Area A -- Approved Course List

(For doctoral students - at least 6 credit hours of Area A course work must be earned in courses listed or cross-listed with the Math department.)

Course Title	Course #	Last offered
Advanced Theory of Finite Element Methods	CSE 393H, E M 394H	Spring 2023
Advanced Topics in Estimation Theory	ASE 381P.7	Fall 2023
Algebraic Geometry	M 392C*	Fall 2024
Algebraic Topology	M 382C	Fall 2024
Analytical Methods I	ASE 380P.1, E M 386K	Fall 2024
Analytical Methods II	ASE 380P.2, E M 386L	Spring 2025
Applied Probability	ORI 390R.1	Fall 2024
Bayesian Deep Learning	STA 380†	Fall 2019
Bayesian Statistical Methods	SDS 384.7†	Spring 2025
Combinatorics and Graph Theory	C S 388C	Fall 2024
Complex Analysis	CSE 385S, M 381D	Spring 2025
Computational & Variational Methods for Inverse Problems	CSE 393P, M E 397*, GEO 391*, ORI 397*	Spring 2025
Convex Optimization	ECE 381K.18	Fall 2024
Deep Learning I	M 393C*	Fall 2022
Deep Learning II	M 393C*	Spring 2023
Design & Analysis of Experiments	CSE 384U, M 384E, SDS 384.6	Spring 2025
Differential Geometry	M 392C*	Fall 2021
Differential Topology	M 382D	Spring 2025
Fast Algorithms: Theory & Practice	CSE 393*, M 397C*	Spring 2022
Foundational Techniques Machine Learning/Data Science	CSE 382M, M 393C*, C S 395T*	Spring 2025
Functional Analysis in Theoretical Mechanics	CSE 386M, E M 386M	Fall 2024
Geometric Foundations of Data Science	CSE 392*	Spring 2025
Geometric Methods in Data Science	CSE 392*, M 392C*	Fall 2021
Introduction Theo/Cmpt Mth Mach Learn	CSE 392*	Fall 2020
Large Scale Optimization II	ECE 381V*	Spring 2025
Linear Models	SDS 387	Fall 2024
Markov Chains & Mixing Time	M 393C*	Spring 2020
Math Statistics for Applics	STA 380.10*	Spring 2025
Mathematical Methods for Statistical Analysis	SDS 381†	Spring 2020
Mathematical Methods in Science & Engineering	CSE 386L, E M 386L, ASE 380P.2	Spring 2025
Mathematical Statistics I	CSE 384R, M 384C, SDS 384.2	Fall 2024
Mathematical Statistics II	CSE 384S, M 384D, SDS 384.3	Spring 2025
Mathematics in Deep Learning	M 393C*	Fall 2024
Methods of Applied Mathematics I	CSE 386C, M 383C	Fall 2024
Methods of Applied Mathematics II	CSE 386D, M 383D	Spring 2025
Methods of Mathematical Physics	M 393C*	Fall 2024
Methods of Mathematical Physics I	CSE 385M, PHY 381M	Fall 2024
Monte Carlo Methods in Statistics	SDS 386D†	Spring 2024
Nonlinear Optimization	ORI 397*	Fall 2021
Nonlinear Programming	ORI 391Q.1	Spring 2025

** Indicates topics course number. Topic title must match.*

† Indicates course may be counted as listed/cross-listed with Math dept

Area A -- Approved Course List

(For doctoral students - at least 6 credit hours of Area A course work must be earned in courses listed or cross-listed with the Math department.)

