

# B.S. IN MATHEMATICS - APPLIED AND COMPUTATIONAL MATHEMATICS CONCENTRATION

College of the Sciences and Mathematics

## Curriculum

**General Education Requirements** (<http://catalog.wcupa.edu/undergraduate/general-education-requirements>)

|  |   |
|--|---|
| English Composition requirements         | 6 |
| Mathematics requirement                  | 3 |
| Public Speaking requirement              | 3 |
| Science requirements                     | 6 |
| Behavioral & Social Science requirements | 6 |
| Humanities requirements                  | 6 |
| Arts requirement                         | 3 |
| Diverse Communities requirement          | 3 |
| Interdisciplinary requirement            | 3 |
| Student Electives                        | 9 |
| Writing Emphasis requirements            | 9 |

### Major Requirements

|            |   |   |
|------------|---|---|
| MAT 161    | Calculus I                              | 4 |
| MAT 162    | Calculus II                             | 4 |
| MAT 200    | The Nature of Mathematics               | 3 |
| MAT 261    | Calculus III                            | 4 |
| MAT 311    | Linear Algebra <sup>1</sup>             | 3 |
| MAT 319    | Applied Statistics                      | 3 |
| MAT 325    | Numerical Analysis I                    | 3 |
| MAT 343    | Differential Equations                  | 3 |
| MAT 413    | Computer Algebra                        | 3 |
| MAT 425    | Numerical Analysis II                   | 3 |
| MAT 427    | Introduction to Optimization Techniques | 3 |
| or MAT 493 | Mathematical Modeling                   |   |
| MAT 443    | Applied Analysis I                      | 3 |
| MAT 445    | Complex Variables                       | 3 |
| or MAT 441 | Real Analysis I                         |   |
| MAT 455    | Industrial Mathematics Practicum        | 3 |

### Related/Cognate Requirements

|                              |   |     |
|------------------------------|---|-----|
| Select one of the following: | 3                                       |     |
| ENG 368                      | Business and Organizational Writing     |     |
| ENG 371                      | Technical Writing                       |     |
| ENG 375                      | Strategies for Writing in the Workplace |     |
| CSC 141                      | Computer Science I <sup>1</sup>         | 3   |
| PHY 170                      | Physics I <sup>1</sup>                  | 3-4 |
| or BIO 110                   | General Biology                         |     |
| or CHE 103                   | General Chemistry I                     |     |
| or ESS 101                   | Introduction to Geology                 |     |

Select 12-13 credits of science cognates (PHY, BIO, CHE, CSC, or ESS) under the guidance of an advisor. At least two cognates must be at the 200-level or above.

### Free Electives or Internship

|  |  |     |
|--|--|-----|
| Select 13-15 credits of electives chosen under advisement. | 13-15  |     |
| MAT 491  | Internship in Applied Mathematics <sup>2</sup> | 2-4 |

**Total Minimum Credits Required** 120

<sup>1</sup> Indicates course satisfies a general education requirement.

<sup>2</sup> MAT 491 is an elective and not a requirement. It may be taken for variable credit and repeated for credit.

## Accelerated B.S. Mathematics - Applied and Computational Mathematics to M.S. Applied and Computational Mathematics Program

To be considered for the accelerated program, students must have attained (completed) 75 credits with a minimum of 24 mathematics credits. Students must have a minimum cumulative GPA of 3.00 including a minimum GPA of 3.00 for mathematics courses. Once admitted to the graduate program, graduate policies apply, including minimum GPA (3.00). *See the Graduate Catalog for further details.*

Students in the accelerated program can take up to 15 credits of graduate coursework to satisfy the B.S. program requirements. The course list below provides the approved graduate substitutions for undergraduate courses. The remaining graduate courses can be taken in place of free electives in the B.S. program.

### Major Requirements <sup>1</sup>

|                       |                                |   |
|-----------------------|--------------------------------|---|
| MAT 493               | Mathematical Modeling          | 3 |
| or MAT 548 or MAT 549 |                                |   |
| MAT 445               | Complex Variables <sup>2</sup> | 3 |
| or MAT 575            | Complex Analysis I             |   |
| MAT 441               | Real Analysis I <sup>2</sup>   | 3 |
| or MAT 545            | Real Analysis I                |   |

### Free Electives or Internship

The remaining 9 credits of graduate courses may be taken in place of Free Electives. 9

<sup>1</sup> MAT 500 (Fundamentals of Applied Mathematics) and one of the Industrial Mathematics Practicum courses (MAT 555 or 556) are waived for students in the accelerated program.

