

APPLIED COMPUTER SCIENCE, B.S.

Concentration in Bioinformatics

2023-2024

The Bachelor of Science degree in Applied Computer Science (BS ACS) has been created for those students who want and need the knowledge and expertise of computer science to work in one of the many disciplines that require advanced computing techniques. These fields do not merely use computing but create new and interesting problems for the computer scientist.

The objectives of the BS ACS program are to provide students with the following:

1. The fundamental knowledge regarding theory, methods and applications of Computer Science.
2. A foundation in a second chosen discipline.
3. Knowledge of concepts that integrate Computer Science with the second chosen discipline using senior level classes that focus on the emerging issues.
4. Preparation for employment as a computational expert in a non-computer science discipline.
5. Preparation for graduate studies in fields such as Computer Science, their second discipline and related computational areas.

Application Area

The study of computational issues central to biological science, (i.e. bioinformatics) requires knowledge of both biology and computer science. In bioinformatics, vast files of raw data are being analyzed to find answers to important questions in molecular biology. Computer scientists have a better understanding of the computational techniques, but do not have the background required to formulate the computational biology questions. Biologists understand the molecular issues, but lack knowledge of computational techniques. The interdisciplinary nature of bioinformatics requires a strong preparation in both computer science and biology fundamentals which the bioinformatics concentration provides.

Degree Requirements

The bioinformatics concentration of the ACS program can be successfully completed within the normal 120 semester hour degree GMU. In addition to Mason Core requirements, including humanities, and social science, the BS ACS program requires foundation, core, and

concentration courses as described in this brochure.

The foundation and core course requirements provide the student with expertise in programming, computer systems, software requirements and modeling, formal methods and analysis of algorithms. At least 45 semester hours of the degree requirements must be at the 300 level or above.

ACS Foundation Courses:

CS 110, 112, 211

MATH 113, 114, 125, 203

ACS Core:

CS 262, 310, 321, 330, 367, 471, 483

One CS course numbered above 400 (≠498)

All BS ACS majors must complete at least 36 additional credits to meet the course requirements of the Bioinformatics concentration. These credits will include a course in Statistics relevant to the concentration.

Bioinformatics Concentration

Foundation:

PHYS 160/161, CHEM 211/213, BIOL 213,

CS 306, STAT 344

Core:

BINF 450, BIOL 482, BIOL 580, CS 450

BINF 401, BINF 402

Two approved electives related to bioinformatics

Sample Schedule

FIRST SEMESTER (14 CREDITS)

CS 110 Essentials of Computer Science	3
CS 112 Introduction to Programming	4
MATH 113 Analytic Geometry and Calculus I	4
ENGH 101 Composition [MC] *	3

SECOND SEMESTER (16 CREDITS)

CS 211 Object-Oriented Programming	3
MATH 114 Analytic Geometry and Calculus II	4
MATH 125 Discrete Mathematics I	3
Western Civilization [MC]*	3
COMM 100/101 Public Speaking [MC]*	3

THIRD SEMESTER (16 CREDITS)

CS 262 Low-Level Programming	3
CS 310 Data Structures	3
MATH 203 Linear Algebra	3
PHYS 160/161 University Physics [MC]*	4
Literature [MC] *	3

FOURTH SEMESTER (15 CREDITS)

CS 330 Formal Methods and Models	3
CS 367 Computer Systems and Programming	4
CHEM 211/213 Introductory Chemistry I [MC]*	4
Social and Behavioral Science [MC]*	3
General Elective	1

FIFTH SEMESTER (16 CREDITS)

ENGH 302 Advanced Composition [MC]*	3
CS 471 Operating Systems	3
CS 483 Analysis of Algorithms	3
STAT 344 Prob/Stat for Engrs & Scientists	3
BIOL 213 Cell Structure & Function	4

SIXTH SEMESTER (15 CREDITS)

BIOL 482 Introduction to Molecular Genetics	3
CS 321 Software Req's & Design Modeling	3
BINF 450 Bioinformatics for Life Science	4
Arts [MC]*	3
General Elective	2

SEVENTH SEMESTER (15 CREDITS)

CS 306 Synthesis of Ethics & Law	3
BINF 401 Bioinformatics and Comp. Biology I	3
BIOL 580 Computer Applications-Life Science	3
Bioinformatics Related Elective	3
Global Understanding [MC]*	3

EIGHTH SEMESTER (14 CREDITS)

BINF 402 Bioinformatics and Comp. Biology II	3
CS 450 Database Concepts	3
Bioinformatics related elective	3
ACS Senior course	3
General Elective	2