

**Jeremy Wojdak**, Radford University, Radford, VA, USA  
Joel Hagen, Radford University, Radford, VA, USA  
Fred Singer, Radford University, Radford, VA, USA  
Jill Stewart, Radford University, Radford, VA, USA  
Juergen Gerlach, Radford University, Radford, VA, USA

**SUMS4BIO – Increasing quantitative sophistication across the undergraduate biology curriculum: horizontal and vertical integration across courses.**

Faculty in the Departments of Biology and Mathematics and Statistics at Radford University will cooperate in developing strategies and materials for improving the quantitative skills of biology students. This project targets students entering the major with at- or below-average SAT math scores (mean RU Math SAT score = 511, national average = 515) and mathematical deficiencies identified by the ALEKS assessment instrument. Twenty-eight percent of these students are first generation college students, 16 percent are minorities, and 23 percent receive Pell Grants. To meet the needs of this student population, faculty teams will develop two new courses: a freshman level Mathematics for Biology course and a sophomore level Statistics for Biology course. The two departments will closely link the Mathematics for Biology course with two introductory biology courses: Ecology & Adaptation and Introductory Seminar in Biology. Because these linked courses will involve eleven contact hours per week, students will learn and practice fundamental quantitative skills at a pace that will not be overwhelming, but will encourage breadth and depth of exposure. Teams of faculty will design interdisciplinary course modules to engage students in activities that place fundamental quantitative skills in biological context through lab and field experiments closely linked to topics covered in lecture and discussion. The two departments will explicitly link the new Statistics for Biology course to Organismal Biology taken during the second semester of the sophomore year. Through an intentional plan of vertical integration, students will later expand and further develop these basic skills in the remaining three courses of the biology core curriculum and in most elective courses. Students interested in professional careers in biology will use this foundation as a stepping-stone to calculus and other higher-level mathematics courses. Here we meet students at a relatively low level of skill development and then incrementally develop their quantitative skills to more sophisticated levels.