<sup>2</sup> Choose one (but not both) of these substitutions since the B.S. program requires only one analysis class (real or complex).

All math major courses must be passed with a C or better.

## Sample Course Plan

To track their individual degree progress, students are advised to access their Degree Progress Report (DPR) via myWCU regularly. For more information, visit [wcupa.edu/DegreeProgressReport](http://wcupa.edu/DegreeProgressReport).

The following is a suggested course sequence for this program; course offerings and availability are not guaranteed. Students should consult their academic advisor with any questions.

| Course                           | Title  | Credits |
|----------------------------------|--|---------|
| <b>Year One</b>                  |  |         |
| <b>Semester One</b>              |  |         |
| MAT 161                          | Calculus I                                     | 4       |
| CSC 141                          | Computer Science I <sup>2</sup>                | 3       |
| Gen Ed Arts                      |  | 3       |
| Gen Ed Humanities                |  | 3       |
| Gen Ed Behavioral/Social Science |  | 3       |
| Credits                          |  | 16      |
| <b>Semester Two</b>              |  |         |
| MAT 162                          | Calculus II                                    | 4       |
| MAT 200                          | The Nature of Mathematics                      | 3       |
| PHY 170                          | Physics I <sup>2</sup>                         | 4       |
| WRT 120                          | Effective Writing I                            | 3       |
| SPK 230                          | Business and Professional Speech Communication | 3       |
| Credits                          |  | 17      |

|                                  |                                     |         |
|----------------------------------|-------------------------------------|---------|
| <b>Year Two</b>                  |                                     |         |
| <b>Semester Three</b>            |                                     |         |
| MAT 261                          | Calculus III                        | 4       |
| MAT 311                          | Linear Algebra <sup>1</sup>         | 3       |
| PHY 180                          | Physics II                          | 4       |
| WRT 200                          | Critical Writing and Research       | 3       |
| Gen Ed Elective                  |                                     | 3       |
|                                  | Credits                             | 17      |
| <b>Semester Four</b>             |                                     |         |
| MAT 319                          | Applied Statistics                  | 3       |
| MAT 343                          | Differential Equations              | 3       |
| PHY 240                          | Introduction to Modern Physics      | 3       |
| Gen Ed Behavioral/Social Science |                                     | 3       |
| Free Elective                    |                                     | 3       |
|                                  | Credits                             | 15      |
| <b>Year Three</b>                |                                     |         |
| <b>Semester Five</b>             |                                     |         |
| MAT 325                          | Numerical Analysis I                | 3       |
| MAT 413                          | Computer Algebra                    | 3       |
| PHY 240                          | Introduction to Modern Physics      | 3       |
| IW Course                        |                                     | 3       |
| Gen Ed Elective                  |                                     | 3       |
|                                  | Credits                             | 15      |
| <b>Semester Six</b>              |                                     |         |
| MAT 443                          | Applied Analysis I                  | 3       |
| MAT 445                          | Complex Variables                   | 3       |
| PHY 300                          | Mechanics                           | 3       |
| JW Course                        |                                     | 3       |
| Free Elective                    |                                     | 3       |
|                                  | Credits                             | 15      |
| <b>Year Four</b>                 |                                     |         |
| <b>Semester Seven</b>            |                                     |         |
| ENG 368                          | Business and Organizational Writing | 3       |
| MAT 425                          | Numerical Analysis II               | 3       |
| Gen Ed Humanities                |                                     | 3       |
| Gen Ed Elective                  |                                     | 3       |
| Free Elective                    |                                     | 3       |
|                                  | Credits                             | 15      |
| <b>Semester Eight</b>            |                                     |         |
| MAT 493                          | Mathematical Modeling               | 3       |
| MAT 491                          | Internship in Applied Mathematics   | 2-4     |
| PHY 350                          | Heat and Thermodynamics             | 3       |
| Free Elective                    |                                     | 6       |
|                                  | Credits                             | 14-16   |
|                                  | Total Credits                       | 124-126 |

Three writing-emphasis courses are required. At least one must be at the three hundred level or above. Transfer students entering with 40-70 semester hours must take two writing emphasis courses and those entering with more than 70 semester hours must take one.

<sup>1</sup> MAT 311, a **three** semester hour course, is used to fulfill **three** semester hours of the General Education Mathematics requirement.

<sup>2</sup> PHY 170, a **four** semester hour course, and CSC 141, a **three** semester hour course, are used to fulfill **six** semester hours of the General Education Science requirement.