Course Title	Course #	Last offered
Optimal Control Theory	ASE 381P.3	Spring 2025
Partial Differential Equations I	CSE 396.1, M 393C*	Fall 2024
Partial Differential Equations II	CSE 396*, M 393C*	Spring 2025
Predictive Machine Learning	CSE 392*, M 393C*, C S 395T*	Spring 2025
Probability & Stochastic Processes I	ECE 381J	Fall 2024
Randomized Algorithms	C S 388R	Fall 2023
Real Analysis	CSE 385R, M 381C	Fall 2024
Regression Analysis	CSE 384T, M 384G, SDS 384.4	Fall 2024
Statistical Estimation Theory	ASE 381P.6	Fall 2024
Statistical Methods I	SDS 380C†	Fall 2024
Statistical Methods II	SDS 380D†	Spring 2025
Statistical Modeling I	SDS 383C†	Fall 2024
Statistical Modeling II	SDS 383D†	Spring 2025
Statistical Models for Big Data	SDS 385*†	Fall 2022
Stochastic Processes I	CSE 394.1, M 394C*	Fall 2024
Theoretical Foundations of Reinforcement Learning Algorithms	ASE 389*	Spring 2025
Theoretical Statistics	SDS 384.11†	Spring 2025
Theory of Probability I	CSE 384K, M 385C	Fall 2024
Theory of Probability II	CSE 384L, M 385D	Spring 2025
Understanding Inversion & Machine Learning	CSE 397, E M 397	Fall 2018

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† Indicates course may be counted as listed/cross-listed with Math dept

Area B -- Approved Course List

Course name	Course #	Last offered
Advanced Numerical Methods - Theory & Practice	M E 397*	Spring 2022
Advanced Theory of Finite Element Methods	CSE 393H, E M 394H	Spring 2023
Algorithms: Techniques & Theory	C S 388G	Spring 2025
Autonomous Robots	C S 393R	Spring 2024
Bayesian Methods: Machine Learning	STA 380*	Spring 2018
Bayesian Statistical Methods	SDS 384.7	Spring 2025
Bootstrap Statistics	NEU 384C	Spring 2020
Boundary Element Methods	C E 380P.4	Fall 2024
Comp PDE-Constrnd Bayesian Inv	CSE 397*, E M 397*	Fall 2018
Comp Stat Appl in Data Sci	C S 395T*	Spring 2020
Compilers	C S 380C	Spring 2025
Computational & Variational Methods for Inverse Problems	CSE 393P, M E 397*, GEO 391*, ORI 397*	Spring 2025
Computational Methods in Radiation Transport	CSE 397*, M E 388F	Fall 2020
Computational Physics	PHY 381C	Fall 2024
Computer Graphics	CSE 382G, C S 384G	Spring 2025
Continuous Algorithms	C S 395T*	Spring 2025
Convex Optimization	ECE 381K.18	Fall 2024
Convex Optimization Theory	ECE 381V*	Fall 2015
Data Mining	ECE 380L.10	Fall 2021
Data Mining: A Mathematical Perspective	C S 391D	Spring 2020
Data-Driven Algorithm Design	C S 388D	Fall 2023
Fast Algorithms: Theory & Practice	CSE 393*, M 397C*	Spring 2022
Fast Methods in Scientific Computing	M 393C*	Spring 2019
Finite Element Method in Geophysics	GEO 384F	Fall 2022
Finite Element Methods	CSE 393F, E M 394F, ASE 384P.4	Fall 2023
Foundational Techniques Machine Learning/Data Science	CSE 382M	Spring 2025
Foundations of Computational Fluid Dynamics	ASE 382Q.11	Spring 2025
Geometric Foundations of Data Science	CSE 392*	Spring 2025
Geometric Methods in Data Science	CSE 392*, M392C*	Fall 2021
Geophysical Time Series Analysis	GEO 384R	Spring 2016
Introduction Theo/Cmpt Mth Mach Learn	CSE 392*	Fall 2020
Introduction to Applied Harmonic Analysis	M 393C*	Fall 2016
Introduction to Machine Learning	E M 397*	Fall 2024
Large Scale Optimization II	ECE 381V*	Spring 2025
Learning for Dynamics and Control	ASE 389*	Fall 2023
Learning-Based Optimal Control	ECE 381V*	Fall 2024
Linear Programming	ORI 391Q.5	Fall 2024
Machine Learning	C S 391L	Spring 2025
Mathematics in Deep Learning	M 393C*	Fall 2024
Monte Carlo Methods in Statistics	SDS 386D	Spring 2024
Multicore Computing	ECE 382C.12	Spring 2022
Multiscale Methods in Computational Fluid Dynamics	CSE 397.1	Spring 2025
Multiscale Modeling & Computation	M 393C*	Fall 2017
Neural Computation	C S 395T*	Spring 2021
Neural Networks	NEU 394N, NEU 394P*, C S 394N	Fall 2024
Nonlin Stat/Dyn Fin Elem Anly	CSE 397.2	Fall 2024

