

# Advanced Dual Degree Program

## B.A. Computing & Informatics/M.S. Bioinformatics

### B.A. in Computing and Informatics

Academic Program Guide for **New First-Year Students** (Effective Fall 2018)

Department of Computer Science ([computerscience@rowan.edu](mailto:computerscience@rowan.edu))

*Students who entered Rowan University prior to Fall 2018 should follow the guide for their program and start year in consultation with their advisor.*

#### Rowan University Graduation Requirements for all Majors / Degrees

- Students must complete at least 120 semester hours (sh) of coursework that apply to their Rowan University degree.
- Students must have a cumulative GPA of at least 2.0 in Rowan University coursework. (Transfer courses/credit do not count toward the RU GPA.)
- A minimum of 30 sh of coursework must be completed at/through Rowan University.
- Only grades of “D-” or above may apply to graduation/degree requirements. (Some programs may set higher minimums.)
- Students must meet the Rowan Core and Rowan Experience Requirements.
  - An individual course can potentially satisfy one Rowan Core literacy and/or multiple Rowan Experience attributes.
  - Rowan Core & Rowan Experience designations are listed in course details in Section Tally ([www.rowan.edu/registrar](http://www.rowan.edu/registrar)) and may also be searched on that site under “Attributes.” A list of Rowan Core courses is here: <https://confluence.rowan.edu/display/AS/Rowan+Core+Course+List>.
- Students must apply for graduation and should do so for the term in which they will complete all program requirements.

#### Program-Specific Graduation Requirements for this Major / Degree

- Graduate courses may be counted as restricted electives when taken as senior privilege or part of the accelerated BA/MS degree program.

#### Rowan Core Requirements<sup>1</sup>

*Students must satisfy all six Rowan Core Literacies. A minimum total of 3 sh of coursework is required to satisfy each Literacy.*

*With the exception of the 9 sh counted here for Communicative Literacy, credits attached to the courses in this section will apply elsewhere.*

- (COML) Communicative Literacy: *Must be met by the following three courses or their official equivalents:*
  - COMP 01111 College Composition I (3 sh)    ○ COMP 01112 College Composition II (3 sh)    ○ CMS 04205 Public Speaking (3 sh)\*

**\*CMS 04205 is required as pre-requisite for one or more major courses in this program. Therefore, CMS 04205 or its transferred equivalent must be taken to fulfill this degree**
- (ARTL) Artistic Literacy                      *Recommendation from major:*
- (GLBL) Global Literacy                        *Recommendation from major:*
- (HUML) Humanistic Literacy                *Recommendation from major:* INTR 01265 (3 sh counted under non-program)
- (QNTL) Quantitative Literacy                *Recommendation from major:* STAT 02260; MATH 03125 or 01130 (3 or 4 sh counted under non-program)
- (SCIL) Scientific Literacy                    *Recommendation from major:*

Subtotal of credits counted in this section: 9 sh

#### Rowan Experience Requirements

*Students must satisfy all three Rowan Experience attributes. Credits attached to the courses in this section will apply elsewhere.*

- (LIT) Broad-Based Literature Attribute    *Recommendation from major:*
- (WI) Writing Intensive Attribute            *Recommendation from major:* WA 01302 Technical Writing (3 sh counted under major)
- (RS) Rowan Seminar Attribute<sup>2</sup>            *Recommendation from major:*

#### Non-Program Courses (minimum 18 sh)

*Courses in this section cannot be in the major department.*

Course #	Course Name	Course Attributes / Notes	Sem/Yr	Grade	Credits
STAT 02260, MATH 03125 or MATH 01130	Statistics I, Calculus: Techniques & Applications or Calculus I	Satisfies Quantitative Literacy			3, 3 or 4
INTR 01265	Computers and Society	Satisfies Humanistic Literacy			3
WA 01302	Technical Writing	Writing Intensive			3
<b>Subtotal: 18 sh</b>					

<sup>1</sup> The Rowan Core requirements are waived for transfer students with an earned A.A. or A.S. degree from a NJ community/county college.

<sup>2</sup> The Rowan Seminar requirement is waived for all students transferring 24 or more approved credits into Rowan University at the time of initial entry.

