

ROSE-HULMAN DEPARTMENT OF MATHEMATICS

1999-2000 Strategic Plan - version 2 updated 11 Apr 00

Overall strategic planning activities

1. Develop and approve a departmental strategic plan, by December 1, 1999 that:
 - is derived from the previously approved goals statement that is attached as Appendix A, and the departments previous goals statements
 - establishes timelines, responsible parties, and measures of success,
 - seeks coordination with other departments where warranted, and
 - looks externally in identifying solutions.
2. Identify departmental stakeholders and establish regular communication with them.
3. Implement an external advisory board.

Mathematics Key Strategic Directions (MAKSD)

The five key strategic directions below are modeled on the five key strategic directions of the Academic Affairs plan

MAKSD1: Student recruitment, persistence and placement.

MAKSD2: Improvement of curriculum, program and learning environment.

MAKSD3: Faculty and staff development.

MAKSD4: Assessment of student learning and program success.

MAKSD5: Space allocation/upgrade, infrastructure and other resources

and the communication with departmental stakeholders

MAKSD6: Identify stakeholders and establish regular communication with them.

Notes:

In some of the tactical work plans below the implementation of the item may involve departmental policy traditionally discussed and approved by the entire department (e.g., any curricular change). In that case the responsible party for the item will bring a proposal to the department within the timeline.

Mathematics Key Strategic Direction 1 (MAKSD1)

Student recruitment, persistence and placement

MAKSD1.1 Math majors and minors:

- a. Continue to increase the number of majors in mathematics – both primary and double majors - and the number of students taking upper division mathematics courses.
- b. Also, continue efforts to get a vigorous math minors program in place, including redefining the math minor, and creating sample minors for each major and along thematic lines e.g., statistics

Recruitment

Timeline: ongoing activity

Responsible: Dept Head and all faculty on an informal basis.

Minors

Timeline: By May 1,2000

Responsible: Mathematics Curriculum Committee

MAKSD1.2 Scholarships: Seek scholarship opportunities for mathematics majors including:

- a. actuarial scholarships and fellowships,
- b. Rose scholarship associated with the Rose-Hulman high school contest.

Actuarial scholarship

Timeline: 2000-2001

Responsible: Allen Broughton

Rose scholarship

Timeline: 2000-2001

Responsible: John Rickert, develop plan, present to department

MAKSD1.3 Diagnostic test, Calculus placement and persistence:

- a. Make the diagnostics test and its use more effective.
- b. Increase support of and coordination with the Learning Center.
- c. Review the placement processes for calculus students

Diagnostic test

Timeline: By June 1,2000

Responsible: John Rickert & Dept Head

Learning Center coordination

Timeline: By June 1,2000

Responsible: Dept Head following departmental discussion

Calculus placement

Timeline: 2000-2001 school year

Responsible: Curriculum Committee

MAKSD1.4 Student involvement: Improve the sense of belonging and “professional involvement” for mathematics majors, mathematics minors and other students with a strong interest in mathematics.

- a. Increase the involvement of the Math Club and the Pi Mu Epsilon organization in the extracurricular activities of the department.
- b. Promote mathematical presentations by students, both on and off campus.
- c. Continue the high level of student activity in local, regional, and national mathematics competitions.

Timeline: Ongoing Activity

Responsible: Club Advisors, Contest Organizers, and faculty mentors (of students)

MAKSD1.5 Placement: Develop a knowledge base and network for placement of mathematics students, both in industry and graduate school.

Timeline: 2000-2001 school year

Responsible: Dept in conjunction with Advisory Board

Mathematics Key Strategic Direction 2 (MAKSD2): Improvement of curriculum, program and learning environment

MAKSD2.1 Freshman and sophomore curriculum: Use the various teaching teams in the first two years (Calculus, Differential Equations and Matrix Algebra and Statistics) to implement and to continuously improve recent curriculum changes. This includes:

- a. coordinating the calculus sequence with the physics sequence, and
- b. successfully teaching the first year of the merged FCSEC mathematics courses and “traditional” mathematics courses.