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Area B -- Approved Course List

Course name	Course #	Last offered
Nonlinear Optimization	ORI 397*	Fall 2021
Nonlinear Programming	ORI 391Q.1	Spring 2025
Numerical Analysis: Differential Equations	CSE 383L , M 387D	Spring 2025
Numerical Analysis: Algebra & Approximation	CSE 383K , M 387C	Fall 2024
Numerical Analysis: Linear Algebra	CSE 383C, C S 383C, M 383E	Fall 2024
Numerical Optimization: Graphics/AI	C S 395T*	Spring 2024
Optimization Under Uncertainty	ORI 391Q.17	Spring 2023
Optimization: Theory & Practice	CHE 385P, CHE 384T	Spring 2025
Parallel Algorithms	C S 388P	Fall 2016
Parallel Algorithms for Scientific Computing	CSE 392.1, C S 395T*	Spring 2024
Parallel Computing for Science & Engineering	SDS 394C or CSE 392*	Spring 2025
Physical Simulation of Computer Graphics	CSE 392*, C S 384P	Spring 2025
Predictive Computational Science Foundations	CSE 397*	Spring 2020
Predictive Machine Learning	CSE 392*, M 393C*, C S 395T*	Spring 2025
Randomized Algorithms	C S 388R	Fall 2024
Reinforcement Learning: Theory and Practice	C S 394R, ECE 381V*	Spring 2024
Scientific & Technical Computing	SDS 394	Fall 2023
Scientific Computing in Machine & Deep Learning	CSE 392*	Fall 2024
Special Topics in Machine Learning	ECE 381V*	Fall 2021
Statistical & Discrete Methods for Scientific Computing	CSE 383M	Spring 2020
Stochastic Sys, Estimation, and Control	M E 384Q.7	Spring 2025
Sublinear Algorithms	C S 390S	Fall 2024
The Finite Element Method	CSE 393.1, C E 381R	Fall 2024
Tools & Techniques of Computational Science	CSE 380	Fall 2024
Understanding Inversion & Machine Learning	CSE 397*, E M 397*	Fall 2018
Validation & Uncertainty Quantification in Computational Models	CSE 397.3	Fall 2024
Verif & Synthesis for Cyberphys Sys	C S 395T*, ASE 396*	Fall 2024

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Area C -- Approved Course List

