COMPUTATIONAL SCIENCE & ENGINEERING MINOR

for the Minor in Computational Science & Engineering

College: Engineering (https://engineering.illinois.edu)
webpage: Computational Science & Engineering Minor (https://cse.illinois.edu/cse-educational-programs/undergraduate-minor)

Code	Title	Hours
Core Courses		9
Programming		
CS 101	Intro Computing: Engrg & Sci	3
CS 125	Intro to Computer Science	4
CS 225	Data Structures	4
ECE 220	Computer Systems & Programming	4
LING 402	Tools & Tech Spch & Lang Proc	3
Applied Math		
ECE 493	Advanced Engineering Math	3 or 4
MATH 441	Differential Equations	3 or 4
or MATH 44	Intro Partial Diff Equations	
or MATH 48	Dynamics & Differential Eqns	
MATH 415	Applied Linear Algebra	3 or 4
MATH 444	Elementary Real Analysis	3 or 4
or MATH 44	Real Variables	
MATH 446	Applied Complex Variables	3 or 4
or MATH 448	Complex Variables	
MATH 482	Linear Programming	3 or 4
or MATH 48	Nonlinear Programming	
STAT 408	Actuarial Statistics I	4
or STAT 409	Actuarial Statistics II	
or STAT 410	Statistics and Probability II	
or STAT 420	Methods of Applied Statistics	
or STAT 430	Topics in Applied Statistics	
or MATH 461	Probability Theory	
Computational Methods		
CS 411	Database Systems	3 or 4
CS 450	Numerical Analysis	3 or 4
or CSE 401	Numerical Analysis	
CS 466	Introduction to Bioinformatics	3 or 4
ECE 448	Artificial Intelligence	3 or 4
GEOG 489	Programming for GIS	4
LING 402	Tools & Tech Spch & Lang Proc	3
STAT 440	Statistical Data Management	3 or 4
TAM 470	Computational Mechanics	3 or 4
or CSE 450	Computational Mechanics	
Application Coursework/Computing Elective		9
OPTION 1		
Three 400-level CSE courses; see list below:		
Core Courses:		
CSE 401	Numerical Analysis	3 or 4
CSE 402	Parallel Progrmg: Sci & Engrg	3 or 4
CSE 408	Applied Parallel Programming	4
CSE 510	Numerical Methods for PDEs	4
CSE 527	Scientific Visualization	4
Computing Electives. Courses below are topically organized and are cross listed with many departments. Double counting from Core courses and application courses is not allowed. Choose Option 1 or Option 2 below.		
Option 1		
Biological, Chemical and Atmospheric Sciences:		
CHEM 576	Computational Chemical Biology	4
CS 466	Introduction to Bioinformatics	3 or 4
CEE 534	Surface Water Quality Modeling	4
CEE 557	Groundwater Modeling	4
CSE 566	Numerical Fluid Dynamics	4
CHEM 550	Advanced Quantum Dynamics	4
Computer Software, Hardware and Graphics		
CSE 402	Parallel Progrmg: Sci & Engrg	3 or 4
CSE 422	Computer System Organization	3 or 4
CSE 423	Operating Systems Design	3 or 4
CSE 426	Software Engineering I	3 or 4
CSE 427	Interactive Computer Graphics	3 or 4
CSE 429	Software Engineering II	3 or 4
CSE 521	Computer Architecture	4
CSE 522	Parallel Computer Architecture	4
CSE 527	Scientific Visualization	4
Electronics and Electromagnetics:		
CSE 530	Computational Electromagnetics	4
CSE 532	Numerical Circuit Analysis	4
Fluid Mechanics		
CSE 450	Computational Mechanics	3 or 4
CSE 461	Computational Aerodynamics	3 or 4
CSE 560	Computational Fluid Mechanics	4
CSE 561	Computational Process Modeling	4
CSE 566	Numerical Fluid Dynamics	4
CSE 412	Numerical Thermo-Fluid Mechs	2 to 4
Numerical Computing:		
CSE 401	Numerical Analysis	3 or 4
CSE 414	Algorithms	4
CSE 441	Introduction to Optimization	3 or 4
CSE 510	Numerical Methods for PDEs	4
CSE 511	Iterative & Multigrid Methods	4
CSE 512	Parallel Numerical Algorithms	4
CSE 513	Topics in Numerical Analysis	4
CSE 515	Algorithms	4
CS 598	Special Topics (Integral Equation and Fast Algorithms)	2 to 4
CSE 517	Adv Finite Element Methods	4
CSE 553	Computational Inelasticity	4
Other Related Fields:		
TAM 598	Advanced Special Topics (Uncertainty Quantification)	1 to 4

CS 598	Special Topics (Integeral Equations and Fast Methods)	2 to 4
CEE 528	Construction Data Modeling	4
ASTR 510	Computational Astrophysics	4
Physics and Materials Science:		
CSE 485	Atomic Scale Simulations	3 or 4
MSE 498	Special Topics (Atomic Scale Simulations)	1 to 4
AE 598	Special Topics (Mult-scale Modeling of Materials)	1 to 4
Power Systems, Control and Signal and Image Processing:		
CSE 441	Introduction to Optimization	3 or 4
CSE 543	Topics in Image Processing	4
ECE 513	Vector Space Signal Processing	4
ECE 558	Digital Imaging	4
Solid Mechanics:		
CSE 450	Computational Mechanics	3 or 4
CSE 451	Finite Element Analysis	3 or 4
CSE 517	Adv Finite Element Methods	4
CSE 551	Finite Element Methods	4
CSE 552	Nonlinear Finite Elements	4
ME 570	Nonlinear Solid Mech Design	4
TAM 598	Advanced Special Topics (Computational Nonlinear Dynamics)	1 to 4
Statistics and Data Sciences:		
CSE 428	Statistical Computing	3 or 4
CSE 440	Statistical Data Management	3 or 4
CSE 448	Advanced Data Analysis	4
CSE 525	Computational Statistics	4
STAT 530	Bioinformatics	4
CSE 542	Statistical Learning	4
STAT 430	Topics in Applied Statistics (Big Data Analysis Foundation; Basics of Statistical Learning)	3 or 4
STAT 432	Basics of Statistical Learning	3 or 4
CS 412	Introduction to Data Mining	3 or 4
CS 410	Text Information Systems	3 or 4
OPTION 2		
Two 400-level CSE courses listed above AND an independent study on a computational topic. In order for an independent study to fulfill the minor requirement, the student must conduct the undergraduate research with one of the CSE affiliated faculty.		