Combined Advanced Degree Program

Bachelor of Science in Computer Science/Master of Science in Data Science

Definitions
The description below uses the following terms:

- *CADP BSCS/MSDS program:* The complete Combined Advanced Degree Program Bachelor of Science in Computer Science/Master of Science in Data Science Degree Program, at the completion of which a student receives both a BS in Computer Science and an MS in Data 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 Data 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 Combined Advanced Degree Program BS in Computer Science and MS in Data Science:

Step	Date	Procedure
1	Student's second semester of junior year, after completing 75 credits	Student submits application to the Department of Computer Science for Combined Advanced Degree BS/MS program (deadlines and procedures below)
2	Upon acceptance into the CADP BSCS/MSDS program	Student and Computer Science Graduate Program Coordinator fill out a *CADP Student Agreement* form. Student is matriculated in the CADP BSCS/MSDS.
3	Senior year	Student informs the Computer Science Graduate Program Coordinator which graduate classes they want to take. This must be done both semesters of BS/MS (senior) year!
4	When student has completed requirements for BS degree	Student fills out the *CADP Transition and Transfer* form and submits it to Computer Science Graduate Program Coordinator and Department Chairperson/Head for approval. The approved form is submitted to the Graduate School and the student is enrolled in the MS/BS year of the program.
5	When student has met all requirements of both BS and MS degree	Student applies for graduation for both the BSCS and MSDS degrees.

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 Combined Advanced Degree BS/MS degree program allows interested and qualified students to complete the department's Bachelors of Science and Master of Science degrees in a shorter time, usually 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 and will be able to complete all BS requirements in two addition semesters.
- Have completed at least 24 credits of undergraduate Computer Science courses (listed in the Combined Advanced Degree in CS Program application) 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 2 letters of recommendation and a Combined Advanced Degree BS/MS in Computer Science/Data Science application form, must be submitted to the Graduate Program Coordinator of the Computer Science Department by the application deadline (listed below). This application packet can be obtained from the Computer Science Department website at CADP in DS application.

Application Deadlines
Deadlines for applying to the program are as follows:

- Fall - March 1st
- Spring - October 1st

Admission
Final admission decisions will be made by a Graduate Admissions Committee chaired by the Computer Science Graduate Program Coordinator and communicated to the applicants.

Satisfactory Standing and Progress towards Graduation
In order to graduate from the Combined Advanced Degree BS Computer Science/MS Data 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 DS courses take 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 DS.

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 Data Science courses) during their BS/MS (+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 students 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 re-admitted 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 Computer Science Graduate Program Coordinator, Computer Science Department Chairperson/Head, and any other approvals that are required under university policy.

4. Satisfactory academic progress:
    a. Completion of at least 2 graduate Data Science courses by the end of the BS/MS year of the program.
    b. Earn at least a B in all graduate courses taken during the BS/MS year of the program.
    c. Comply with all requirements of the MS in DS outlined in Graduate Academic Policies. The MS in DS is a Category 3 program: "No more than two total C grades or any combination of "C+" or "C" can be counted toward courses required and counted for graduation/program completion. (C- grades and any grade lower than a "C" are not acceptable.)"
    d. Completion of the program by the end of the +1 year of the program.

The academic progress of every student in the program is reviewed at the end of each semester of the program and 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 Computer Science Graduate 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 CADP 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 a student has not already complete the requirements of 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 of the BS degree, they can apply for and will be awarded the BS in Computer Science degree and are eligible for applying for admission to the MS in Data 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 Data Science. These degrees 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 graduate credits per semester.

Structure of the Program
The Combined Advanced Degree BSCS/MSDS 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 DS Degree Program in the first semester of their senior year. In particular, the number of graduate DS courses that each student should enroll in each semester is listed in the table below:

Semester of CADP in DS	Number of graduate DA courses
1st (First semester of Senior Year – typically Fall)	2
2nd (Second semester of Senior Year – typically Spring)	2
1st (First semester of Graduate Year – typically Fall)	3
2nd (Second semester of Graduate Year – typically Spring)	3

MS in Data Science Degree Program

Program Requirements

The M.S. in Data Science program consists of 10 courses and a total of 30 graduate semester hours (s.h.). Students may enroll in this program part-time or full-time.

Foundation Courses
Applicants must have successfully completed the following courses (or their equivalents) at an accredited institution: Calculus II, Probability and Statistical Inference for Computing Systems, Linear Algebra, Introduction to Object-Oriented Programming or Computer Science and Programming, and Data Structures and Algorithms or Data Structures for Engineers.

The following courses make up the M.S. in Data Science program.

- **10 Courses/ 30 Semester Hours**
- **Foundation Courses: Yes**
- **Graduation / Exit / Thesis Requirements: No**

Required Courses – 6 s.h.

Course #	Course Name	Notes	Sem/Yr	Grade	Credits
CS 02505	Data Mining I				3
STAT 02515	Applied Multivariate Data Analysis				3
				Subtotal: 6 s.h.	

