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 Differential & Integral 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.

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.