

# **ROSE-HULMAN DEPARTMENT OF MATHEMATICS**

## **2000-2001 Strategic Plan approved 31 Oct 00**

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### **Overview 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:** Continue to increase the number of majors in mathematics – both primary and double majors - and the number of students taking upper division mathematics courses.

- a. Take a more active role in the recruitment of mathematics majors from off campus.
- b. Increase the number of students taking courses in the Continuous Applied Mathematics and the Statistics concentrations (as double majors and minors) collaborating with client departments and modifying courses as necessary.

#### **Recruitment**

Timeline: ongoing activity

Responsible: Dept Head, faculty assigned to recruitment activities.

#### **Continuous Applied Math and Statistics**

Timeline: by May 2001 and then ongoing

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

**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. Monitor and improve changes in the placement processes for calculus students

#### **Diagnostic test**

Timeline: By June 30,2001

Responsible: John Rickert & Dept Head

### **Learning Center coordination**

Timeline: ongoing

Responsible: Dept Head

### **Calculus placement**

Timeline: ongoing

Responsible: Dept Head

**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, and specific faculty taking on a placement role.

## **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
- b. investigate making calculus a 4 hour course
- c. implement computer use recommendations

### **Coordination**

Timeline: By May 1, 2001

Responsible: Curriculum Committee

### **4 hour Calculus**

Timeline: report by May 1, 2001  
Responsible: Curriculum Committee

### **Computer Use**

Timeline: By May 1, 2000 and then ongoing  
Responsible: DE and Calc Instructors  
Report to department in spring quarter by course coordinators

### **MAKSD2.2 Math major redesign:**

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

### **Implement Major**

Timeline: Ongoing Activity  
Responsible: Student Advisors

### **Statistics concentration**

Timeline: ongoing activity  
Responsible: Dept head and Statistics Coordinator

Note the link to **MAKSD1.1.b**

### **MAKSD2.3 Computing:**

- a. Implement the 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, and to participate in the strategic planning efforts for “beyond the laptop” computing.
- e. Increase the effectiveness of WCC and student help in supporting our academic computing.

### **Laptop in the first two years**

Timeline: May 1, 2001 and then ongoing  
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: dept head and designated faculty

**Supplemental Materials:** Computer classroom demos written by students.

Timeline: planning in 2000-01

Responsible: Dept head to coordinate

**Text Library**

Timeline: ongoing activity

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 for non-math courses**

Timeline: by May 2001 ongoing activity

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, including participation in the strategic planning for high end computing
- 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, Allen Broughton to take a lead

### **TED**

Timeline: Ongoing Activity

Responsible: Interested faculty coordinated by Dept Head, Allen Broughton to work on this as part of sabbatical activity.

### **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. Electronic Journal of Undergraduate Mathematics Research

Timeline: Ongoing Activity

Responsible: Interested/responsible faculty coordinated by Dept Head

**MAKSD2.8 Continue to press for a 10 minute passing period.**

Timeline: Ongoing Activity

Responsible: Coordinate with KSD2 and KSD5, and quality of education committee.

## **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.
- c. Prepare for “passing the torch” from senior faculty to junior faculty during the next 5-10 years. Include this consideration in hiring.

#### **Mentoring**

Timeline: ongoing activity

Responsible: Dept Head and faculty mentors

#### **Mentoring opportunities**

Timeline: ongoing activity

Responsible: Dept Head

#### **Passing the torch**

Timeline: ongoing activity

Responsible: Dept coordinated by 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. Develop and implement an assessment plan to document effectiveness of mathematics instruction

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

**MAKSD4.2 Assessment of Program**

- a. Develop and implement an assessment plan for the effectiveness of Fast Track Calculus and other advanced placement.
- b. Develop and implement an assessment plan for the effectiveness of the diagnostic test and trailer sections of mathematics

**Advanced Placement**

Timeline: Continue Design and Implement in 2000-2001  
Responsible: Dept Head and Curriculum Committee.

**Diagnostic Test and Trailer Sections**

Timeline: Continue Design and Implement in 2000-2001  
Responsible: Dept Head, John Rickert 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:**

- a. 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 below.

- b. Renovate main office area to provide for better traffic flow and improved work environment

**Short-term space allocation/renovation in Crapo Hall:**

Timeline: Design 2000-01

Responsible: Dept Head

**Office renovation Crapo Hall:**

Timeline: Design 2000-01

Responsible: Dept Head

**MAKSD5.2 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.

Timeline: Implementation ASAP

Responsible: Dept Head, work with KSD2 and KSD5

**MAKSD5.3 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, and the use of available space such as the auditorium.

Timeline: Make formal proposal 2000-01

Responsible: Dept Head to coordinate, work with KSD2 and KSD5

**MAKSD5.4 Improvement of Classroom space:** Working with KSD2 and KSD5, and IAIT

- a. press for more classroom space, or better utilization of current space.
- b. request AV stations in classrooms

Timeline: Make formal proposal 2000-01

Responsible: Dept Head to coordinate, work with KSD2 and KSD5 and IAIT

**MAKSD5.6 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: Library Committee

**MAKSD5.7 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 particular,

- a. Obtain workstations for faculty, for computation beyond the capabilities of the laptop on an as-needed basis.
- b. Continue to work to have the Theorodrome used exclusively as a computer laboratory.
- c. Upgrade/replace workstations in the Theorodrome on a regular basis, to keep up with current computing needs.
- d. Upgrade or obtain new software, specific to the Mathematics Department.
- e. Working with other departments, especially Computer Science and the Imaging Systems Laboratory, formulate a strategic plan for “beyond the laptop computing” for the department in the context of an institutional plan.
- f. Submit an equipment request to the Dean for equipment by Nov 15.
- 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: submit budget by Dean’s timeline (Oct 6),

Responsible Mathematics Computing Committee and Dept Head for followup.

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

### **MAKSD6.1 Implement an external advisory board**

Timeline: Design and complete in fall quarter, 2000, meet by the end of the winter quarter.

Responsible: Dept Head

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

Timeline: end of winter quarter

Responsible: Dept Head after departmental discussion.

### **MAKSD6.3 Conduct annual survey of selected students and alumni**

Timeline: ongoing activity

Responsible: Dept Head after departmental discussion.

## **Appendix A**

### **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.