Bioinformatics with MS in Data Science 4+1
Recommended Graduation Plan (Fall 2024)

The recommended graduation plan is designed to provide a blueprint for students to complete their degrees on time. These plans are the recommended sequences of courses. Students must meet with their Academic Advisor to develop a more individualized plan to complete their degree.

NOTE: This recommended Graduation Plan is applicable to students admitted into the major during the 2024-2025 academic year. To enroll, visit https://www.ramapo.edu/data-science/4plus1/

CRWT Placement
CRWT 101 to CRWT 102
CRWT 101S to CRWT 102S

Math Placement
MATH 021/022 to MATH 024 to MATH 110-121

NOTE: CRWT and MATH courses are determined by placement testing and should be taken following the sequence above.

First Year					
Fall Semester	**HRS**	✓	**Spring Semester**	**HRS**	✓
Gen Ed: INTD 101-First Year Seminar	4		BIOL 113 & BIOL 113L-Fundamentals of Biology II Lecture & Lab*	4+1	
Gen Ed: CHEM 116 & CHEM 116L-General Chemistry I Lecture & Lab	4+1		CHEM 117 & CHEM 117L-General Chemistry II Lecture & Lab*	4+1	
Gen Ed: CRWT 102 - Critical Reading & Writing II	4		CMPS 130 - SCI PROBLEM SOLVING-PYTHON	4	
BIOL 111 & BIOL 111L-Fundamentals of Biology I Lecture & Lab **WI**	4+1		Gen Ed: MATH 121-Calculus I*	4	
			TAS Pathways Module 1: PATH TS1-Career Assessment/ Advising	Degree Rqmt.	
Total:	18		**Total:**	18	

Second Year					
Fall Semester	**HRS**	✓	**Spring Semester**	**HRS**	✓
CHEM 211 & CHEM 211L -Organic Chemistry I Lecture & Lab * OR CHEM 206 & CHEM 206L-Essentials of Organic Chemistry Lecture* & Lab*	4+1		CHEM 213 & CHEM 213L-Organic Chemistry II Lecture* & Lab* OR Elective(s)	4+1	
CMPS 240 – DATA ANALYTICS IN PYTHON*	4		BIOL 332 & BIOL 332L-Genetics Lecture & Lab*	4+1.5	
DATA 101 – Introduction to Data Science	4		PSYC 242-Statistics OR ENSC 345-Research Design & Statistics	4	
General Education Requirement	4				
TAS Pathways Module 2: PATH TS2 - Resume/ CV Writing	Degree Rqmt.		TAS Pathways Module 3: PATH TS3 Interview Preparation	Degree Rqmt.	
Total:	17		**Total:**	14.5	

Third Year					
Fall Semester	**HRS**	**✓**	**Spring Semester**	**HRS**	**✓**
BIOL 407 & BIOL 407L-Cell & Molecular Biology Lecture & Lab* **WI**	4+1.5		BIIN 430-Bioinformatics*	4	
MATH 237-Discrete Structures*	4		CMPS 364-Database Design*	4	
General Education Requirement	4		MATH 262 - Linear Algebra*	4	
General Education Requirement	4		General Education Requirement	4	
Total:	17.5		**Total:**	16	

Fourth Year					
Fall Semester	**HRS**	**✓**	**Spring Semester**	**HRS**	**✓**
Bioinformatics Elective (Group I)	4		BIIN 450-Advanced Bioinformatics* **WI**	4	
General Education Requirement	4		General Education Requirement	4	
DATA 601 - Introduction to Data Science (MS)	3		Bioinformatics Elective (Group I or II)	4	
CMPS 530 - Python for Data Science** (MS)	3		DATA 620: Ethics for Data Science (MS)	3	
Total:	14		**Total:**	15	

Fifth Year					
Fall Semester	**HRS**	**✓**	**Spring Semester**	**HRS**	**✓**
MATH 570: Applied Statistics	3		CMPS 664: Advanced Database and Big Data Systems	3	
MATH 680: Advanced Mathematical Modeling	3		Data Science Technical Elective	3	
Technical Elective AND/OR Interdisciplinary Elective AND/OR DATA 730 Fieldwork Experience***	3 + 3		DATA 750: Data Science Thesis	3	
Total:	12		**Total:**	9	

Total Undergraduate Credits Required: 128 credits (all courses listed in first four years)
Major GPA required for undergraduate graduation: 2.0
WI: Writing Intensive - 3 courses required in the major.

General Education courses can be done in any order with the exception of INTD 101, CRWT and MATH. Those three general education courses will need to be done first. First Year Seminar is taken in the first semester. Failure to complete CRWT and MATH will result in a hold when the student hits 64 credits. The following general education courses can be done in any order. For more info on these courses, please visit the [General Education program requirements website in the College Catalog](#):

- Social Science Inquiry (SOSC 110) *[+W]*
- Scientific Reasoning
- Historical Perspectives *[+W]*
- Studies in the Arts & Humanities (*CRWT 102 is a prerequisite to this course*) *[+W]*
- Global Awareness *[+W]*
- Distribution Category (Systems, Sustainability, & Society **OR** Culture & Creativity **OR** Values and Ethics) **(Must be outside of TAS)**
- Distribution Category

+W: Students transferring in with 48 or more credits are waived from these general education requirements.

Total Graduate Credits Required: 30 credits (listed with MS in fourth year and all fifth year courses)
Student must be in good academic standing: https://www.ramapo.edu/provost/policy/graduate-academic-standing/

*   This course has a prerequisite. Please refer to the course catalog for information about pre-requisites.
**   This course satisfies a Group II Bioinformatics Elective
***   Students must complete two technical electives and one interdisciplinary elective. DATA 730 Fieldwork Experience may
         be used to replace one of the three total electives.