

HSU Academic Department Report – Mathematics

I. Departmental History, Mission, and Goals

MISSION STATEMENT

The mission of the Humboldt State University Mathematics Department is to provide excellent instruction in mathematics, statistics, and quantitative reasoning; to encourage scholarly activities among faculty and students; to meet broad community needs for mathematical and statistical expertise, including those of K-14 schools, governmental and professional organizations, and the applied sciences; and to promote mathematical and statistical literacy throughout society.

GOALS

Goal 1: (All Students): To provide students with quantitative reasoning skills and enhanced mathematical and statistical literacy for productive citizenship.

Goal 2 (Students in client disciplines): To provide students with a mastery of concepts necessary for effective work within their disciplines.

Goal 3 (Mathematics majors and minors): To provide students with a strong foundation suitable for teaching, pursuit of a career in a quantitative discipline, or graduate study.

Goal 3a: To provide students with knowledge of broad mathematical concepts that are the foundation of the discipline.

Goal 3b: To provide students with specialized analytical and technical skills for solving quantitative problems.

Goal 3c: To stimulate curiosity, encourage persistence and develop mathematical maturity.

Goal 4: To promote active involvement of every faculty member in scholarly activities that extends knowledge in the discipline, the teaching of the discipline, or the application of the discipline. Collaboration is encouraged, especially with students.

Goal 5: To provide the campus and broader community with access to expertise in mathematics education, statistics, mathematical modeling, and pure and applied mathematics.

Goal 6: To promote active involvement of faculty in campus, regional, state, national and international organizations leading to improvements in education, management and understanding of complex systems, and progress toward a just and equitable society.

HISTORY

The Mathematics Department began its formal existence in 1957 under the leadership of Dr. Hank Tropp. In the first 15 years of the department, three distinct undergraduate options were defined and developed: Pure Mathematics (leading to graduate study in mathematics), Applied Mathematics (leading to graduate study or to professional work in applied mathematics, statistics, math modeling, computer science, and other applied sciences), and Mathematics Education (leading to a secondary teaching credential in mathematics). The next 10 years saw the development and implementation of a unique multi-disciplinary Masters Degree Program in Mathematical Modeling of Environmental Systems. In addition, a 4th undergraduate option in Computer Science was added. Over the last 25 years, these programs, with the exception of the degree option in Computer Science (suspended in

1993, and eventually terminated), have been fine tuned to better meet the needs of students and respond to the changes in disciplines and accreditation.

To provide leadership to the mathematical community of the north coast, the department established four key co-curricular activities. These activities are ongoing.

The Redwood Empire Math Tournament

In order to recognize achievement and to increase interest in mathematics, the Redwood Empire Mathematics Tournament is held every spring on the campus of Humboldt State University. The Tournament was founded in 1960 by Dr. James E. Householder. Between 100 and 200 middle school and high school students in the region gather to compete for mathematical fame and fortune.

The State of Jefferson Math Congress

The State of Jefferson Mathematics Congress was organized jointly by the Mathematics Departments of Humboldt State University and Southern Oregon State University to help overcome the geographical isolation of these institutions from other centers of mathematical activity. The Congress encourages mathematics in the State of Jefferson by bringing people together to share and discuss current ideas on mathematics, applications, and curricular directions.

The inaugural session of the State of Jefferson Mathematics Congress, then known as the Weaverville Mathematics Congress, was held near Weaverville, California, during May 1972; each succeeding May (thru 1997) or October (since 1997) the Congress has reconvened for two days. The most recent sessions, held on the shores of Whiskeytown Lake, have included camping mathematicians and their families from Humboldt State and Southern Oregon, as well as Chico State, Sonoma State, San Francisco State, and the University of Nevada at Reno.

The Redwood Area Math Project

Formed in 1978 by Dr. Roy Ryden, and led since 1987 by Dr. Phyllis Chinn, the Redwood Area Math Project provides professional development and leadership training for K-12 teachers of Mathematics. The current efforts of the RAMP include a 3-year professional development program for teachers primarily from the Del Norte County School District.

The Kieval Lecture Series

The Harry S. Kieval Lectures in Mathematics, which Dr. Kieval also began in 1979, brings renowned visiting experts in the field of mathematics to campus each semester. The lectures are offered to students and the public and have drawn relatively large crowds of local math enthusiasts to one of the most celebrated math lecture series among comprehensive universities.

The heart of the Mathematics Department is its faculty. Known for excellent teaching, the math faculty include three of the past 20 HSU Professors of the year. In the early 2000s, the department was ranked 1st in the nation by the National Science Foundation among non-Ph.D. granting institutions for sending student on to doctoral programs, and 5th among all universities in the nation.

