

Everything you want to know
about bridge courses—except
whether they work.

*Preliminary findings from a
national survey*

(Slides for a talk given at the
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Idea for the survey

From catalogs, gather basic data about bridge courses, including

- How many US colleges/universities list a bridge course in their catalogs?
- How many US colleges/universities require a bridge course for the mathematics major?
- What are the most common topics listed in the catalog descriptions of bridge courses?

Real question: Do bridge courses work?

“Working” definition

- Students leave a bridge course recognizing the role and nature of proof in mathematics;
- students can write basic proofs properly;
- students write better proofs in their subsequent coursework; and
- students do all of that better than they would have “the old way,” before bridge courses.

Straw poll

List the 2 - 3 topics that you think are essential for a bridge course.

Topic

Your overall confidence level 1-10 (10 = high confidence) that proofs courses “work.” _____

Bridge Course Definition for the survey

Explicitly described as a bridge course **or** *two* of the following criteria are met:

- Catalog course description prominently mentions mathematical proofs.
- Catalog course description implies transition or bridge to advanced undergraduate courses.
- Catalog course title includes “proof” or the title is one commonly associated with bridge courses: “Transition to Higher Mathematics”, “Foundations of Mathematics”, “Fundamentals of Mathematics”,

And the title and primary course content is **not** discrete mathematics, linear algebra, real analysis, abstract algebra, geometry, or formal/symbolic logic.

Personal History of Bridge Courses

Pre-1983 Students expected to learn proof-writing by observation

May 1983 - Bucknell instituted Writing Across the Curriculum

Summer 1984 - Three courses became the department's "Writing within the Discipline" courses through the inclusion of explicit instruction in proof writing

Summer 1994 - Designed a bridge course for Bucknell to replace most of the proof writing instruction in the above three courses

Winter 1998 - Designed a bridge course for Western Oregon University.

Survey Methodology

From the 1,431 institutions on the AMS lists used for “Annual Survey of the Mathematical Sciences,” we randomly chose 20% from each category (Groups I, II, III, M, and B). (Discarded institutions without bachelors degrees in math.)

Searched catalogs for the desired information.

Recorded the information in a data base.

Results: Frequency

Bridge course in catalog	39.6%
Bridge course required for major	32.6%
No bridge, but discrete w/ proofs	22.0%
Discrete w/ proofs required	16.3%
No bridge, no discrete, but some other w/ proofs	15.9%
Some other w/ proofs required	9.8%

Results: Topics

Set Theory	83.5%
Logic	78.3%
Functions	55.7%
Relations	54.6%
Methods of proof	40.2%
Induction	33.0%
Equivalence relations	18.6%
Number theory	15.5%
Real numbers	9.2%

Assessment: Do bridge courses work?

E-mail sent to institutions having bridge courses:

“In preparation for a panel discussion at the 2007 Joint Mathematics Meetings, we are gathering some data about courses like your [bridge course], which seems to include instruction in proof writing. We want to ask just two yes/no questions. . . .

1. Has anyone done assessment of [your bridge course] to determine its effectiveness in helping students write better proofs in their subsequent coursework?

2. If “yes”, would you be willing to share the results of the assessment with us? . . .”

Results: Assessment

60% (58 of 97) responded.

Answered "yes" to Question 1	2
Assessment planned for this year	3
Volunteered a positive opinion	15
Confessed uncertainty	1
(Assessed in-course improvement	2)