## UNDERGRADUATE ELECTIVES FOR CS MAJORS - PITTSBURGH

### PROBABILITY
- 21325: Probability
- 36217: Probability Theory and Random Processes (for CS students entering CMU prior to 2017)
- 36218: Probability Theory for Computer Scientists (for CS students entering CMU in 2017 or later)
- 36225: Introduction to Probability Theory (+ 36226 for prob. category credit for students entering 2017 or later)

### ALGORITHMS AND COMPLEXITY
- 15354*: Computational Discrete Mathematics
- 15455*: Undergraduate Complexity Theory
- 21301: Combinatorics

### LOGIC & LANGUAGES
- 15312*: Foundations of Programming Languages
- 15317*: Constructive Logic
- 15414*: Bug Catching: Automated Program Verification
- 15424*: Foundations of Cyber-Physical Systems
- 21300: Basic Logic (for CS students entering CMU prior to 2017)
- 80310: Formal Logic (for CS students entering CMU prior to 2017)

### SYSTEMS
- 15410*: Operating System Design and Implementation
- 15411*: Compiler Design
- 15418*: Parallel Computer Architecture and Programming
- 15440*: Distributed Systems
- 15445*: Database Systems (NEW)

### APPLICATIONS/DOMAINS
- 02510*: Computational Genomics (for students entering CMU prior to 2017) (for students entering CMU in 2017 or later, 02510 counts as an SCS elective only)
- 05391*: Designing Human Centered Software
- 10601*: Introduction to Machine Learning (Master's) (for students entering CMU prior to 2017) (for students entering CMU in 2017 or later, they should take 10-401 when it is offered in Spring 2019)
- 11411*: Natural Language Processing
- 15322*: Introduction to Computer Music
- 15381*: Artificial Intelligence: Representation and Problem Solving
- 15462*: Computer Graphics
- 16384*: Robot Kinematics and Dynamics
- 17313*: Foundations of Software Engineering

## SCS UNDERGRADUATE ELECTIVES (in addition to SCS courses marked * above)
- 02319: Genomics and Epigenetics of the Brain
- 02512: Computational Methods for Biological Modeling and Simulation
- 02518: Computational Medicine
- 05392: Interaction Design Overview
- 05410: User-Centered Research and Evaluation
- 05413: Human Factors
- 05430: Programming Usable Interfaces
- 05432: Personalized Online Learning
- 05452: Service Design
- 05499: Special Topics in HCI (Human AI Interaction, Document Design, Transformational Game Design Studio, Persuasive Design, Computing For Good)
- 11344/05434: Machine Learning in Practice
- 11421: Grammars and Lexicons
- 11441: Machine Learning for Text Mining
- 11442: Search Engines
- 11492: Speech Processing
- 15294: Rapid Prototyping Technologies [IDEATE Course] [Mini-1: 5 units]**
- 15295: Competition Programming and Problem Solving [5 units]**
- 15319: Cloud Computing
- 15394: Intermediate Rapid Prototyping [IDEATE Course] [Mini-2: 5 units]**
- 15412: Operating System Practicum
- 15463: Computational Photography
- 15466: Computer Game Programming
- 15483: Truth, Justice and Algorithms
- 15487: Introduction to Computer Security (NEW NUMBER COMING)
- 15503: Introduction to Cryptography
- 15539: Independent Study in Computer Science Pedagogy
- 16311: Introduction to Robotics
- 16362: Mobile Robot Algorithms Laboratory
- 16375: Robotics for Creative Practice [IDEATE Course]
- 16425: Medical Image Analysis
- 16455: Human-Machine Virtuosity
- 17214: Principles of Software Construction: Objects, Design & Concurrency
- 17224: Influence, Persuasion, and Manipulation Online
- 17331: Information Security, Privacy and Policy
- 17356: Startup Engineering
- 17428: Machine Learning and Sensing
- 17437: Web Application Development

**NOTE: Courses less than 9 units should be paired together to form a full SCS elective of at least 9 units.**