programming (3 s.h.)
- CS 04.548 Programming Languages: Theory, Implementation and Application (3 s.h.)
- CS 04.560 Design and Implementation of Operating Systems (3 s.h.)
- CS 04.564 Compiler Design Theory (3 s.h.)
- CS 04.570 Advanced Object Oriented Design (3 s.h.)
- CS 06.510 Computer Networks (3 s.h.)
- CS 06.520 Topics in Computer Architecture (3 s.h.)
- CS 07.522 Advanced Theory of Computing (3 s.h.)
- CS 07.523 Advanced Software Engineering (3 s.h.)
- CS 07.540 Advanced Design and Analysis of Algorithms (3 s.h.)
- CS 07.550 Concepts in Artificial Intelligence (3 s.h.)
- CS 07.751 Advanced Cyber Security: Principles and Applications (3 s.h.)
- CS 07.552 Cryptographic Algorithms (3 s.h.)
- CS 07.556 Machine Learning (3 s.h.)

**Electives** include the following existing Rowan University graduate level courses:

- CS 01.541 Bioinformatics - Advanced Computational Aspects (3 s.h.)
- CS 04.505 Advanced Web Programming (3 s.h.)
- CS 04.565 System Programming (3 s.h.)
- CS 04.571 Advanced Topics in Mobile Programming (3 s.h.)
- CS 06.505 Wireless Networks and Systems (3 s.h.)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS.06.512</td>
<td>Network Security</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>CS.06.515</td>
<td>Embedded Systems Programming</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>CS.07.524</td>
<td>Agile Software Engineering</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>CS.07.545</td>
<td>Advanced Robotics</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>CS.07.555</td>
<td>Natural Language Processing</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>CS.07.560</td>
<td>Computer Graphics</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>CS.07.565</td>
<td>Computer Vision</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>CS.07.570</td>
<td>Information Visualization</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>CS.07.575</td>
<td>Advanced TCP/IP and Internet Protocols and Technologies</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>CS.07.580</td>
<td>Computer Animation</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>CS.07.590</td>
<td>Game Design and Development</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>CS.07.595</td>
<td>Advanced Topics in Computer Science</td>
<td>3 s.h.</td>
</tr>
</tbody>
</table>

**Any core course can be taken as an elective.**

Students can choose a maximum of 6 credits of approved graduate electives from graduate programs in the field of Electrical and Computer Engineering, Mathematics, Management Information Systems, Data Analytics, or Bioinformatics. Only 3 credits from the graduate program in Management Information Systems could be counted towards electives for a graduate degree in Computer Science.

Any graduate course taken outside of Rowan-CS must be approved prior to registration by the CS Graduate Program Committee. Such an approval is on an individual basis. The interested student must submit in writing to the CS Graduate Program Coordinator an explanation as to why they are interested in the course and how the course addresses one or more of the goals of the MS in CS program. The student can expect a response from the Graduate Committee within 10 business days.

The MS in CS program goals are:

- **Program Goal 1:** MS Computer Science graduates understand core areas of Computer Science and apply this knowledge to solving computing problems.
- **Program Goal 2:** MS Computer Science graduates are able to design, analyze, implement and evaluate computer systems and applications.
- **Program Goal 3:** MS Computer Science graduates communicate effectively.
- **Program Goal 4:** MS Computer Science graduates are prepared to engage in continuing professional development and research.

Students choosing the thesis track must complete:

- CS 07.530 Computer Science Thesis I (3 s.h.)
- CS 07.531 Computer Science Thesis II (3 s.h.)

OR (only after the approval of the CS Graduate Program Coordinator) CS 07.530 Computer Science Thesis I (3 s.h.)

- CS 07.531 Computer Science Thesis II (3 s.h.)
- CS 07.532 Computer Science Thesis III (3 s.h.)
Project Intensive Designation
The course instructor may choose to designate a course as “project intensive.” Project intensive courses contain a significant project that contributes to the students’ final grade. Students choosing the non-thesis option must take at least two project intensive electives. The CS Graduate Program Coordinator will ensure that courses are designated as “project intensive” prior to registration periods and that the students can register for the required 6 credits within the specified period of the program.

Sequence of course work:

------------------------4th YEAR (Senior) – YEAR ONE OF PROGRAM ------------------------
FALL SEMESTER (12 s.h.)
  Graduate CS Core (as Restricted Elective)
Graduate CS (as Restricted Elective)
Graduate CS (as Restricted Elective)

SPRING SEMESTER (15 s.h.)
Graduate CS Core (as Restricted Elective)

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5th YEAR (Graduate Student) – YEAR TWO OF PROGRAM----------------

FALL SEMESTER (9 s.h.)
  Graduate CS Core
  Graduate CS Elective
  Graduate CS Elective
  Elective (or Graduate Thesis I if Thesis track chosen)

SPRING SEMESTER (9 s.h.)
  Graduate CS Core
  Graduate CS Elective
  Graduate CS Elective (or Graduate Thesis II if Thesis track chosen)