The University of Texas at Austin
Department of Statistics and Data Sciences
College of Natural Sciences

# Certificate in Scientific Computation and Data Sciences Course Requirements (2022–2024 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

## I. Prerequisite Knowledge (choose one)

**Mathematics**: 408D Multivariable Calculus, 408M Multivariable Calculus

## 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
**Computational Engineering**: 301 Intro to Computer Programming, 322 Scientific Computation
**Computer Science**: 303E Elements of Computers and Programming, 313E Elements of Software Design
**Electrical Engineering:** 312/H Software Design and Implementation/Honors
**Geological Sciences**: 325J Programming in FORTRAN and MATLAB

### B. Mathematics (choose one)

**Statistics & Data Sciences**: 329C Practical Linear Algebra I
**Mathematics**: 340L Matrices and Matrix Calculations, 341 Linear Algebra & Matrix Theory, 372K Partial Differential Equations and Applications

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

### A. Numerical Methods

**Statistics & Data Sciences**: 335 Scientific and Technical Computing
**Biomedical Engineering**: 313L Intro to Numerical Methods
**Chemical Engineering**: 348 Numerical Methods in Chemical Engineering and Problem Solving
**Computational Engineering**: 311K Engineering Computation
**Computer Science**: 323E/H Elements of Scientific Computing/Honors, 367 Numerical Methods
**Mathematics**: 348 Scientific Computation in Numerical Analysis, 368K Numerical Methods for Applications
**Petroleum and Geosystems Engineering**: 310 Formulation and Solution of Geosystem Engineering Problems

### B. Statistical Methods

**Statistics & Data Sciences**: 325H Honor Statistics, 320E Elements of Statistics, 328M Biostatistics
**Biomedical Engineering**: 335 Engineering, Probability, and Statistics
**Economics**: 329 Economic Statistics
**Electrical Engineering**: 351K Probability and 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 and Grid Computing, 374E Visualization & Data Analysis
**Biomedical Engineering**: 350 Computational Methods for Biomedical Engineers
**Chemistry**: 354M Intro to Comp Methods in Chemistry
**Computer Science**: 324E Elements of Graphics and Visualization, 327E Elements of Databases, 329E Topics in Elements of Computing*, 377 Principles and 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, 376C Methods of Applied Mathematics
**Mechanical Engineering**: 367S Simulation Modeling
**Management Information Systems**: 325 Database Management
**Neuroscience**: 366M Quantitative Methods

## IV. Applied Computing Courses (Choose one)

**Statistics & Data Sciences**: 322E Elements of Data Science, 348 Computation Biology & Bioinformatics
**Finance/Statistics (IROM):** 372.6 Optimization Methods in Finance
**Aerospace Engineering**: 347 Intro to Computational Fluid Dynamics
**Biochemistry**: 339N Systems Biology & Bioinformatics
**Biology**: 321G Intro to Computational Bio
**Biomedical Engineering**: 342 Biomechanics of Human Movement, 346 Computational Biomolecular Engineering, 377T Topics in Biomedical Engineering*
**Computer Science**: 324E Elements of Graphics and Visualization, 329E Topics in Elements of Computing*
**Chemistry**: 368 Advanced Topics in Chemistry*
**Economics**: 363C Computational Economics
**Electrical Engineering**: 379K Topics in Electrical Engineering*
**Geological Sciences**: 325K Computational Methods in Geological Sciences
**Linguistics**: 350 Special Topics in the Study of Linguistics*
**Mathematics**: 375T Topics in Mathematics*, 374M Mathematical Modeling in Science and Engineering
**Physics**: 329 Introduction to Computational Physics

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

**Statistics & Data Sciences**: 379R 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 for more information.