

The Wright State Model for Engineering Mathematics Education: Uncorking the Bottleneck to Student Success

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Abstract: The inability of incoming students to advance past the traditional freshman calculus sequence is a primary cause of attrition in engineering programs across the country. As a result, this presentation will describe an NSF funded initiative at Wright State University to redefine the way engineering mathematics is taught, with the goal of increasing student retention, motivation and success in engineering. The Wright State approach begins with the development of a novel first-year engineering mathematics course, EGR 101 “Introductory Mathematics for Engineering Applications.” Taught by *engineering* faculty, the course includes lecture, laboratory and recitation components. Using an application-oriented, hands-on approach, the course addresses only the salient math topics *actually used* in core engineering courses. These include the traditional physics, engineering mechanics, electric circuits and computer programming sequences. The EGR 101 course replaces traditional math prerequisite requirements for the above core courses, so that students can begin advancing in the engineering curriculum without first completing the required calculus sequence. The Wright State model concludes with a more just-in-time structuring of the traditional math sequence, in concert with college and ABET requirements. The result has shifted the traditional emphasis on math prerequisite requirements to an emphasis on *engineering motivation for math*. This presentation will provide an overview of the Wright State model for engineering mathematics education, followed by a longitudinal assessment of its impact on student performance, perception and retention - from first-year through graduation. In particular, results suggest that the introduction of EGR 101 and associated prerequisite changes have successfully mitigated the effect of incoming math preparation on student success in engineering across the entire range of incoming ACT math scores, which has more than *doubled* the average graduation rate of enrolled students. The presentation will also include a summary of more recent developments, including the introduction of EGR 199 as a precursor to EGR 101 for initially underprepared students, as well as the ongoing expansion of the program to the K-12 arena. The presentation will conclude with an overview of our current NSF funded programs, which have resulted in pilot adoption by dozens of institutions across the country, at both the university and community college levels.