## Major Requirements (42 sh)

### SUMMARY OF MAJOR REQUIREMENTS

- 21 sh of Foundational Courses
  - 9 sh of Upper-Level and Capstone Courses
  - 12 sh of Computing and Informatics Restricted Electives
- 
- 42 sh total

### FOUNDATIONAL COURSES

Course #	Course Name	Course Attributes / Notes	Sem/Yr	Grade	Credits
CS 00100	Computer Science Learning Community	Not required for transfer students			1
PHIL 09130, MATH 03160 or MATH 03150	Introduction to Symbolic Logic, Discrete Structures or Discrete Math				3
CS 01104, CS 04171 or CS 04110	Introduction to Programming and Problem Solving, Creating Android Apps or Introduction to Programming Using Robots				3
CS 04103	Computer Science and Programming				4
CS 04210	Advanced Programming Workshop	2 sections of course must be taken with different topics (e.g., JS, C#)			2
CS 04210	Advanced Programming Workshop				2
CS 04225	Principles of Data Structures				3
CST 09210	Intro to Computer Networks & Data Communication				3
<b>Subtotal: 21 sh</b>					

### UPPER-LEVEL AND CAPSTONE COURSES

Course #	Course Name	Course Attributes / Notes	Sem/Yr	Grade	Credits
<b>Database Coursework.</b>					
One of the options below:					
MIS 02337 / CS 10337	Applied Database Technologies	Database Option 1			3
CS 10338 CS 10339	SQL In-depth (1 credit) AND Database Modeling and Design (2 credits)	Database Option 2			3
CS 10310	Introduction to Web Development				3
CS 10430	Computing & Informatics Capstone Experience				3
<b>Subtotal: 9 sh</b>					

### COMPUTING AND INFORMATICS RESTRICTED ELECTIVES

Choose 12 credits from the courses below.

	Course #	Course Name	Course Attributes / Notes	Sem/Yr	Grade	Credits
<input type="radio"/>	BINF 07250	Intro to Bioinformatics				3
<input type="radio"/>	CS 01205	Computer Laboratory Techniques				3
<input type="radio"/>	CS 01211	Principles of Information Security				3
<input type="radio"/>	CS 01295	Special Topics in Computer Science	multiple sections of this course with different topics can be taken.			3
<input type="radio"/>	CS 01395	Topics in Computer Science	multiple sections of course with differ- ent topics can be taken.			3
<input type="radio"/>	CS 02421	Big Data Tools and Techniques				3
<input type="radio"/>	CS 04350	Blockchain Programming				3
<input type="radio"/>	CS 10250	Cryptography and Blockchain Essentials				3
<input type="radio"/>	CS 10271	Introduction to Android Programming				3
<input type="radio"/>	CS 04372	Advanced Android Programming				3
<input type="radio"/>	CS 10275	Introduction to iOS Programming				3
<input type="radio"/>	CS 04376	Advanced iOS Programming				3
<input type="radio"/>	CS 04471	Topics in Mobile Programming				3
<input type="radio"/>	CS 06447	Introduction to IoT Upper Stack				3
<input type="radio"/>	CS 07355	Cybersecurity Management, Policy, and Risk				3
<input type="radio"/>	CS 07370	Introduction to Information Visualization				3
<input type="radio"/>	CS 07430	Human Computer Interaction				3
<input type="radio"/>	CS 07485	Web and Text Mining				3

Course #	Course Name	Course Attributes / Notes	Sem/Yr	Grade	Credits
○ CS 99300	Computer Field Experience	Requires permission of instructor. Field experience may be from 3 to 12 credits; however only 3 credits can apply to the program requirements.			3
○ CS 99310	Advanced Learning Assistant Exp. in CS	Requires permission of instructor			3
○ CS 99490	Computer Science Research II				3
○ CS 10200	Fundamentals of Network Security				3
○ CS 10340	Systems Administration				3
○ CS 10342	Web Server Platforms				3
○ CS 10344	Concepts of Computing Technologies				3
○ CST 03215	Penetration Testing Fundamentals				3
○ CST 03218	Ethical Hacking Fundamentals				3
○ CST 03252	Foundations of Computer Forensics				3
○ ENT 06351	Technology Entrepreneurship				3
○ GEOG 16160	Intro to Mapping/Geographic Info Science				3
○ GEOG 16260	Geographic Info Science I				3
○ GEOG 16261	Cartography				3
○ MIS 02302	Emerging Technologies I				3
○ MIS 02303	Emerging Technologies II				3
○ MIS 02336	Advanced Database Management	Only available to MIS double majors			3
○ MIS 02325	Project Management				3
					Subtotal: 12 sh

### Free Electives for this Major/Degree (51 sh)

*Students should choose Free Electives that satisfy any Rowan Core or Rowan Experience requirements that are not fulfilled by Major or Non-Program courses.*

Course #	Course Name	Course Attributes / Notes	Sem/Yr	Grade	Credits
					Subtotal: 51 sh

Total Program Credits Required for this Major / Degree: 120 SH

# M.S. in Bioinformatics

## Curriculum

The M.S. in Bioinformatics program consists of 30 semester hours (s.h.). Both a thesis and a non-thesis track are available.

