# AMSC420: Mathematical Modeling

**Credits:** 3  
**Grading Method:** Regular  
**CORE:** CS  

Prerequisite: MATH240 or MATH461; and (MATH241, MATH246, and STAT400); and permission of CMNS-Mathematics department. Also offered as: MATH420. Credit only granted for: AMSC420 or MATH420.

The course will develop skills in mathematical modeling through practical experience. Students will work in groups on specific projects involving real-life problems that are accessible to their existing mathematical backgrounds. In addition to the development of mathematical models, emphasis will be placed on the use of computational methods to investigate these models, and effective oral and written presentation of the results.

<table>
<thead>
<tr>
<th>Section</th>
<th>Instructor</th>
<th>Seats (Total:</th>
<th>Open:</th>
<th>Waitlist:</th>
<th>Time</th>
<th>Location</th>
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<tbody>
<tr>
<td>0101</td>
<td>Charles Levermore</td>
<td>25</td>
<td>17</td>
<td>0</td>
<td>TuTh 9:30am - 10:45am</td>
<td>MTH 0106</td>
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# AMSC460: Computational Methods

**Credits:** 3  
**Grading Method:** Regular, Pass-Fail, Audit  

Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and 1 course with a minimum grade of C- from (MATH340, MATH241); and 1 course with a minimum grade of C- from (CMSC106, CMSC131). Also offered as: CMSC460. Credit only granted for: AMSC460, CMSC460, AMSC466, or CMSC466.

Basic computational methods for interpolation, least squares, approximation, numerical quadrature, numerical solution of polynomial and transcendental equations, systems of linear equations and initial value problems for ordinary differential equations. Emphasis on methods and their computational properties rather than their analytic aspects. Intended primarily for students in the physical and engineering sciences.

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<tr>
<th>Section</th>
<th>Instructor</th>
<th>Seats (Total:</th>
<th>Open:</th>
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<tr>
<td>0101</td>
<td>Tobias von Petersdorff</td>
<td>31</td>
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<td>0</td>
<td>MWF 1:00pm - 1:50pm</td>
<td>MTH 0303</td>
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<tr>
<td>0201</td>
<td>Wujun Zhang</td>
<td>29</td>
<td>1</td>
<td>0</td>
<td>TuTh 2:00pm - 3:15pm</td>
<td>MTH 0303</td>
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<tr>
<td>0301</td>
<td>Gil Ariel</td>
<td>28</td>
<td>1</td>
<td>0</td>
<td>TuTh 2:00pm - 3:15pm</td>
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**AMSC466**  
**Introduction to Numerical Analysis I**  
(Perm req)  
Credits: 3  
Grading Method: Regular, Pass-Fail, Audit  
*Prerequisite:* 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and 1 course with a minimum grade of C- from (MATH340, MATH241); and 1 course with a minimum grade of C- from (CMSC106, CMSC131). Also offered as: CMSC466. Credit only granted for: AMSC460, CMSC460, AMSC466, or CMSC466.  
*Floating point computations, direct methods for linear systems, interpolation, solution of nonlinear equations.*  

<table>
<thead>
<tr>
<th>0101</th>
<th>Doron Levy</th>
<th>Seats (Total: 32, Open: 0, Waitlist: 0)</th>
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<td></td>
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<td>TuTh 2:00pm - 3:15pm PHY 1219</td>
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**AMSC498A**  
**Selected Topics in Applied Mathematics**  
(Perm req)  
Credits: 1-3  
Grading Method: Regular, Pass-Fail, Audit  
*Topics in applied mathematics of special interest to advanced undergraduate students.*  
*Contact department for information to register for this course.*

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**AMSC661**  
**Scientific Computing II**  
Credits: 3  
Grading Method: Regular  
*Prerequisite:* Must have knowledge of C or Fortran. And AMSC460 or CMSC460; or (CMSC466 or AMSC466); or (must have knowledge of basic numerical analysis (linear equations, nonlinear equations, integration, interpolation); and permission of instructor). Also offered as: CMSC661. Credit only granted for: AMSC661 or CMSC661.  
*Fourier and wavelet transform methods, numerical methods for elliptic partial differential equations, numerical linear algebra for sparse matrices. Finite element methods, numerical methods for time dependent partial differential equations. Techniques for scientific computation with an introduction to the theory and software for each topic. Course is part of a two course sequence (660 and 661), but can be taken independently.*  

<table>
<thead>
<tr>
<th>0101</th>
<th>Maria Cameron</th>
<th>Seats (Total: 20, Open: 5, Waitlist: 0)</th>
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<tr>
<td></td>
<td></td>
<td>MWF 12:00pm - 12:50pm MTH 1308</td>
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**AMSC662**  
**Computer Organization and Programming for Scientific Computing**  
Credits: 3  
Grading Method: Regular, Audit
Prerequisite: Must have knowledge of C or Fortran. And AMSC460 or CMSC460; or (CMSC466 or AMSC466); or (must have knowledge of basic numerical analysis (linear equations, nonlinear equations, integration, interpolation); and permission of instructor). Also offered as: CMSC662. Credit only granted for: AMSC662 or CMSC662.