Coordination

Timeline: By May 1, 2000

Responsible: Curriculum Committee

DE

Timeline: By May 1, 2000

Responsible: DE Instructors

Report to dept in spring quarter

MAKSD2.2 Math major redesign:

- a. Implement the newly approved mathematics major.
- b. Design and implement the statistics concentration of the math major.

Implement Major

Timeline: Ongoing Activity

Responsible: Student Advisors

Statistics concentration

Timeline: December 30,1999

Responsible: Curriculum Committee

MAKSD2.3 Computing:

- a. Develop a consensus and guidelines for the use of the laptop in the freshman and sophomore courses.
- b. Continue to make appropriate utilization of the laptop computer in the upper-division courses.
- c. More effectively use the Theorodrome as a high end computing resource.
- d. Continue to demonstrate leadership in high-end computing on campus.
- e. Increase the effectiveness of WCC and student help in supporting our academic computing.

Laptop in the first two years

Timeline: May 1 2000

Responsible: Departmental Discussion

Laptop in upper division courses

Timeline: Ongoing activity

Responsible: Course Instructors

Theorodrome

Timeline: Ongoing activity

Responsible: Department Head and interested faculty

Computing leadership

Timeline: Ongoing activity

Responsible: Department Head and interested faculty

Computer support

Timeline: Ongoing activity

Responsible: Department Head

MAKSD2.4 Curriculum documentation: Document, archive, and update materials associated to the curriculum including:

- a. syllabi for all courses
- b. final exam archives
- c. developing a culture of sharing curricular materials
- d. supplemental course materials
- e. Keep either copies of or a list of textbooks used in the department for past courses with instructor comments concerning the positives and negatives

Syllabi

Timeline: Ongoing activity as the courses are taught

Responsible: Course Instructors, coordinated by Department Head

Final exam archives

Timeline: by May 1, 2000 and then an ongoing activity

Responsible: course instructors, department head and secretary

Sharing

Timeline: commence in 2000-01

Responsible: course coordinators and dept head

Supplemental Materials

Timeline: planning 1999-2000, commence in 2000-01

Responsible: unknown

Text Library

Timeline: start by 1 Apr 99 (comments on an ongoing basis)

Responsible: Library committee

MAKSD2.5 Interdepartmental Coordination:

- a. Continue to vigorously participate in the interdepartmental coordination of programs, in particular IFYCSEM and Foundation Coalition Sophomore Curriculum.
- b. Keep a departmental library of texts being used in other courses on campus.

IFYCSEM and FCSEC

Timeline: Ongoing Activity

Responsible: Dept Head

Text Library

Timeline: start by 1 Apr 99

Responsible: Library committee

MAKSD2.6 Projects and undergraduate research: Increase the number of opportunities for faculty and students to work on mathematically or statistically based projects and undergraduate research including:

- a. continuing involvement in the Imaging Systems Laboratory,
- b. other project opportunities such as with TED
- c. finding additional ways to involve more Rose-Hulman students in undergraduate mathematics research, both during the school year and in the summer.

Imaging

Timeline: Ongoing Activity

Responsible: Imaging faculty

TED

Timeline: Ongoing Activity

Responsible: Interested faculty coordinated by Dept Head

Undergraduate Research

Timeline: 2000-2001 school year and beyond

Responsible: interested faculty, coordinated by Dept Head

MAKSD2.7 Supporting Programs: Continue to support and further develop the Department's existing programs and activities that support undergraduate education:

- a. Fast-Track Calculus
- b. the Rose-Hulman Conference in Undergraduate Mathematics
- c. Research Experiences for Undergraduates
- d. the Rose-Hulman High School Mathematics Contest
- e. Establishing the planned electronic Journal of Undergraduate Mathematics Research

Timeline: Ongoing Activity

Responsible: Interested faculty coordinated by Dept Head

**Mathematics Key Strategic Direction 3 (MAKSD3):
Faculty and staff development**

MAKSD3.1 Workload: Through various means find course reductions for faculty to accomplish various significant tasks of value to the department and the institute that:

- a. support curriculum development
- b. support professional development, especially of junior faculty, and
- c. various other tasks that are of mutual benefit to the department and institute.