### Notes:

- In each of the final two semesters of the undergraduate portion of the CADP program, students should take two 3 credit graduate courses from either the Required Courses bank below or the Department of Computer Science elective bank.
- These 12 credits will count towards the 30 credits required by the M.S. in Bioinformatics as well as the 120 credits required for the B.A. and B.S. programs.
- Students in the CADP programs are still required to fulfill the requirements of the undergraduate degree by the completion of their final undergraduate year including the four undergraduate program restricted electives.
- Only courses from the Department of Computer Science elective bank can count as undergraduate program restricted electives.
- If a student reverts back to the undergraduate major and does not fulfill the requirements of the MS program, they would need to fulfill the requirements of the undergraduate degree to graduate.

The following courses make up the M.S. in Bioinformatics program:

## Required Courses

Course #	Course Name	Course Attributes / Notes	Sem/Yr	Grade	Credits
CHEM 07595	Bioinformatics: Advanced Biochemical Applications				3
BINF 05555	Bioinformatics: Advanced Biological Applications				3
CS 01541	Bioinformatics: Advanced Computational Aspects				3
BINF 07500	Bioinformatics Seminar				3
					Subtotal: 12 sh

## Remaining Credits

Students are required to complete 18 additional credits to complete the MS Degree. All students, including CADP students, can elect a thesis track or a non-thesis track. Degree completion options are limited to the following:

- 18 credits of **elective** course work
- 9 credits of **thesis** work (BINF 07501 MS Thesis Research 1, BINF 07502 MS Thesis Research 2 and BINF 07503 MS Thesis Research 3) and 9 credits of **elective** course work
- 12 credits of **thesis** work (BINF 07501 MS Thesis Research 1, BINF 07502 MS Thesis Research 2, BINF 07503 MS Thesis Research 3 and BINF 07504 MS Thesis Research 4) and 6 credits of **elective** course work

## A. ELECTIVE COURSE BANK

### Department of Chemistry and Biochemistry

Course #	Course Name	Course Attributes / Notes	Sem/Yr	Grade	Credits
CHEM 07531	Special Topics in Biochemistry				3
CHEM 07570	Organic Spectroscopy				3
CHEM 07568	Medicinal Chemistry				3
CHEM 07557	Chemical Biology				3
CHEM 07560	Advanced Biochemistry Lecture				3
CHEM 09510	Instrumental Analysis				4
CHEM 07592	Advanced Pharmaceutical Chemistry				3
CHEM 08505	Advanced Biophysical Chemistry				3
CHEM 07590	General Aspects of Pharmacology				3
CHEM 08510	Advanced Survey of Molecular Modeling Methods				3

### Department of Molecular & Cellular Biosciences

Course #	Course Name	Course Attributes / Notes	Sem/Yr	Grade	Credits
MCB 01538	Graduate Immunology				4
MCB 01506	Graduate Translation Cell Biology				3
MCB 01521	Graduate Cell Culture Techniques				4
MCB 01550	Graduate Molecular Genetics				4

### Department of Computer Science

Course #	Course Name	Course Attributes / Notes	Sem/Yr	Grade	Credits
CS 45530	Advanced Data Systems: Theory and Programming				3
CS 07523	Advanced Software Engineering				3
CS 07540	Advanced Design and Analysis of Algorithms				3
CS 07570	Information Visualization				3
MIS 02599	Special Topics in Management Information Systems				3
CS 07556	Machine Learning				3
CS 02505	Data Mining I				3
DA 02510	Visual Analytics				3
CS 02605	Data Mining II				3
CS 03505	Data Quality and Web/Text Mining				3

## B. THESIS COURSES

### Thesis Coursework

Course #	Course Name	Course Attributes / Notes	Sem/Yr	Grade	Credits
BINF 07501	MS Thesis Research 1				3
BINF 07502	MS Thesis Research 2				3
BINF 07503	MS Thesis Research 3				3
BINF 07504	MS Thesis Research 4				3

Required for the Graduate Degree: 30 SH

Total Completed SH for this Accelerated Undergrad / Graduate Dual Degree 138 SH  
(12 credits count for both BA and MS)