

Bridge Courses in the United States

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The goal of this proposal is to research the existing literature, the conference presentations, and the approach taken by American universities when offering a "bridge course." We understand a "bridge course" as a class that is an introduction to proofs, and that marks the transition from the lower level undergraduate courses (Calculus, Differential Equations, Linear Algebra etc.) to the upper level courses (Real Analysis, Abstract Algebra etc.).

This effort is motivated in part by the interest to improve our own bridge course at the University of Arizona, Math 323 -Formal Mathematical Reasoning and Writing. This class, since its inception, has gained more importance than just a bridge course: it became for some majors (e.g., Mathematics Education) THE required upper division proof-oriented course. It has served to give many students, who do not require Real Analysis or Modern Algebra for graduation, a feeling for what "real mathematics" (proving things rigorously) is like.

Additionally, this course attempts to overcome basic misconceptions regarding numbers, algebra, and simple logic, which students moving into upper division mathematics courses still often have. (We refer here to such basic ideas as, if $a < b$ then it is not always true that $a^2 < b^2$.) The students perceive our Math 323 as their most difficult mathematics course, the grade received is typically the lowest of their studies, and a significant number have to repeat the class.

Here are some questions that we shall try to answer with our research. For the universities that offer a bridge course: what is its content, how is it taught, and where is it placed with respect to the other curriculum? For those that do not: how do they prepare mathematics majors for upper division courses? What has been published about bridge courses? How can we use our study to improve Math 323?

Initially, we will perform a simple literature search. Looking into resources used to teach bridge courses, any academic discussion about such courses, and any presentations in regard them. Next, we will specifically research how other departments around the country structure such courses, what material is meant to be taught in them, and where such a course falls in the regular curriculum of various types of math students. From there, a report will be written collecting the information, drawing conclusions, and proposing suggestions based on the research to improve our offering here at the University of Arizona.