

# APPLIED MATHEMATICAL SCIENCES - BS, CRYPTOGRAPHY EMPHASIS

The curriculum in the Bachelor of Science in Applied Mathematical Sciences with a Cryptography emphasis explores the application of analytical problem solving tools to concrete problems in cybersecurity.

Students in the Cryptography emphasis investigate a broad array of techniques in applied and pure mathematics and pursue electives in computer science that demonstrate how mathematics is central to keeping information and data secure.

A student completing this program is prepared to enter employment with analytical and quantitative tools relevant to technological industries or government, especially in cybersecurity related fields. Furthermore, with the appropriate electives chosen, the student is prepared to enter quantitatively oriented graduate schools, including PhD programs in Applied Mathematics or Mathematics. A minor in computer science or cybersecurity is well suited to students in this program. All advising for this degree option is done through the Undergraduate Program Office in the Department of Mathematics.

## Program Requirements

### First Year

	Semester Credit Hours
<b>Fall</b>	
ENGL 104 Composition and Rhetoric or ENGL 103 or Introduction to Rhetoric and Composition	3
MATH 171 Calculus I	4
University Core Curriculum ( <a href="http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/">http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/</a> ) <sup>1</sup>	3
Freshman Science elective <sup>2</sup>	4
General elective <sup>3,4</sup>	1
<b>Semester Credit Hours</b>	<b>15</b>

<b>Spring</b>	
ECON 202 Principles of Economics or ECON 203 or Principles of Economics	3
MATH 172 Calculus II	4
University Core Curriculum ( <a href="http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/">http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/</a> ) <sup>1</sup>	3
Freshman Science elective <sup>2</sup>	4
General elective <sup>3,4</sup>	1
<b>Semester Credit Hours</b>	<b>15</b>

### Second Year

<b>Fall</b>	
MATH 221 Several Variable Calculus	4
MATH 300 Foundations of Mathematics	3
STAT 211 Principles of Statistics I	3
Select one of the following:	4
CSCE 110 Programming I	

CSCE 111	Introduction to Computer Science Concepts and Programming	
CSCE 206	Structured Programming in C	

**Semester Credit Hours 14**

<b>Spring</b>		
CSCE 121	Introduction to Program Design and Concepts	4
MATH 308	Differential Equations	3
MATH 323	Linear Algebra	3
STAT 212	Principles of Statistics II	3
University Core Curriculum ( <a href="http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/">http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/</a> ) <sup>1</sup>		3

**Semester Credit Hours 16**

<b>Third Year</b>		
<b>Fall</b>		
MATH 409	Advanced Calculus I	3
MATH 470	Communications and Cryptography	3
PHYS 206 & PHYS 226	Newtonian Mechanics for Engineering and Science and Physics of Motion Laboratory for the Sciences	4
University Core Curriculum ( <a href="http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/">http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/</a> ) <sup>1</sup>		3
General Elective <sup>4</sup>		1

**Semester Credit Hours 14**

<b>Spring</b>		
MATH 415	Modern Algebra I <sup>5</sup> or MATH 433 or Applied Algebra	3
MATH 471	Communications and Cryptography II	3
Select one of the following:		4
OCNG 451	Mathematical Modeling of Ocean Climate	
PHYS 207 & PHYS 227	Electricity and Magnetism for Engineering and Science and Electricity and Magnetism Laboratory for the Sciences	
University Core Curriculum ( <a href="http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/">http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/</a> ) <sup>1</sup>		3
General elective <sup>4</sup>		3

**Semester Credit Hours 16**

<b>Fourth Year</b>		
<b>Fall</b>		
MATH 427	Introduction to Number Theory or MATH 431 or Structures and Methods of Combinatorics	3
MATH 472	Elliptic Curve Cryptography	3
Select 3 hours from the following:		3
CSCE 210-470 ( <a href="http://catalog.tamu.edu/undergraduate/course-descriptions/csce/">http://catalog.tamu.edu/undergraduate/course-descriptions/csce/</a> ) <sup>6</sup>		
ISEN 320	Operations Research I	
ISEN 340	Operations Research II	
MATH 325	The Mathematics of Interest	

