GEORGE MASON UNIVERSITY | The Volgenau School of Information Technology and Engineering

APPLIED COMPUTER SCIENCE, B.S.

Concentrations in Biology and Geography

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 Areas

The study of computational issues central to biological science, i.e. bioinformatics, requires knowledge of both Biology and Computer Science. Geographic Information Systems (GIS), another emerging applied CS discipline, requires computational knowledge as well as a solid background in Geography. Both bioinformatics and GIS generate vast files of raw data that can be analyzed for answers to important questions. Computer scientists have a better understanding of these issues but do not have the background required to formulate the basic questions. Many other fields, such as Mathematics and Economics, are experiencing the need for computational methods as well.

Degree Requirements

The biology and geography concentrations of the ACS program can be successfully completed within the normal 120 semester hour degree GMU. In addition to General Education (GE) requirements, including humanities, and social science, the BS ACS program requires foundation, core, and concentration courses as described below. These 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 101, 105, 112, 211; MATH 113, 114, 125, 203.
ACS Core:
ECE 301, CS 262, 310, 330, 367, 421, 465, 483.
One CS course numbered above 400.

All BS ACS majors must complete at least 36 additional credits to meet the course requirements of one of the concentrations. These credits will include either STAT 344 (Statistics and Probability) or a course in Statistics relevant to the concentration. Current concentrations are Biology, Computer Game Design, Geography and Software Engineering.

Biology

Foundation: BIOL 213, 303, 304, 305/6 and CHEM 211, 212.
Core: BIOL 311, 312 (or STAT 344), 385, 482, 580.
One BIOL course numbered above 300

Geography

Foundation: GEOG 101, 102, 103, 110, 300 and STAT 344.
Core: GEOG 310, 311, 411, 412, 416 and 463
One GEOG course numbered above 300

Biology Concentration Degree Requirements

FIRST SEMESTER (17 CREDITS)

CS 101 Preview of Computer Science	2
CS 112 Intro. to Computer Programming	4
MATH 113 Analytic Geometry and Calculus I	4
ENGL 101 Composition	3
BIOL 213 Cell Structure and Function	4

SECOND SEMESTER (15 CREDITS)

CS 211 Object-Oriented Programming	3
MATH 114 Analytic Geometry and Calculus II	4
BIOL 303 Animal Biology	4
CS 105 Computer Ethics and Society	1
COMM 100 Public Speaking	3

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THIRD SEMESTER (14 CREDITS)
CS 262 Low- level Programming 1
CS 310 Data Structures.....3
ECE 301 Digital Electronics.....3
MATH 125 Discrete Mathematics.....3
CHEM 211 General Chemistry I 4

FOURTH SEMESTER (14 CREDITS)
CS 367 Computer Systems and Programming 3
BIOL 304 Plant Biology 4
CHEM 212 General Chemistry II.....4
Western Civilization elective.....3

FIFTH SEMESTER (16 CREDITS)
CS 330 Formal Methods and Models 3
CS 465 Computer Systems Architecture 3
MATH 203 Linear Algebra 3
BIOL 305 & 306 Biology of Micro-Organisms & Lab .4
Literature elective 3

SIXTH SEMESTER (16 CREDITS)
CS 421 Software Requirements & Design Modeling....3
BIOL 311 General Genetics 4
BIOL 482 Introduction to Molecular Biology.....3
Fine Arts Elective 3
ENGL 302 Advanced Composition.....3

SEVENTH SEMESTER (15 CREDITS)
BIOL 385 Biotechnology & Genetic Engineering 3
BIOL 312 Biostatistics (or STAT 344).....3
Global Understanding elective.....3
Social Science elective.....3
CS 483 Analysis of Algorithms 3

EIGHTH SEMESTER (13 CREDITS)
BIOL 580 Computer Apps in the Life Sciences 3
CS Senior elective.....3
BIOL Senior elective 3
Synthesis course.....3
Elective 1

Geography Concentration Degree Requirements

FIRST SEMESTER (16 CREDITS)
CS 101 Preview of Computer Science.....2
CS 112 Introduction to Programming.....4
MATH 113 Analytic Geometry and Calculus I.....4
ENGL 101 Composition 3
GEOG 102 Physical Geography 3

SECOND SEMESTER (14 CREDITS)
CS 211 Object-Oriented Programming 3
MATH 114 Analytic Geometry and Calculus II 4
GEOG 103 Human Geography 3
CS 105 Computer Ethics and Society 1
COMM 100 Public Speaking 3

THIRD SEMESTER (16 CREDITS)
CS 310 Data Structures 3
CS 262 Low-Level Programming 1
ECE 301 Digital Electronics 3
MATH 125 Discrete Mathematics 3
Western Civilization elective 3
GEOG 101 Major World Regions.....3

FOURTH SEMESTER (15 CREDITS)
CS 367 Computer Systems and Programming.....3
GEOG 311 Intro to Geographic Info Systems 3
GEOG 110 Maps and Mapping.....3
Fine Arts elective 3
MATH 203 Linear Algebra.....3

FIFTH SEMESTER (16 CREDITS)
CS 330 Formal Methods and Models 3
CS 465 Computer Systems Architecture.....3
GEOG 300 Quant Methods Geographical Analysis ..3
GEOG 412 Aerial Photography Interpretation.....3
Natural Science elective 4

SIXTH SEMESTER (16 CREDITS)
CS 421 Software Req's & Design Modeling 3
GEOG 310 Intro to Digital Cartography.....4
GEOG 416 Satellite Image Analysis.....3
STAT 344 Introduction to Statistics.....3
Literature elective.....3

SEVENTH SEMESTER (15 CREDITS)
GEOG 411 Advanced Digital Cartography 3
GEOG Senior elective.....3
CS 483 Analysis of Algorithms 3
ENGL 302 Advanced Composition 3
Elective.....3

EIGHTH SEMESTER (12 CREDITS)
GEOG 463 Applied Geographic Info Systems 3
CS Senior elective 3
Synthesis elective 3
Electives 3