Over the past 7 years the department has experienced a “changing of the guard.” Professors Vrem, Lamberson, Yanosko, Biles, Stauffer, Chinn, Hunt, Khazanie, Upatising, and Patel have been replaced by Professors Goetz, Dugaw, Owens, Evans, Mazzag, Van Kirk, and Freedman. Two others, Professors Burroughs and Brown, who were to be part of the “new guard” have left for positions in other institutions. Thus, we have “replaced” 10 faculty with 7 faculty. As a result, we have been in the process of increasing the time bases of our part-time faculty, most of whom will

now have full-time temporary status. In addition, we have sought to achieve economy in our curriculum while preserving as much rigor and richness as possible.

II. Departmental Faculty and Staff

Mathematics Dept Instructors -- AY Average Count of Appointments facpos_MATH report generated: 22-FEB-08						
Appt Category	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Lecturer	12	6	8	7	9	8
Assist Prof	4	5	4	4	4	3
Assoc Prof	3	3	3	5	6	5
Professor	8	9	6	5	6	7
Teach Assoc	15	12	15	15	13	12
Volunteer	0	1	1	2	1	0
Total	42	35	36	38	39	34
Mathematics AY average FTEF (time base totals) facpos_MATH report generated: 22-FEB-08						
Appt Category	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Lecturer	6.94	4.46	5.83	5.47	5.90	5.46
Assist Prof	4.00	5.00	4.00	4.00	4.00	3.00
Assoc Prof	3.00	2.50	3.00	5.00	6.00	5.00
Professor	7.50	8.62	6.00	4.50	5.00	6.00
Teach Assoc	3.80	3.52	4.44	4.77	3.98	3.43
Volunteer	.00	.09	.12	.14	.03	.00
Total	25.24	24.18	23.38	23.87	24.91	22.89
Mathematics department release/assigned time facpos_MATH report generated: 22-FEB-08						
Assignment Description	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Excess Enrollment (=>75)	.00	.06	.10	.16	.26	.39
New Preparations	.03	.06	.00	.20	.13	.09
In-serv Training for K-12 pers	.00	.06	.03	.00	.00	.03
Instr Support of Grad Students	.20	.20	.03	.10	.07	.00
Special Instr Programs	.31	.35	.20	.12	.34	.00
Instr Experimt Innov/Research	.25	.27	.13	.00	.09	.00
Instr-Related Services	.09	.00	.09	.00	.07	.00
Advising Responsibilities	.00	.03	.00	.00	.00	.20
Instr-Related Comm Assignmnts	.33	.13	.47	.40	.43	.78
Dept Chair AY, Leaders/Dir.	.43	.43	.43	.67	.63	1.01
Dept Chair - 12mo	.25	.25	.25	.25	.32	.38
Proj/Prog Leaders, Dir., Coord	.00	.00	.00	.00	.00	.09
Other State Funds	.00	.00	.00	.46	.05	.00

Grant: Redwood Projects	.00	.00	.00	.00	.03	.00
Grant: Academic	.00	.00	.00	.00	.20	.17
Total	1.89	1.84	1.72	2.35	2.61	3.13

Personnel (at least .5 FTE)

Name	Position	Description of Specialty and Key Contributions (no more than 100 words per person)
Mr. Guy Adams	Instructor (.8)	Introductory Mathematics Teaches courses in remedial math, statistics, and calculus.
Dr. Sharon Brown	Associate Professor	Mathematical Modeling Directed the Environmental Systems Graduate Program and more recently the College Faculty Preparation Program. Teaches key courses for math modeling graduate students, supervises master's thesis, and has demonstrated interest and ability in math courses for prospective teachers. On leave without pay during the 2008-2009 academic year.
Ms. Sandra Casassa	ASC II	Mathematics and CS Department ASC II Coordinates the joint office for Mathematics and Computing Science, provides faculty support for almost 30 FTEF.
Dr. Phyllis Chinn	Professor (FERP)	Graph Theory, Combinatorics, Teacher preparation and enhancement Has taught the graph theory class as a discovery method, capstone course for math majors and the geometry courses for secondary teachers. Developed and taught the courses for prospective elementary teachers (math 108, 308B,C), the capstone class for secondary teachers (Math 407). RAMP co-director and co-teacher of a variety of classes for in-service teachers. I have taught the graduate teaching seminars.
Dr. Chris Dugaw	Assistant Professor	Mathematical Modeling Currently, coordinator of the Environmental Systems Graduate Program and recently coordinator for the Mathematical Modeling option within this program. Serves on the departmental Curriculum, Technology, and Graduate committees, as well as the University Priority Scheduling committee. Teaches key courses for math modeling graduate students, supervises master's thesis, and is an active scholar with 5 peer-reviewed publications and 4 presentations at the national or regional level within the last 4 years. Organizer of the 2009 North Coast Regional Graduate Conference and co-organizer of the 2008 conference.
Dr. Tyler J. Evans	Associate Professor	Algebra and Number Theory Teaches a large variety (seventeen distinct courses at HSU) of both LD service courses and UD courses for the mathematics major, and in particular key algebra and number theory courses for the mathematics and mathematics education major. Organizer of the Mathematics Colloquium lecture series. Active researcher with eight refereed publications including three with HSU undergraduate mathematics major coauthors. Member of CSU Transforming Course Design team and serves on the CSU Entry Level Mathematics (ELM) Committee.
Dr. Martin	Professor	Logic and Set Theory, History of Mathematics, Calculus Educ.