Timeline: ongoing activity

Responsible: Dept Head

MAKSD3.2 Junior Faculty:

- a. Improve the quality of assessment and guidance for junior faculty, especially the mentoring of the large number of new faculty.
- b. Continue to aggressively pursue mentoring opportunities within the department.

Mentoring

Timeline: ongoing activity

Responsible: Dept Head and faculty mentors

Mentoring opportunities

Timeline: ongoing activity

Responsible: Dept Head

MAKSD3.3 Professional Development:

- a. Continue to support a high level of varied, appropriate, professional development opportunities for all faculty, including both teaching and scholarly development.
- b. Continue our colloquia and seminars.
- c. Staff development.

Faculty development

Timeline: ongoing activity

Responsible: Dept Head to coordinate

Seminars

Timeline: ongoing activity

Responsible: seminar and colloquium coordinators

Staff development

Timeline: ongoing activity

Responsible: Dept Head

**Mathematics Key Strategic Direction 4 (MAKSD4):
Assessment of student learning and program success**

MAKSD4.1 Assessment of student outcomes:

- a. Support the engineering departments preparation for ABET.
- b. Develop and implement an assessment plan (of student outcomes) for North Central accreditation.

ABET

Timeline: By May 1,2000
Responsible: coordinated by Dept Head

North Central

Timeline: Design in 1999-2000, Implementation in 2000-2001
Responsible: Dept Head and Curriculum Committee.

MAKSD4.2 Assessment of Program Develop and implement an assessment plan for the effectiveness of programs such as the Diagnostic test, trailer sections of mathematics and Fast Track Calculus and other advanced placement.

Timeline: Design in 1999-2000, Implementation in 2000-2001
Responsible: Dept Head and Curriculum Committee.

Mathematics Key Strategic Direction 5 (MAKSD5): Space allocation/upgrade, infrastructure and other resources needs

MAKSD5.1

Short-term space allocation/renovation in Crapo Hall: Review space utilization and quality to maximize effective utilization of non-office space over the short term. Consider solutions that include medium cost renovation, and furniture replacement and reallocation. Include, in particular, MAKSD5.2 and MAKSD5.3 below.

Timeline: 1999-2000
Responsible: Dept Head

MAKSD5.2

Crapo Classrooms: Complete the conversion of the bench and fixed seating of the Crapo laptop classrooms to the table and chairs layout (as in G222) to allow for better student-student and faculty-student interaction, especially in group work.

Timeline: 1999-2000
Responsible: Dept Head

MAKSD5.3 Informal study space: Create an informal study area that will foster faculty/student and student/student interaction outside the classroom. Look at Civil Engineering's Learning Center as a possible model. Coordinate with institute strategic planning and **MAKSD5.4**

Timeline: Design in 1999-2000, Implementation ASAP
Responsible: Dept Head

MAKSD5.4 Long-term renovation: Make a proposal on the long-term renovation of Crapo Hall, and its impact on the mathematics department. Consider possible solutions that will also include creative interaction with other departments, e.g. Computer Science.

Timeline: Design in 1999-2000, Implementation ??????

Responsible: Dept Head to coordinate

MAKSD5.5 Library Resources Working with the Dean, the Library and spending our own funds ensure the availability of key research and scholarship resources for faculty and our students.