Course name	Course #	Last offered
3D Remote Sensing Anlytics/App	ASE 389*	Fall 2021
Acoustics I	M E 384N.1	Fall 2024
Acoustics II	M E 384N.2	Spring 2025
Advanced Combustion	M E 382R.5	Spring 2022
Advanced Dynamics	E M 381	Spring 2025
Advanced Numerical Methods - Theory & Practice	M E 397*	Spring 2022
Advanced Petrophysics	PGE 381L	Fall 2024
Advanced Physical Chemistry	CH 382M	Spring 2024
Advanced Physical Chemistry: Intro to Quantum Mechanics	CH 382K	Fall 2024
Advanced Physical Chemistry: Statistical Mechanics	CH 382L	Fall 2024
Advanced Problems in Compressible Flow	ASE 382Q.7	Fall 2024
Advanced Reservoir Engineering	PGE 388	Fall 2024
Advanced Thermodynamics	CHE 387K	Fall 2024
Advanced Thermodynamics & Phase Behavior	PGE 384	Spring 2023
Applied Orbital Mechanics†	ASE 366L	Spring 2023
Applied Reservoir Characterization	PGE 383.58	Spring 2015
Applied Stochastic Processes	ORI 390R.5	Spring 2025
Astrophysical Gas Dynamics	AST 382C, PHY 396T*	Fall 2024
Autonomous Robots	C S 393R	Spring 2024
Biodesign: Innov/Design I	BME 385J*	Spring 2022
Biodesign: Needs Identification	BME 385J*	Fall 2021
Bioinformatics	BCH 394P	Spring 2025
Biomechanics of Tissues, Scaffolds, and Cells	CSE 397.5	Fall 2023
Biomed Imaging Signals & Systems	BME 381J.3, E E 385J.18	Fall 2024
Biostatistics, Study Design, & Research Methodology	BME 380J.5	Spring 2024
Brain Computer Interaction	ECE 385V*	Fall 2020
Brain Connectivity	PSY 381D*	Spring 2019
Cell Biology	BIO 395H, CH 395H, MOL 395H	Spring 2022
Cellular and Molecular Biomechanics	BME 382J.7	Spring 2025
Classical Mechanics	PHY 385K	Spring 2025
Climate System Modeling	GEO 387G	Fall 2024
Computational & Variational Methods for Inverse Problems	CSE 393P, M E 397*, GEO 391*, ORI 397*	Spring 2025
Computational Bio & Bioinformatics	SDS 385*	Spring 2021
Computational Electromagnetics	ECE 383V*	Spring 2015
Computational Materials Science and Engineering	M E 397*	Spring 2023
Computational Methods for Biomedical Engineers	BME 383J.9	Fall 2023
Computational Methods in Radiation Transport	CSE 397*, M E 388F	Fall 2020
Computational Modeling in Bioengr & Medicine	CSE 397*, BME 385J*	Spring 2019
Computational Modeling of the Cardiovascular System	CSE 397*	Fall 2020
Continuum Mechanics	E M 384K	Fall 2024
Density Functional Theory	PHY 392Q	Fall 2023
Dynamics of Atmospheres & Oceans	GEO 387F	Spring 2020
Dynamics of Turbulent Flow	M E 381P.3	Spring 2025
Electromagnetic Field Theory	ECE 383L	Fall 2023
Electromagnetic Theory I	PHY 387K	Spring 2025
Elements of Cosmology	AST 396C	Fall 2023

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Area C -- Approved Course List

Course name	Course #	Last offered
Environmental Fluid Mechanics	C E 380S	Spring 2025
Evolution of Reef Ecosystems	GEO 389E	Fall 2024
Financial Mathematics for Actuarial Applications	M 389W	Fall 2022
Financial Risk Management	FIN 397.4	Fall 2023
Finite Element Method in Geophysics	GEO 384F	Fall 2022
FMRI Brain Decoding	NEU 394P*	Spring 2018
Foundations of Computational Fluid Dynamics	ASE 382Q.11	Spring 2025
Foundations of Fluid Mechanics	ASE 382Q.1	Fall 2024
Fracture Mechanics	E M 388F	Spring 2025
Fundamentals of Biomedical Optical Imaging	BME 381J.9	Fall 2024
Fundamentals of Combustion	M E 382R.1	Fall 2024
Fundamentals of Ecology	BIO 390E	Fall 2024
Fundamentals of Enhanced Oil Recovery I	PGE 387K	Spring 2024
Fundamentals of Incompressible Flow	M E 381P.1	Fall 2024
Genetics	BIO 395F, CH 395F, MOL 395F	Spring 2024
Genomic Signal Proc & Data Science	ECE 381V*	Spring 2022
Intro to Computational Oncology	CSE 397.6	Spring 2025
Intro to Mathematical Modeling in Science & Engineering I	CSE 389C	Fall 2024
Intro to Mathematical Modeling in Science & Engineering II	CSE 389D	Spring 2025
Introduction to System Theory	ECE 380K	Spring 2016
Inverse Theory	GEO 384M	Fall 2024
Linear Systems Analysis	ASE 381P.1	Fall 2024
Machine Learning	C S 391L	Spring 2025
Machine Learning Applications	GEO 391*	Spring 2023
Machine Learning: Large-Scale Data	ECE 381V*	Spring 2016
Many-Body Theory	PHY 392N	Spring 2025
Markov Decision Process	ORI 390R.16	Spring 2023
Mathematical Physiology	CSE 397.9	Spring 2025
Mathematics in Finance	R M 391*	Spring 2021
Methods in Orbit Determination	ASE 389P.4	Spring 2025
Micromechanics	E M 388M	Fall 2021
Mod Flow/Trans in Porous Media	GEO 391*	Fall 2018
Modeling & Simululation Cardiac Function	CSE 397*	Spring 2017
Molecular Gas Dynamics	ASE 382R.6	Fall 2024
Molecular Gas Dynamics II	ASE 382R*	Spring 2025
Morphodynam/Quant Stratigraphy	GEO 391*	Fall 2018
Multidimensional Data Analysis in Geosciences	GEO 384H	Spring 2025
Multiscale Methods in Computational Fluid Dynamics	CSE 397.1	Spring 2025
Multiscale Nanomechanics	M E 397*	Fall 2024
Natural Language Processing	C S 388	Spring 2025
Neural Computation	C S 395T*	Spring 2021
Neural Dynamics & Information Theory	M 393C*	Fall 2023
Neural Engineering	ECE 385J.1	Spring 2025
Neural Networks	NEU 394N, NEU 394P*, C S 394N	Fall 2024
Nonlin Stat/Dyn Fin Elem Anly	CSE 397.2	Fall 2024
Nonlinear Acoustics	M E 384N.4	Spring 2025

