APPLIED MATH AND COMPUTER SCIENCE, BS (COLLEGE OF ENGINEERING AND APPLIED SCIENCE, DEPARTMENT OF COMPUTER SCIENCE)

The Applied Mathematics and Computer Science (AMCS) program is a special degree program that blends courses from both the College of Letters & Science and the College of Engineering & Applied Science. It is a structured curriculum offering courses from both applied math and computer science so that students get the benefit of both majors without having to double major.

The job outlook for individuals with math majors is extremely favorable, as is the job outlook for computer science majors. A student with combined knowledge in both areas is likely to be in high demand on the job market.

Our program is highly technical in nature yet still retains elements of a classic liberal arts degree. Students take courses in the humanities, social sciences, and natural sciences on their way to a degree. Why? Because math and computer science are not applied in a world without humans. Regardless of the type of industry, the applications being worked on have impact and consequences for human beings. A broad world view of cultures, history, and society only leads to better decision-making in scientific careers, and strong communication skills only make our graduates even more attractive.

Applied Math and Computer Science Major Requirements

Students who intend to complete the program in four years will need to begin taking mathematics in their first semester. Such students should have a University of Wisconsin-Milwaukee mathematics placement level of 30 (ready for precalculus) or better.

Admission

As soon as students realize their interest in the AMCS degree, they should consult with an AMCS advisor either in College of Engineering and Applied Science or College of Letters and Science, who assists in planning a program. Admission to the program requires a GPA of at least 2.500 in 8 credits of mathematics courses at or above the 200 level and 6 credits of computer science courses at or above the 200 level.

Degree Requirements

For the BS (AMCS) degree, 120 credits are required, of which 60 must be taken from the College of Letters and Science. Students must satisfy the general education requirements (GER) (http://catalog.uwm.edu/policies/undergraduate-policies/#generaleducationcontext) of the University. Students must take at least 8 credits of natural sciences outside of mathematics or mathematical statistics.

An overall GPA of 2.000 on all coursework attempted at UWM is required for this degree. In addition, students must achieve a 2.000 GPA on all coursework attempted, including transfer work. A minimum 2.000 GPA must be earned on all 300-level and above courses taken to satisfy the advanced requirements. Students satisfy the residency requirement for the degree by completing at UWM both a minimum of 15 credits of the required advanced courses and one of the following:

- The last 30 credits;
- 45 of the last 60 credits;
- Any 90 credits.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>COMPSCI 250</td>
<td>Introductory Computer Programming</td>
<td>3</td>
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<tr>
<td>COMPSCI 251</td>
<td>Intermediate Computer Programming</td>
<td>3</td>
</tr>
<tr>
<td>COMPSCI 317</td>
<td>Discrete Information Structures ¹</td>
<td>3</td>
</tr>
<tr>
<td>Math 231</td>
<td>Calculus and Analytic Geometry I</td>
<td></td>
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<tr>
<td>Math 232</td>
<td>Calculus and Analytic Geometry II</td>
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<tr>
<td>Math 233</td>
<td>Calculus and Analytic Geometry III</td>
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<tr>
<td>Math 234</td>
<td>Linear Algebra and Differential Equations</td>
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<tr>
<td>Math 240</td>
<td>Matrices and Applications</td>
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<tr>
<td>Math 341</td>
<td>Seminar: Introduction to the Language and Practice of Mathematics</td>
<td>3</td>
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Advanced Requirements

- COMPSCI 351: Data Structures and Algorithms 3
- COMPSCI 535: Algorithm Design and Analysis 3
- Select 9 credits in COMPSCI at the 300 level or above 9
- Select 12 credits from MATH and/or MTHSTAT and/or ACTSCI at the 300 level or above 12
- Select 9 additional credits from CompSci, Math, MthStat, and ActSci courses at the 300 level or above, beyond the “Core” as well as the above “Advanced” Requirements; included in these 9 cr must be a Capstone or Internship Course 9

Capstone and Internship courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Math 489</td>
<td>Internship in Mathematics, Upper Division</td>
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<tr>
<td>MTHSTAT 489</td>
<td>Internship in Mathematical Statistics, Upper Division</td>
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<tr>
<td>Math 575</td>
<td>High School Mathematics from an Advanced Viewpoint</td>
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<tr>
<td>Math 599</td>
<td>Capstone Experience</td>
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<tr>
<td>ACTSCI 590</td>
<td>Actuarial Internship</td>
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<tr>
<td>ACTSCI 599</td>
<td>Capstone Experience</td>
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<tr>
<td>COMPSCI 594</td>
<td>Capstone Project Preparation</td>
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<tr>
<td>COMPSCI 595</td>
<td>Capstone Project</td>
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</tr>
<tr>
<td>COMPSCI 599</td>
<td>Senior Thesis</td>
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</tbody>
</table>

Total Credits 64

¹ COMPSCI 317 is waived for students who earn credit for MTHSTAT 361, which counts towards the math electives for the program. Students who have COMPSCI 317 waived in this case do not need to take any additional credits.