MATH 407-499 ( <a href="http://catalog.tamu.edu/undergraduate/course-descriptions/math/">http://catalog.tamu.edu/undergraduate/course-descriptions/math/</a> )	
STAT 335-482 ( <a href="http://catalog.tamu.edu/undergraduate/course-descriptions/stat/">http://catalog.tamu.edu/undergraduate/course-descriptions/stat/</a> )	
Select one of the following:	3
COMM 203 Public Speaking (Select one of the following:)	
COMM 205 Communication for Technical Professions	
COMM 243 Argumentation and Debate (Elective)	
General elective <sup>4</sup>	3
<b>Semester Credit Hours</b>	<b>15</b>
<b>Spring</b>	
MATH 411 Mathematical Probability	3
Select 3 hours from the following:	3
CSCE 210-470 ( <a href="http://catalog.tamu.edu/undergraduate/course-descriptions/csce/">http://catalog.tamu.edu/undergraduate/course-descriptions/csce/</a> ) <sup>6</sup>	
MATH 325 The Mathematics of Interest	
MATH 407-499 ( <a href="http://catalog.tamu.edu/undergraduate/course-descriptions/math/">http://catalog.tamu.edu/undergraduate/course-descriptions/math/</a> )	
Select 3 hours from the following:	3
CSCE 210-470 ( <a href="http://catalog.tamu.edu/undergraduate/course-descriptions/csce/">http://catalog.tamu.edu/undergraduate/course-descriptions/csce/</a> ) <sup>6</sup>	
ISEN 320 Operations Research I	
ISEN 340 Operations Research II	
MATH 325 The Mathematics of Interest	
MATH 407-499 ( <a href="http://catalog.tamu.edu/undergraduate/course-descriptions/math/">http://catalog.tamu.edu/undergraduate/course-descriptions/math/</a> )	
STAT 335-482 ( <a href="http://catalog.tamu.edu/undergraduate/course-descriptions/stat/">http://catalog.tamu.edu/undergraduate/course-descriptions/stat/</a> )	
University Core Curriculum ( <a href="http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/">http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/</a> ) <sup>1</sup>	3
General elective <sup>4</sup>	3
<b>Semester Credit Hours</b>	<b>15</b>
<b>Total Semester Credit Hours</b>	<b>120</b>

<sup>1</sup> Of the 18 hours shown as University Core Curriculum (<http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/>), 3 must be from language, philosophy and culture, 3 from creative arts, 6 from American history, 6 from Government/Political Science.

<sup>2</sup> Select 4 hours from: ASTR 111, BIOL 111, BIOL 112, CHEM 119, CHEM 120, CHEM 107/CHEM 117. The remaining 4 hours may be selected from: ASTR 111, ATMO 201/ATMO 202, BIOL 111, BIOL 112, CHEM 119, CHEM 120, CHEM 107/CHEM 117, GEOL 101/GEOL 102, OCNG 251/OCNG 252.

<sup>3</sup> MATH 170 is highly recommended for math majors co-enrolled in MATH 150, MATH 151, MATH 152, MATH 171 or MATH 172. MATH 200 is also highly recommended for math majors co-enrolled in MATH 151, MATH 152, MATH 171 or MATH 172.

<sup>4</sup> Select from any 100-499 course not used elsewhere, (except ALED 125; ASCC 102; ASTR 109/PHYS 109, ASTR 119/PHYS 119; BMEN 153; ISEN 101; KINE 199; LAND 101; MATH 102- 148, MATH 151 - 168 (<http://catalog.tamu.edu/undergraduate/course-descriptions/math/>), MATH 304, MATH 309, MATH 311, MATH 365, MATH 366, MATH 367, MATH 375, MATH 376; PBSI 301;

PHYS 201, PHYS 202, PHYS 205; STAT 201, STAT 301-303 (<http://catalog.tamu.edu/undergraduate/course-descriptions/stat/>)).

<sup>5</sup> MATH 433 is only offered in Spring semesters.

<sup>6</sup> Except CSCE 222/ECEN 222, CSCE 285, CSCE 289, CSCE 291.

Maximum of 3 hours of MATH 300 or CSCE 222/ECEN 222 may be used in this degree program.

Maximum of 3 hours of MATH 411 or STAT 414 may be used in this degree program.

Maximum of 4 hours of MATH 417, MATH 437 or CSCE 442 may be used in this degree program.

If a grade of D or F is earned in any of the following courses, MATH 151/MATH 171, MATH 152/MATH 172, MATH 221/MATH 251/MATH 253, MATH 300, MATH 323 or MATH 308, this course must be immediately retaken and a grade of C or better earned. The department will allow at most two D's in upper-level (325-499) courses. If a third D is earned, one of the three courses in which a D was earned must be retaken and a grade of C or better earned.

Students desiring teacher certification should consult the requirements for certification before registering for electives.

Graduation requirements include a requirement for 3 hours of International and Cultural Diversity course (<http://catalog.tamu.edu/undergraduate/general-information/degree-information/international-cultural-diversity-requirements/>)s and 3 hours of Cultural Discourse (<http://catalog.tamu.edu/undergraduate/general-information/degree-information/cultural-discourse-requirements/>) courses. A course satisfying a Core category, a college/department requirement, or a general elective can be used to satisfy this requirement. See academic advisor.