

Bridge Course Committee Report

Activities of the Bridge Course Committee

The Department Chair called a faculty meeting in April of 2018 to discuss potential changes to portions of LSU Course Catalogue pertaining to the Department's Bridge Courses. At that meeting, many ideas and concerns were raised, resulting in the formation of a Bridge Course Committee to more thoroughly and thoughtfully discuss these courses and their place in LSU's undergraduate mathematics curriculum. The committee met throughout Summer 2018 and voted to approve the the recommendations described below.

Recommendations of the Bridge Course Committee

1. Changes to the Bridge Course requirement.

We recommend that the LSU Catalogue be altered so that

- students are required to take a single bridge course,
- students are strongly recommend to take two bridge courses, and
- the total number of hours required for a degree in mathematics remains unchanged.

2. An exemption to the Bridge Course requirement.

We recommend that the department create an exam that students can take to exempt themselves entirely from the bridge course requirement. The exam should test basic mathematical maturity, including logical quantifiers, mathematical grammar, and proofs by contradiction and induction.

3. Academic advising.

Exemptions to the Bridge Course requirement should be rare, and mathematics majors should generically complete this requirement prior to enrolling in advanced courses. We recommend that Undergraduate Mathematics Advisors be mindful of this general rule when approving student schedules.

4. Suggested pre and co-requisites for Bridge Courses.

We recommend that the perquisites for the Bridge courses be altered as follows:

- Math 2020: Prerequisites (**NONE**), Co-requisites (**NONE**)
- Math 2025: Prerequisites (Math 1550), Co-requisites (**NONE**)
- Math 2030: Prerequisites (Math 1550), Co-requisites (Math 1552)

5. Bridge Course statement and catalogue descriptions.

If allowed by the university, we recommend that the catalogue be altered to include the below statement regarding the purpose of bridge courses. If not allowed, we recommend that this statement appear on the Department's website in an appropriate and prominent location. We further recommend that the catalogue entries for the Bridge courses be altered as below.

Statement: The purpose of the bridge courses 2020, 2025, and 2030 is to develop students' proficiency in reading and writing rigorous mathematics and their appreciation for abstract mathematics. These serve as preparation for higher-level mathematics courses. This entails logically coherent definitions, statements, and proofs. The content of the courses differs, but each incorporates the language of precise mathematics, such as logical quantifiers, mathematical grammar, and proofs by contradiction and induction.

Suggested Catalogue Descriptions for each of the Bridge Courses:

- *Math 2020: Solving Discrete Problems*

The purpose of this course is to develop students' proficiency in reading and writing rigorous mathematics. This entails logically coherent definitions, statements, and proofs. The mathematical topics are selected from formal logic, set theory, counting, discrete probability, graph theory, and number theory.

- *Math 2025: Linear Algebra and Wavelets*

This course is an introduction to mathematical thinking, including quantifiers, logical arguments and proof writing through linear algebra and wavelet transforms. Specific topics include: Haar wavelets, multiresolution analysis, and applications to imaging and signal processing.

- *Math 2030: Discrete Dynamical Systems*

The mathematical topics covered are fundamental in mathematical analysis, and are chosen from the area of discrete dynamical systems. These topics include precise definitions of limits, continuity, and stability properties of fixed points and cycles. Quadratic maps and their bifurcations are studied in detail, and metric spaces are introduced as the natural abstraction to explore deeper properties of symbolic dynamics, chaos, and fractals.

6. CI certification.

We recommend that professors teaching bridge courses be encouraged to obtain a Communication Intensive (CI) designation for their course through Communication across the Curriculum (CxC).

7. Enrollment.

We recommend that the department make reasonable efforts to ensure that enrollments in bridge courses are consistent with their stated purpose as a gateway to higher-level mathematics.

Approved by the Bridge Course Committee September 16, 2018.

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