Flashman		Active in the teaching and learning of Calculus, Proof, and History through the Mathematical Association of America – including leadership of presentations and workshops at national meetings; Directed state-wide effort to improve articulation between the community colleges and the state universities in mathematics, Current chair of the UCC,
Dr. Walden Freedman	Associate Professor	Analysis, primarily functional analysis, but also real analysis; topological groups. Teaches key math major courses such as Real Analysis and Advanced Calculus. Chair of the curriculum committee during 07-08, involved especially with lower division assessment. Library liaison since Fall 2001.
Dr. Pete Goetz	Assistant Professor	Noncommutative Algebra Teaches key courses in pure mathematics such as Calculus, Linear Algebra, Number Theory, and Abstract Algebra. Runs seminar and independent study courses on advanced topics not usually covered in the undergraduate curriculum; some examples are Analytic Number Theory, Algebraic Geometry, Lie Algebras. Does research in noncommutative algebra, in such areas as noncommutative algebraic geometry, homological algebra, and A-infinity algebras. Advises students considering pursuing graduate degrees in pure mathematics. Currently serving on the math department curriculum committee.
Dr. Jeffrey Haag	Associate Professor	Numerical Linear Algebra I teach a wide variety of courses from precalculus to graduate. I have been Faculty Advisor to Mathematics Club from 1994-2007, and again in 2008-09. I serve on several department committees, often as chair. I am the thesis advisor of one graduate student who should graduate this year.
Dr. Diane Johnson	Professor	Undergraduate Applied Math & Professional Development Taught various undergraduate applied mathematics courses. Department Chair 2006-07. Coordinator of campus-wide Faculty MidSemester Evaluations Program. Taught Professional Development Courses for graduate Math Modeling students.
Dr. Yoon G Kim	Professor	Mathematical Statistics and Applied Statistics Have been teaching a wide range of statistics: from GE statistics to a variety of bio statistics classes, and business statistics. Have been engaged in statistics consulting for researchers from on and off campus. Have been helping foreign students and community members in many ways.
Mr. Craig Kuramada	ASC I	Math and CS Department ASC I Provides support coordination for the joint department office for Mathematics and Computing Science.
Dr. Bori Mazzag	Assistant Professor	Mathematical Modeling/Mathematical Biology I am currently the option coordinator for the Mathematical Modeling track of the Environmental Systems Graduate Program. I teach a variety of applied mathematics courses. I have advised both undergraduate research projects and Masters theses.
Dr. Dale Oliver	Professor	Mathematics Education: The Mathematical Education of Teachers Specializes in designing and leading professional development

		institutes for K-12 teachers on the teaching and learning of mathematics, and for college and university mathematics faculty on the mathematical preparation of teachers. Designs and teaches math courses for teachers, including the math methodology courses for the secondary education program. Advises state and national organizations and policy boards on the mathematical education of teachers. Has served as full-time or near-full-time department chair for 5 of the past 9 years.
Dr. Ken Owens	Associate Professor	Mathematical Modeling Founder of the Plasma Simulation Institute for modeling fusion energy. Research director for graduate students and summer students in the Research Experience for Undergraduates program. Teacher of key courses for math modeling graduate and undergraduate students. On research leave during the 2008-2009 academic year.
Dr. Mark Rizzardi	Professor	Statistics / Biometry Teaches statistics and biometry classes of all levels and Science 530 for the Environmental Systems graduate program. Commonly serves as a committee member on Master's Theses for students from the biosciences and Environmental Systems program. Regularly provides statistical advice to undergraduate and graduate students.
Dr. Rob Van Kirk	Associate Professor	Applied Statistics and Stochastic Modeling New faculty in the department (2008-2009) who is bringing a nationally recognized and externally funded research program in aquatic resources to HSU. Key components of this program include statistical applications in hydrology and fisheries biology, fish population modeling, and hydrologic modeling, all of which will provide expanded learning opportunities for undergraduate and graduate students in the department and across CNRS. Primary teaching responsibilities will be in biometry and statistics.