This course presents fundamental issues of computer hardware, software, parallel computing, and scientific data management for programming for scientific computation.

<table>
<thead>
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<th>Instructor</th>
<th>Seats (Total: 35, Open: 6, Waitlist: 0)</th>
<th>Time</th>
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<tbody>
<tr>
<td>AMSC664</td>
<td>Ramani Duraiswami</td>
<td></td>
<td>TuTh 11:00am - 12:15pm</td>
</tr>
</tbody>
</table>

Advanced Scientific Computing II

Credits: 3
Grading Method: Regular

Prerequisite: AMSC663. Restriction: Permission of instructor. Also offered as: CMSC664. Credit only granted for: AMSC664 or CMSC664.

In the sequence AMSC 663, AMSC 664 students work on a year-long individual project to develop software for a scientific task in a high performance computing environment. Lectures will be given on code development and validation, parallel algorithms for partial differential equations, nonlinear systems, optimization.

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<tr>
<th>Course Code</th>
<th>Instructor</th>
<th>Seats (Total: 20, Open: 12, Waitlist: 0)</th>
<th>Time</th>
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<tbody>
<tr>
<td>AMSC674</td>
<td>Howard Elman</td>
<td></td>
<td>TuTh 9:30am - 10:45am</td>
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Partial Differential Equations II

Credits: 3
Grading Method: Regular, Audit

Prerequisite: MATH673 or AMSC673; or permission of instructor. Also offered as: MATH674. Credit only granted for: AMSC674 or MATH674.


Offered Spring only.

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<th>Time</th>
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<tr>
<td>AMSC689</td>
<td>Jacob Bedrossian</td>
<td></td>
<td>TuTh 11:00am - 12:15pm</td>
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Research Interactions in Applied Mathematics and Scientific Computation
The students participate in a vertically integrated (undergraduate, graduate and/or postdoctoral, faculty) research group. Format varies, but includes regular meetings, readings and presentations of material. See graduate program’s online syllabus or contact the graduate program director for more information.

Contact department for information to register for this course.

**AMSC760**  
**Applied Statistics Practicum**  
Credits: 3  
Grading Method: Regular  
Prerequisite: Must have completed one year of graduate study in Applied Statistics. Restriction: Must have project proposal approved by SAC coordinator.

A semester long applied statistical project (a minimum 10 hours per week or 120 hours in total), in an internship of collaborative research-laboratory setting working on a substantive applied quantitative project with significant statistical content.

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<th>Term</th>
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<tbody>
<tr>
<td>0101</td>
<td>Konstantina Trivisa</td>
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Seats (Total: 10, Open: 9, Waitlist: 0)

Contact instructor or department for details.

**AMSC762**  
**Data Analysis Project**  
Credits: 1  
Grading Method: Regular  
This course cannot be used to meet any of the Applied Statistics Area’s seminar requirements. Offered yearly, required of and limited to MS non-thesis and doctoral students in Applied Statistics Area, for whom the resulting projects serve as a Qualifying Exam component. After 5-6 lectures or presentations on components of successful data analyses and write-ups, 3-4 sessions will discuss previous student project submissions. The culminating project, to be completed in a two week period between semesters, is an analysis and written report of one of three project choices made available each year to represent a spectrum of realistic applied statistical problems.

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<tbody>
<tr>
<td>0101</td>
<td>Konstantina Trivisa</td>
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</tbody>
</table>

Seats (Total: 20, Open: 20, Waitlist: 0)

Contact instructor or department for details.

Prerequisites: Oral and written communications skills are critical for the applied statistician. Limited to MS non-thesis and doctoral students in the Applied Statistics Area, for whom the resulting projects serve as a Qualifying Exam component.

**AMSC799**  
**Master's Thesis Research**  
Credits: 1-6  
Grading Method: Regular, Sat-Fail  
Contact department for information to register for this course.
AMSC808A  Advanced Topics in Applied Mathematics
Credits: 1-3  Grading Method: Regular, Audit

Advanced topics of current interest.
Contact department for information to register for this course.

AMSC808V  Advanced Topics in Applied Mathematics; Stochastic PDE
Credits: 1-3  Grading Method: Regular, Audit

Advanced topics of current interest.

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<thead>
<tr>
<th>Course</th>
<th>Instructor</th>
<th>Seats (Total: 25, Open: 20, Waitlist: 0)</th>
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<tbody>
<tr>
<td>0101</td>
<td>Tobias von Petersdorff</td>
<td>MWF 11:00am - 11:50am CHM 0124</td>
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</table>

AMSC898  Pre-Candidacy Research
Credits: 1-8  Grading Method: Regular, Sat-Fail
Contact department for information to register for this course.

AMSC899  Doctoral Dissertation Research
(Perm req)  Credits: 6  Grading Method: Regular, Sat-Fail
Contact department for information to register for this course.