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Area C -- Approved Course List

Course name	Course #	Last offered
Nuclear Reactor Theory I	M E 388D	Fall 2024
Numerical Modeling in the Geosciences	GEO 398M	Spring 2025
Numerical Simulation of Reservoirs	PGE 392K	Fall 2023
Optimal Control Theory	ASE 381P.3	Spring 2025
Physical Climatology	GEO 387H	Fall 2023
Physical Hydrology	GEO 382S	Fall 2024
Physical Oceanography	GEO 382P	Spring 2023
Physical Simulation of Computer Graphics	C S 384P	Spring 2025
Plasma and Reactive Flows	ASE 382Q.10	Spring 2025
Plasma Physics I	PHY 380L	Spring 2025
Predictive Computational Science Foundations	CSE 397*	Spring 2020
Principles of Neuroscience I	NEU 382T	Fall 2024
Quantum Field Theory I	PHY 396K	Fall 2024
Quantum Mechanics I	PHY 389K	Spring 2025
Reactive Flow in Porous Media	GEO 391*	Spring 2016
Relativity Theory I	PHY 387M	Fall 2024
Research in Computational Linguistics	LIN 389C	Spring 2025
Robot Learning	C S 391R	Fall 2024
Scalable Machine Learning	C S 395T*	Fall 2015
Seismic Data Processing	GEO 384S	Spring 2024
Seismology II	GEO 380F	Fall 2022
Seismology III	GEO 390D	Fall 2022
Semiconductor Physics	ECE 396K.2	Spring 2025
Solid Mechanics I	ASE 384P.1	Fall 2024
Solid Mechanics II	E M 388L, ASE 384P.2	Spring 2025
Solid-State Physics I	PHY 392K	Spring 2025
Solid-State Physics II	PHY 392L	Fall 2024
Solid-State Physics: Biophysics	PHY 392T*	Fall 2021
Spacecraft Dynamics†	ASE 366K	Spring 2025
Statistical Mechanics	PHY 385L	Spring 2025
Stochastic Hydrology	C E 385S	Fall 2024
Structural Dynamics	E M 384L, ASE 384P.3	Spring 2024
Structured Models for NLP	C S 395T*	Fall 2017
Systems Modeling	ORI 390Q.8	Spring 2023
Theory of Plasticity	E M 380	Spring 2024
Thermodynamics of Geologic Processes	GEO 390M	Spring 2025
Transport Phenomena	PGE 381M	Fall 2024
Uncertainty Quantification	ASE 389*	Spring 2024
Uncertainty Quantification	GEO 391*	Spring 2015
Underwater Acoustics	M E 384N.5	Fall 2024
Vision Systems	NEU 380E	Fall 2022
Wave Propagation I	E M 394V	Spring 2018

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