Additional Requirements

Students completing a Data Science BS who wish to also earn an AMCS BS must complete 9 credits upper division ActSci/Math/MthStat/
CompSci beyond the courses in those curricular areas used to fulfill the Data Science Major requirements.

## Potential Course of Study

### Year 1

#### Fall
- COMPSCI 250: Introductory Computer Programming
  - Credits: 3
- ENGLISH 101: Introduction to College Writing
  - Credits: 3
- MATH 115: Precalculus
  - Credits: 4
- 1st semester foreign language
  - Credits: 3-5

**Total Credits:** 13-15

#### Spring
- COMPSCI 251: Intermediate Computer Programming
  - Credits: 3
- ENGLISH 102: College Writing and Research (OWC-A GER)
  - Credits: 3
- MATH 231: Calculus and Analytic Geometry I
  - Credits: 4
- 2nd semester foreign language
  - Credits: 3-5

**Total Credits:** 13-15

### Year 2

#### Fall
- COMPSCI 351: Data Structures and Algorithms
  - Credits: 3
- MATH 232: Calculus and Analytic Geometry II
  - Credits: 4
- MATH 341: Seminar: Introduction to the Language and Practice of Mathematics
  - Credits: 3
- Humanities + Cultural Diversity GER
  - Credits: 3
- Arts GER
  - Credits: 3

**Total Credits:** 16

#### Spring
- COMPSCI 317: Discrete Information Structures
  - Credits: 3
- MATH 233: Calculus and Analytic Geometry III
  - Credits: 4
- MATH 234: Linear Algebra and Differential Equations
  - Credits: 3-4
  - or MATH 240: Matrices and Applications
- Natural Science with lab (NS+ GER)
  - Credits: 4-5

**Total Credits:** 14-16

### Year 3

#### Fall
- COMPSCI 535: Algorithm Design and Analysis
  - Credits: 3
- CompSci advanced elective
  - Credits: 3
- Math advanced elective
  - Credits: 3
- Math or Comp Sci advanced elective
  - Credits: 3
- Natural Science GER
  - Credits: 3

**Total Credits:** 15-16

#### Spring
- CompSci advanced elective
  - Credits: 3
- Math advanced elective
  - Credits: 3
- Math advanced elective
  - Credits: 3
- Math or Comp Sci advanced elective
  - Credits: 3
- Social Science GER
  - Credits: 3

**Total Credits:** 15

### Year 4

#### Fall
- CompSci advanced elective
  - Credits: 3
- Math advanced elective
  - Credits: 3
- Math or CompSci capstone or internship, plus Math/CS advanced elective if needed to get to 3 cr min
  - Credits: 3
- Humanities + OWCB
  - Credits: 3
- Electives as needed to reach cr requirements
  - Credits: 6-0

**Total Credits:** 18-12

#### Spring
- Electives as needed to reach cr requirements
  - Credits: 13-12

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### Honors in the Degree

Students in AMCS who meet all of the following criteria can be awarded honors in the degree upon graduation:

1. A 3.000 cumulative GPA in all UWM graded credits;
2. A 3.500 GPA over all UWM courses attempted that count toward the AMCS degree;
3. A 3.500 GPA over all upper division UWM courses counting toward the AMCS degree;
4. A grade of B+ or better in one of: MATH 599, MATH 699, COMPSCI 595, or COMPSCI 699;
5. Completion of 3 credits in Mathematical Sciences (curricular areas MATH or MTHSTAT) or Computer Science in a course numbered 600 or higher that is different from MATH 699 and COMPSCI 699.

Students who believe they may qualify for honors in Applied Mathematics & Computer Science should apply to the Department of Mathematical Sciences during their last semester of study.

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1. Select a sufficient number of elective credits from the College of Letters and Science to earn a minimum of 60 L&S credits.