

# Certificate in Scientific Computation and Data Sciences Course Requirements (2016–2018 Catalog)

## Policies and Procedures

- Total of 18 hours (six courses in sections II. – V. below) **must be completed with a grade of C- or higher.**
- No transfer credit or credit-by-exam may be used to fulfill certificate course requirements (except for prerequisite).
- Not all courses listed in this document are offered every semester. See UT course schedule for available class offerings.
- See SDS website for information on how to enroll and for more details about course and research project requirements: <http://stat.utexas.edu/undergraduate/certificate-in-scientific-computation>

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## I. Prerequisite Knowledge (choose one)

**Mathematics:** 408D Sequences, Series, and Multivariable Calculus, 408M Multivariable Calculus

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## II. Core Requirements

### A. Computer Programming (choose one)

**Statistics & Data Sciences:** 322 Intro to Scientific Programming

**Aerospace Engineering:** 301 Intro to Computer Programming

**Biomedical Engineering:** 303 Intro to Computing

**Computer Science:** 313E Elements of Software Design

**Electrical Engineering:** 312 Software Design & Implementation

**Geological Sciences:** 325J Programming in FORTRAN & MATLAB

### B. Mathematics (choose one)

**Statistics & Data Sciences:** 329C Practical Linear Algebra I

**Mathematics:** 427K Advanced Calculus for Applications, 340L Matrices & Matrix Calculations, 341 Linear Algebra & Matrix Theory, 362M Intro to Stochastic Processes

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## III. Scientific Computing Courses (choose two categories and take one in each)

### A. Numerical Methods

**Statistics & Data Sciences:** 335 Scientific & Technical Computing

**Aerospace Engineering:** 211K Engineering Computation

**Civil Engineering:** 379K Computer Methods for Civil Engineering

**Chemical Engineering:** 348 Numerical Methods in Chemical Engineering

**Computer Science:** 323E Elements of Scientific Computing, 323H Scientific Computing-Honors, 367 Numerical Methods

**Mathematics:** 348 Scientific Computation in Numerical Analysis, 368K Numerical Methods for Applications

### B. Statistical Methods

**Statistics & Data Sciences:** 325H Honor Statistics, 328M Biostatistics

**Biomedical Engineering:** 335 Engineering, Probability, & Statistics

**Economics:** 329 Economic Statistics

**Electrical Engineering:** 351K Probability & Random Processes

**Mathematics:** 358K Applied Statistics, 378K Intro to Mathematical Statistics

**Mechanical Engineering:** 335 Engineering Statistics

### C. Other Computing Topics

**Statistics & Data Sciences:** 329D Practical Linear Algebra II, 374C Parallel Computing, 374D Distributed & Grid Computing for Sci. & Engineers, 374E Visualization & Data Analysis

**Computer Science:** 324E Elements of Graphics & Visualization, 327E Elements of Databases, 329E Topics in Elements of Computing\*, 377 Principles & Applications of Parallel Programming

*\*Topics courses must be approved by the faculty committee. See SDS website for details on approval process.*

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**Mathematics:** 346 Applied Linear Algebra, 362M Introduction to Stochastic Processes, 368K Numerical Methods for Applications, 372K PDE & Applications, 376C Methods of Applied Mathematics

**Mechanical Engineering:** 367S Simulation Modeling

**Management Information Systems:** 325 Database Management

**Neuroscience:** 366M Quantitative Methods

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#### IV. Applied Computing Courses (choose one)

**Aerospace Engineering:** 347 Intro to Computational Fluid Dynamics

**Biology:** 321G Intro to Computational Bio, 377J Computational Biology Lab

**Computer Science:** 329E Topics in Elements of Computing\*

**Chemistry:** 368 Advanced Topics in Chemistry

**Biomedical Engineering:** 341 Engineering Tools for Computational Genomics Lab, 342 Computational Biomechanics, 346 Computational Structural Biology, 377T Topics in Biomedical Engineering\*

**Economics:** 363C Computational Economics

**Electrical Engineering:** 361M Introduction to Data Mining

**Finance/Statistics (IROM):** 372.6/372 Optimization Methods in Finance

**Geological Sciences:** 325K Computational Methods in Geological Sciences

**Mathematics:** 375T Topics in Mathematics\*, 374M Mathematical Modeling in Science & Engineering

**Physics:** 329 Introduction to Computational Physics

*\*Topics courses must be approved by the faculty committee. See SDS website for details on approval process.*

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#### V. Research Project (One course to reach 18 total hours for certificate)

**Statistics & Data Sciences:** 379R, 479R Undergraduate Research

Work with a faculty supervisor on an original research project that is presented in a research paper. Topics must be approved by SDS Faculty Committee prior to enrollment. Students are responsible for finding their own faculty supervisor. See our website or more information