

3. Project Summary

Many computer science (CS) majors at less selective colleges and universities start their mathematics coursework with pre-calculus or even college algebra. These students too often fail introductory CS because they lack the mathematical knowledge and maturity to succeed, while their schools try to improve retention by de-emphasizing the mathematical foundations of CS. This project addresses these problems by supplementing the introductory CS sequence with selective coverage of the mathematical foundations of computer science. It targets students with poor preparation in mathematics, particularly minority, female, and rural students at regional institutions.

Mathematics courses alone cannot meet poorly prepared students' needs. The students do not make the connection between them and what they consider "real" computer science, lack the mathematical maturity to integrate the course content into their own understanding, and find the pace too fast to afford the review and practice that they need. To equip these students to handle a rigorous introduction to CS and to be well prepared for more advanced courses, this project will adapt successful curricular materials and practices to augment the treatment of mathematical foundations in introductory CS. We will assume only high school algebra; cover each topic in the context of its application to CS 1 and 2; and emphasize the incremental development and continual review of appropriate mathematical skills. By offering interactive lessons for asynchronous, on-line delivery, we will support individually tailored, self-paced learning, and minimize the impact on scarce lecture and closed laboratory time. We will provide support for students with discussion lists and help sessions staffed by undergraduate peer mentors, and for faculty with workshops and web-based resources.