The main objective is to expose students with a computational background to applications of computing in the sciences. Students will acquire basic practical skills to solve numerical problems that arise in various scientific disciplines such as in engineering, biology, chemistry, physics. Students will learn some of the classical methods to solve equations of different types (e.g., matrices, difference equations) by a computer. Fundamentals are taught, such as how to solve optimization problems, linear algebra equations, differential equations. Applications are demonstrated from various branches of the sciences.

Course include introduction to optimization, Steepest-Descent, Conjugate-Gradients, Stochastic algorithms; introduction to computational linear algebra, Gaussian-Elimination, norms and condition number, iterative methods, SVD; introduction to numerical methods for differential equations, finite difference, finite element; applications in fields such as image processing/computer vision and computational biology for demonstration.