Core Courses – 9 s.h.

Students must select any three of these core courses

Course #	Course Name	Notes	Sem/Yr	Grade	Credits
CS 02515	Big Data Tools and Techniques				3
CS 02620	Data Warehousing				3
CS 07556	Machine Learning I				3
DS 02510	Visual Analytics				3
ECE 09555	Advanced Topics in Pattern Recognition				3
ENGR 01511	Engineering Optimization				3
MATH 01505	Probability and Mathematical Statistics I				3
MATH 03511	Operations Research I				3
STAT 02509	Probability and Statistics for Data Science				3
				Subtotal: 9 s.h.	

Elective Courses / Thesis – 15 s.h.

Thesis students must take 6 to 9 semester hours of Thesis Research.
Students can also use core courses as electives if not counting for the Core Course Section above.

Course #	Course Name	Notes	Sem/Yr	Grade	Credits
BINF 05555	Bioinformatics - Advanced Biological Applications				3
CS 01541	Bioinformatics – Advanced Computational Aspects				3
CS 02530	Advanced Database Systems: Theory and Programming				3
CS 02570	Information Visualization				3
CS 02605	Data Mining II				3
CS 02625	Data Quality and Web/Text Mining				3
CS 02630	Advanced Topics in Database Systems				3
CS 07540	Advanced Design and Analysis of Algorithms				3
DA 01505	Data Analytics Capstone Practicum				3
DA 03510	Patient Data Understanding				3
DA 03511	Patient Data Privacy & Ethics				3
DA 03520	Healthcare Management				3
ECE 09558	Reinforcement Learning				3
ECE 09560	Artificial Neural Networks				3
ECE 09566	Advanced Topics in Systems, Devices, and Algorithms in Bioinformatics				3
ECE 09568	Discrete Event Systems				3
ECE 09585	Advanced Engineering Cyber Security				3
ECE 09586	Advanced Portable Platform Development				3
ECE 09595	Advanced Emerging Topics in Computational Intelligence, Machine Learning and Data Mining				3
ECE 09655	Advanced Computational Intelligence and Machine Learning				3
MATH 01506	Probability and Mathematical Statistics II				3
MGT 07500	Managerial Decision Making Tools				3
MGT 07600	Predictive Analysis				3
STAT 02510	Introduction to Statistical Data Analysis				3
STAT 02511	Statistical Computing				3
STAT 02514	Decision Analysis				3
STAT 02525	Design and Analysis of Experiments				3
STAT 02530	Applied Survival Analysis				3
STAT 02585	Introduction to Bayesian Statistical Methods				3

Thesis students should take Thesis I, Thesis II, and optionally Thesis III

DS 03650	Thesis I in Data Science				3
DS 03651	Thesis II in Data Science				3
DS 03652	Thesis III in Data Science				3
				Subtotal: 15 s.h.	

Total Program Semester Hours: 30

Graduate Course Offering

The graduate course offering for can be found at Section Tally by choosing the appropriate semester, as department "CSCI- Computer Science" and as attribute "GRAD – Graduate Lvl crses 500 and up". Students can only register for courses that are offered on the Main and Camden campuses. The Camden campus is easily accessible from the main campus by free Rowan University shuttle. The catalog description of the courses offered can be found by clicking on the course CRN. Students cannot register for courses offered as part of our extension programs.

Ensuring Academic Success

The success of our graduate students is essential to the Computer Science Department and to Rowan University. Therefore, in order to ensure progress towards graduation and academic success, it is important for CADP in DS students to stay in regular contact with the Graduate Program Coordinator and to get advice on courses, to check academic progress as well as communicate any concerns, questions or general student issues. Do not hesitate to contact Dr. Xu at xu@rowan.edu. It is the students' responsibility to make sure that they have the necessary background for every course they take. In order to ensure that, the students are encouraged to contact the instructor of the course to enquire about the expected necessary background. If a student is lacking the necessary background for a course, it is the student's responsibility to supplement with self-study in preparation for the course.

Suggested sequence of course work

----------4th YEAR (Senior) – CADP BS in CS/MS in DS YEAR OF PROGRAM ----------

FIRST SEMESTER (at least 12 s.h.)	SECOND SEMESTER (at least 12 s.h.)
Graduate DS (as Restricted Elective)	Graduate DS (as Restricted Elective)
Graduate DS Core (as Restricted Elective)	Graduate DS Core (as Restricted Elective)
Required undergraduate courses	Remaining required undergraduate courses

----------5th YEAR (Graduate Student) – MS/BS YEAR OF PROGRAM----------

FIRST SEMESTER (9 s.h.)	SECOND SEMESTER (9 s.h.)
Graduate DS Core	Graduate DS Core
Graduate DS Elective	Graduate DS Elective
Graduate DS Elective	Graduate DS Elective