

# 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.

### 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) (<https://catalog.uwm.edu/policies/undergraduate-policies/#bachelorsdegreegeneraleducation>) of the University.

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 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 is also required. 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 in the major and a minimum of 30 credits overall.

Code	Title	Credits
<b>Core Requirements</b>		
COMPSCI 250	Introductory Computer Programming	4
COMPSCI 251	Intermediate Computer Programming	4
COMPSCI 317	Discrete Information Structures <sup>1</sup>	4
Select one of the following Technology Ethics Courses:		3
COMPSCI 395	Social, Professional, and Ethical Issues	
PHILOS 237	Technology, Values, and Society	
INFOST 120	Information Technology Ethics	
Select the following (or an equivalent sequence):		12
MATH 231	Calculus and Analytic Geometry I	
MATH 232	Calculus and Analytic Geometry II	
MATH 233	Calculus and Analytic Geometry III	
MATH 234	Linear Algebra and Differential Equations	4
or MATH 240	Matrices and Applications	
MATH 341	Seminar: Introduction to the Language and Practice of Mathematics	3
<b>Advanced Requirements</b>		
COMPSCI 351	Data Structures and Algorithms	4
COMPSCI 535	Algorithm Design and Analysis	3
Select 9 credits in COMPSCI at the 300 level or above <sup>2</sup>		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 or must be a Capstone or Internship Course. <sup>2</sup>		9
<b>Capstone and Internship Courses</b>		
MATH 489	Internship in Mathematics, Upper Division	
MTHSTAT 489	Internship in Mathematical Statistics, Upper Division	
MATH 575	High School Mathematics from an Advanced Viewpoint	
MATH 599	Capstone Experience	
ACTSCI 590	Actuarial Internship	
ACTSCI 599	Capstone Experience	
COMPSCI 594	Capstone Project Preparation	
COMPSCI 595	Capstone Project	
COMPSCI 599	Senior Thesis	
<b>Total Credits</b>		<b>71</b>

<sup>1</sup> 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.

<sup>2</sup> COMPSCI 395 may not be counted towards the upper division COMPSCI or mixed "CompSci, Math, MthStat, and ActSci courses at the

300 level or above", regardless of whether COMPSCI 395 was used to satisfy the Technology Ethics course requirement.

### 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		Credits
COMPSCI 250	Introductory Computer Programming	4
ENGLISH 101	Introduction to College Writing	3
MATH 115	Precalculus	4
1st semester foreign language		3-5
<b>Credits</b>		<b>14</b>

#### Spring

COMPSCI 251	Intermediate Computer Programming	4
ENGLISH 102	College Writing and Research (OWC-A GER)	3
MATH 231	Calculus and Analytic Geometry I	4
2nd semester foreign language		3-5
<b>Credits</b>		<b>14</b>

#### Year 2

Fall		Credits
COMPSCI 351	Data Structures and Algorithms	4
MATH 232	Calculus and Analytic Geometry II	4
MATH 341	Seminar: Introduction to the Language and Practice of Mathematics	3
Humanities + Cultural Diversity GER		3
Arts GER		3
<b>Credits</b>		<b>17</b>

#### Spring

COMPSCI 317	Discrete Information Structures	4
MATH 233	Calculus and Analytic Geometry III	4
MATH 234 or MATH 240	Linear Algebra and Differential Equations or Matrices and Applications	3-4
Natural Science with lab (NS+ GER)		4-5
<b>Credits</b>		<b>15</b>

#### Year 3

Fall		Credits
COMPSCI 395	Social, Professional, and Ethical Issues	3
COMPSCI 535	Algorithm Design and Analysis	3
CompSci advanced elective		3
Math advanced elective		3
Math or Comp Sci advanced elective		3
<b>Credits</b>		<b>15</b>

#### Spring

CompSci advanced elective		3
Math advanced elective		3
Math advanced elective		3
Math or Comp Sci advanced elective		3
Social Science GER		3
<b>Credits</b>		<b>15</b>

#### Year 4

Fall		Credits
CompSci advanced elective		3
Math advanced elective		3
Math or CompSci capstone or internship, plus Math/CS advanced elective if needed to get to 3 or min		3
Humanities + OWCB		3

Electives as needed to reach cr requirements	0-6
<b>Credits</b>	<b>18</b>
<b>Spring</b>	
Electives as needed to reach cr requirements <sup>1</sup>	12-13
Social Science GER	3
<b>Credits</b>	<b>16</b>
<b>Total Credits</b>	<b>124</b>

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

## Applied Mathematics and Computer Science BS Learning Outcomes

Students graduating from this program will be able to:

1. **integrate** applications, problem-solving and theory.
2. **apply** the analytical and critical thinking skills required for efficient use, appreciation, and understanding of the mathematical sciences.
3. **communicate** mathematical sciences in technical and non-technical terms.
4. **engage** in a continuing study and application of the mathematical sciences.
5. **associate** and **synthesize** knowledge from different areas of the mathematical sciences.

## 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.

## College of Engineering and Applied Science Dean's Honor List

GPA of 3.500 or above, earned on a full-time student's GPA on 12 or more graded credits in a given semester.

## Honors College Degree and Honors College Degree with Distinction

Granted to graduating seniors who complete Honors College requirements, as listed in the Honors College (<https://catalog.uwm.edu/honors-college/>) section of this site.

## Commencement Honors

Students with a cumulative GPA of 3.500 or above, based on a minimum of 40 graded UWM credits earned prior to the final semester, will receive all-university commencement honors and be awarded the traditional gold cord at the December or May Honors Convocation. Please note that for honors calculation, the GPA is **not** rounded and is truncated at the third decimal (e.g., 3.499).

## Final Honors

Earned on a minimum of 60 graded UWM credits: Cum Laude - 3.500 or above; Magna Cum Laude - 3.650 or above; Summa Cum Laude - 3.800 or above.