PROPOSAL FOR A MINOR IN THE DEPARTMENT OF MATHEMATICS

Title of minor: Minor in Mathematics

Intellectual Merit of Minor: Mathematics has been studied systematically for more than 2500 years, and continues to be an area of active research. Many current advances in science and technology rest on mathematical foundations.

Mathematics develops specific analytical problem-solving skills as well as a logical and analytical perspective that is valuable in science, engineering, information technology, economics, law, medicine, business and certain social sciences. Within any of these other disciplines, the student who acquires these additional skills and perspective stands out from her/his peers. To encourage such students to significantly further their studies in Mathematics beyond the requirements of their majors, and to recognize those students who do so, we propose the establishment of the Minor in Mathematics.

Many of our peer institutions already offer a minor in mathematics. Among them are Penn, Duke, U.C. Berkeley, Stanford and Princeton (applied math only).

In the following MATH stands for the Department of Mathematics at Rice University

Proposed language for the General Announcements:

(To be inserted between ‘Degree Requirements for BA in Mathematics’ and ‘Degree Requirements for MA and PhD in Mathematics’)

Course requirements for a Minor in Mathematics
The minor in mathematics is available to students majoring in other fields who take at least 18 credit hours in MATH at the 200 level or above, including at least 12 credit hours at the 300 level or above. These are subject to the following breadth requirements—at least one course must be from each of the following areas:

- Analysis: MATH 302, 321, 381, 382;
- Discrete mathematics and algebra: MATH 356, 365, 368;
- Linear algebra: MATH 221, 354, 355.

Certain approved classes taken outside the mathematics department may be used to satisfy the breadth requirement in one area, but will not count towards the required 18 credit hours. An approved upper-level MATH course (other than 490 or 499) may be used to satisfy a breadth requirement. Students seeking to substitute approved courses should consult in advance with the chair of the undergraduate committee. At most three credit hours from any particular course or course number may be applied to the minor.

Notes on implementation:

- Upper-level classes satisfying breadth requirements will include:
  - Analysis: MATH 322, 410, 423, 424, 425, 426, 427, 428;
– Discrete mathematics and algebra: MATH 371, 373, 374, 463, 464;
– Linear algebra: MATH 371.

The undergraduate committee will determine which future courses may be applied toward breadth requirements.

• Faculty should not normally offer *Supervised Reading* (MATH 490) solely for the purpose of satisfying minor requirements.

• University graduation requirements stipulate that courses used to satisfy minor requirements must be completed with a grade point average of at least 2.00.

**Remarks for the curriculum committee:**

• Normally, students will complete first-year calculus (MATH 101-102) in addition to the above so that a student getting a minor in MATH will normally have taken at least 8 MATH classes.

• The Rice MATH major requires MATH 101, 102, 211, 212 as well as 8 courses at the 300-level or above. This entails at least 4 more advanced courses than required by the proposed minor.

• We propose the breadth requirement rather than specific required courses to accommodate entering students with varying high-school mathematics backgrounds. Those coming in with advanced standing or college-level work might take MATH 321, 356, and 221; students with no calculus in high-school would be more likely to take MATH 302, 365, and 355.

**Accreditation statement:**

The learning outcomes of the mathematics minor include:

• a deep understanding of the foundations of calculus and its applications to related areas, i.e., analysis;

• familiarity with discrete mathematics and algebraic structures at the university level;

• solution techniques for and theoretical understanding of linear equations;

• the ability to read, assess, formulate, and write formal mathematical arguments.

The proposed curriculum closely reflects these objectives. The first three outcomes are supported by the three breadth requirements. The last outcome is supported by MATH 221, 222, 302, 354, 356, and 365, which are specifically designed to teach students to write proofs.

The minor in mathematics will be evaluated as part of our annual accreditation review. Each year we typically evaluate a required course for each of our programs, to determine whether it continues to meet our curricular and programmatic objectives.