III. Recruitment and Retention

Describe any specific actions (other than HOP or similar standard efforts) the department has taken to recruit and/or retain students, particularly diversity students and/or students who are underrepresented in your discipline. What have been the results of those actions?

Recruitment: The math department is a partner with the departments of Engineering and Computing Science in the SLS Program. The SLS (Scientific Leadership Scholars) was a program that began with the 2007-2008 academic year to recruit diversity students to Engineering, Computing Science, and Mathematics, to a 4-year scholarship program at HSU. About 8 students were recruited into mathematics, with 7 of those 8 students continuing into the second year of the program.

Retention: The math department also partners with the biological sciences (Varkey) through the AMP program (Alliance for Minority Participation) to provide mathematical support for diversity students entering the university. This program provides targeted support for students, particularly for those in the sciences, to ensure academic success in mathematics during the first year at HSU.

IV. Learning, Curriculum, and Assessment.

List the student learning outcomes for your academic programs. Then for each learning outcome that has been assessed, provide a summary paragraph that includes the methodology and results of the assessment.

Student learning outcomes for the BA Programs in Mathematics

Outcome 1: (*Competence in Mathematical Techniques*) Students demonstrate competence in the field of Mathematics, including the following skills:

- 1.1 The ability to apply the techniques of Calculus to Mathematics, Science, Natural Resources, and Environmental Engineering.
- 1.2 The ability to develop and analyze standard models (primarily linear models) for systems in Mathematics, Science, Natural Resources, and Environmental Engineering.
- 1.3 The ability to read, evaluate, and create mathematical proof.
- 1.4 The ability to write algorithms to investigate questions, solve problems or test conjectures using standard tools (e.g., spreadsheet), specialized programs (e.g., C++, MATLAB), and statistical programs (e.g., SASS)
- 1.5 The ability to analyze the validity and efficacy of mathematical work.

Outcome 2: (*Fundamental Understanding*) Students demonstrate a fundamental understanding of the discipline of mathematics, including:

- 2.1 The historical development of the main mathematical and statistical areas in the undergraduate curriculum.
- 2.2 The ability to apply knowledge from one branch of mathematics to another and from mathematics to other disciplines.
- 2.3 The role and responsibilities of mathematicians and mathematical work in science, engineering, education, and broader society.

Outcome 3: (*Communication*) Students demonstrate fluency in mathematical language through communication of their mathematical work, including demonstrated competence in

- 3.1 Written presentations of pure and applied mathematical work that follows normal conventions for logic and syntax.
- 3.2 Oral presentations of pure and applied mathematical work which are technically correct and are engaging for the audience.
- 3.3 Individual and collaborative project work in which a project question is described, methodology is discussed and implemented, results are analyzed, and justifiable conclusions are drawn.

Assessment to date

Outcome 3 was assessed during 2006 (data collected in the spring and analyzed in the fall). About 18 course sections from across the curriculum were used to gather a convenience sample of student writing in mathematics classes. The sample included high, medium, and low performers in each of the courses. A team of 4 math faculty created and calibrated a scoring rubric for the assessment. The two main findings of the assessment were as follows: 1) most students demonstrated fluency in written presentations of pure and applied mathematical work that follows normal conventions for logic and syntax; and 2) while the median quality of written work in reports and projects across the curriculum was of good quality, there was not a discernable improvement in the quality of the

writing from freshman levels to senior levels. The department has since discussed the need for additional opportunities for students to be evaluated on their writing in a technical context.

The assessment of outcome 1 was begun during the spring of 2007, with final examinations collected throughout the curriculum. Instructors identified one or more item from the final examinations that best represented student competence relative to outcome 1. The data has not yet been analyzed by the department.

The assessment of outcome 2 was begun during the fall of 2007 in conjunction with a college-level assessment of General Education, area B. This assessment will be augmented by an analysis of final examinations collected from selected math major courses in the spring of 2008. Analysis of data for outcomes 1 and 2 is scheduled for the fall of 2008.