Timeline: ongoing activity

Responsible: Dept Head

MAKSD5.6 Ensuring an Excellent Computing Environment Seeking external funding as necessary, and working with other departments and units of the Institute, ensure the adequacy of computing resources for teaching, student learning and scholarship/research. In a particular,

- a. Working with the Associate Dean, ensure that all mathematics faculty have their laptop computer upgraded on a three-year cycle.
- b. Obtain workstations for faculty, for computation beyond the capabilities of the laptop on an as-needed basis.
- c. Continue to work to have the Theorodrome used exclusively as a computer laboratory.
- d. Upgrade/replace the workstations in the Theorodrome on a regular basis, to keep up with current computing needs.
- e. Upgrade or obtain new software, specific to the Mathematics Department.
- f. Working with other departments, especially Computer Science and the Imaging Systems Laboratory, contribute to the evolution of high-end computation.
- g. Work with WCC to ensure good communications for the purpose of obtaining a high level support for the computing in the Mathematics Department.

Timeline: ongoing activity

Responsible: Dept Head

Mathematics Key Strategic Direction 6 (MAKSD6): Communication with stakeholders

MAKSD6.1 Implement an external advisory board

Timeline: Design and complete by January 31 2000, meet in spring quarter
Responsible: Dept Head

MAKSD6.2 Identify the internal stakeholders at RHIT and establish a method of interaction with them.

Timeline: by May 1, 2000
Responsible: Dept Head after departmental discussion.

MAKSD6.3 Conduct annual survey of selected students and alumni

Timeline: by May 1, 2000
Responsible: Dept Head after departmental discussion.

Goals Statement for the Department of Mathematics

STUDENT LEARNING GOALS

GOAL - Transition to College

To provide incoming freshmen with a smooth transition to college mathematics.

GOAL - Mathematical Foundations

To provide all undergraduate students at Rose-Hulman with an education in mathematics which will serve as part of a foundation for life-long learning of science, engineering and mathematics.

OBJECTIVES for this goal: All students should

- become competent users of mathematics,
- appreciate mathematics as an intellectual endeavor in its own right,
- become familiar with basic mathematical and statistical thinking and modeling,
- understand the use of mathematics in other disciplines, and become competent at the application of mathematics to these disciplines,
- become effective problem solvers,
- become competent in using the computer as an aid to mathematical modeling and computation, and
- develop communication skills appropriate in a mathematical context.

GOAL - Mathematics Majors

To graduate majors who have become liberally educated and are prepared for a mathematically based career.

OBJECTIVES for this goal: Our majors should be able to

- formulate and solve problems from a mathematical perspective,
- understand the relationship of mathematics and other technical fields and develop competence at the application of mathematics in one or more of these areas,
- use technology effectively in mathematics and the application of mathematics,
- communicate effectively (reading, writing, speaking and listening) to both technical and non-technical audiences, and
- work cooperatively with others.

Appendix A

DEPARTMENTAL GOALS

GOAL - Program

To continue to build an excellent undergraduate mathematics program.

OBJECTIVES for this goal: Our department should

- increase the number of students who major or minor in mathematics, and
- continuously improve the program's curriculum.

GOAL - Excellence in Undergraduate Mathematics

To become a nationally recognized model for excellence in undergraduate mathematics both through its teaching as well as engaging in a select number of additional activities which support excellence in undergraduate mathematics.

GOAL - Inter Departmental

To continue to have good relationships with other programs, in particular, coordination of mathematics with other programs.

FACULTY DEVELOPMENT GOALS

GOAL - Teaching

To continue to develop as teachers.

OBJECTIVES for this goal: The department should:

- encourage faculty to continue to develop courses,
- maintain or improve our regional and national recognition as leaders in curriculum development, and
- support each faculty member's need for professional development funds to enhance teaching skills.

GOAL - Professional Development

To continue to develop professionally.

OBJECTIVES for this goal: The department should:

- maintain or improve our regional and national recognition in professional activities,
- support each faculty member's need for professional development funds to scholarly activity, and
- maintain a suitably sized staff so that all members of the department can have adequate opportunity for professional development.