**Computational Thought**
FRSEM-UA 385; class # 6784
Instructor: Dennis E. Shasha      [*syllabus*](http://cas.nyu.edu/docs/IO/29511/385.doc)
Monday, 2:00–4:30 p.m.
Required cohort meeting: Wednesday 3:30-4:30 p.m.

*Prerequisites: AP calculus, discrete mathematics, or programming experience*

Computational technology and methods lie at the core of modern science, commerce, entertainment, and, regrettably, war. There are very powerful ideas underlying the field that have roots in mathematics, linguistics, engineering, and even philosophy. Some of its greatest inventions were born in cafés or as responses to a puzzle. Some recent algorithmic methods come from studying ants and evolution. This course introduces computational thinking as it builds on logic, linguistics, heuristics, artificial intelligence, and biological computing. The learning style combines straight lecture, interactive discussions of puzzles and games, and short computer programs (in the programming language Python which you will learn). Students make a few presentations during the semester about topics such as the solutions to computationally motivated puzzles, the relative power of linguistic descriptions, and their very own simulations of either an auction or a multi-bank elevator. The goal is for students to learn to think about computation from multiple perspectives and to synthesize those perspectives when faced with unsolved challenges.

DENNIS SHASHA is Professor of Computer Science at the Courant Institute of New York University where he works with biologists on pattern discovery for network inference; with computational chemists on algorithms for protein design; with physicists and financial specialists on algorithms for time series; on clocked computation for DNA computing; and on computational reproducibility. Other areas of interest include database tuning as well as tree and graph matching. Because he likes to type, he has written six books of puzzles about a mathematical detective named Dr. Ecco, a biography about great computer scientists, and a book about the future of computing. He has also written five technical books about database tuning, biological pattern recognition, time series, DNA computing, statistics, and causal inference in molecular networks. He has co-authored over seventy journal papers, seventy conference papers, and twenty patents. Professor Shasha has also written the puzzle column for various publications including *Scientific American*.