GEORGE MASON UNIVERSITY | The Volgenau School of Engineering

APPLIED COMPUTER SCIENCE, B.S.

Concentration in Geography

2019-20

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 Geographic Information Systems (GIS) requires both computing knowledge as well as a solid background in geography. GIS generate vast files of raw data that can be analyzed for answers to important questions. Computer scientists have a better understanding of the computational techniques, but do not have the background required to formulate questions related to the compilation, display, and analysis of geographic spatial data. This interdisciplinary field of study requires a strong preparation in both computer science and the geography fundamentals associated with cartography, aerial photography and satellite image analysis and modeling.

Degree Requirements

The geography 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.

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.

All BS ACS majors must complete at least 36 additional credits to meet the course requirements of the Geography concentration. These credits will include either STAT 344 (Statistics and Probability) or a course in Statistics relevant to the concentration.

Geography Concentration

Foundation:
CS 306; STAT 344;
GGS 101, 102, 103, 110, 300.

Core:
GGS 310, 311, 411, 412, 416 and 463

One GGS course numbered above 300

Sample Schedule

Below is one example of how the ACS in Geography major may be achieved within eight semesters.

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
GGS 102 Physical Geography 3

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SECOND SEMESTER (16 CREDITS)
CS 211 Object-Oriented Programming 3
MATH 114 Analytic Geometry and Calculus II 4
COMM 100/101 Public Speaking 3
ENGH 101 Composition 3
GGS 103 Human Geography 3

THIRD SEMESTER (15 CREDITS)
Western Civilization elective 3
CS 262 Low-Level Programming 3
CS 310 Data Structures 3
GGS 101 Major World Regions 3
MATH 125 Discrete Mathematics 3

FOURTH SEMESTER (16 CREDITS)
MATH 203 Linear Algebra 3
Natural Science course 4
GGS 110 Maps and Mapping 3
GGS 311 Intro to Geographic Info Systems 3
Literature course 3

FIFTH SEMESTER (16 CREDITS)
CS 330 Formal Methods and Models 3
CS 367 Computer Systems and Programming 4
GGS 300 Quant Methods Geographical Analysis 3
GGS 412 Aerial Photography Interpretation 3
Elective 3

SIXTH SEMESTER (15 CREDITS)
CS 321 Software Req's & Design Modeling 3
GGS 310 Intro to Digital Cartography 4
GGS 416 Satellite Image Analysis 3
STAT 344 Prob/Stat for Engrs & Scientists 3
Elective 2

SEVENTH SEMESTER (15 CREDITS)
CS 471 Operating Systems 3
CS 483 Analysis of Algorithms 3
GGS 411 Advanced Digital Cartography 3
GGS Senior elective 3
ENGH 302 Advanced Composition 3

EIGHTH SEMESTER (14 CREDITS)
GGS 463 Applied Geographic Info Systems 3
CS 306 Synthesis of Ethics and Law 3
CS Senior elective 3
Arts elective 3
Elective 2