

Report California State University Hayward

DEPARTMENT OF STATISTICS MS DEGREE IN STATISTICS Spring 2003

Recommendations

As set forth in the mission statement and the goals and objectives for the programs in Statistics, the objectives and specific competencies listed below constitute the learning objectives for the MS degree program in Statistics at CSUH. All courses are expected to address a specific and overlapping subset of these overall objectives and to develop specific competencies as required for entry-level statisticians working in the field of statistics.

Overall Objectives for the MS in Statistics

1. *To appreciate the basics of modeling and error analysis, particularly those enhanced by the use of cutting-edge computer technology and the most modern computer-intensive statistical methods.*
2. *To carry out accurate and careful statistical analyses of real world problems and to express these analyses as the meaningful oral and written communication of statistical ideas.*
3. *To experience working in teams and to receive cordial, meaningful, and persistent advising appropriate to the students' career goals.*
4. *To develop an appreciation of the ethical and legal issues involved in the collection and dissemination of statistical information and experimental design.*

Specific Competencies

Skill in:

1. Using current computer technology for:

collecting, cleaning, and managing data,
exploratory data analysis and the graphical display of data,
inference and simulation studies.
2. Applying statistical methods and probability modeling to real world problems.
3. Critically evaluating the uses of statistics as they relate to experimental design, including the ability to identify appropriate applications and deceptive or erroneous reasoning.
4. Simulating probabilistic outcomes to assess theories appropriate to real-life examples or hypothetical situations.
5. Communicating statistical methodology appropriately to both statisticians and non-statisticians.
6. Applying the theory of statistics.
7. Reading, understanding and applying articles in professional statistics journals.

Pedagogy/Best Practices

We undertake the following as useful pedagogical strategies to be encouraged in the achievement of the objectives listed above:

1. Faculty teaching statistics courses are committed to meeting these objectives for all students.
2. The statistics MS degree incorporates material and assignments with relevance to students' lives, experiences, and future employment, including real world topics and applications.
3. Statistics course materials are presented in a variety of accessible ways that are understandable to students (e.g., lecture, small group and individual problem-solving, everyday applications, projects).
4. The contributions, experiences, and perspectives of various cultural groups are incorporated into the statistics courses, when appropriate.
5. Learning in statistics is viewed as part of a developmental continuum, and students are given instruction and support appropriate to their individual developmental needs.
6. Department and/or institutional support and advising are provided for students at risk for not completing the MS requirements in statistics.

Assessment Tools

Skills are introduced, practiced, and tested throughout the Statistics master's degree. Reinforcement of these skills continues throughout the student's career at CSUH. Students earning the MS degree in Statistics must accomplish two specific tasks.

1. Toward the end of their first year, MS students enroll in the course STAT 6509, Theory of Regression. This course was chosen because it comes at the end of a sequence of required courses and requires the following:
 - A. A term project requiring passing work in skills 1-7 is required to pass this course and proceed to the second year. Students prepare an advanced statistical regression project during the quarter with drafts and progressively more complex computer programs. The project is evaluated for all skills noted above. The project is suitable for demonstrating to a prospective employer the skills of the student concerning programming, writing, data handling, and project completion. The student may combine this project with other course work, such as other projects and applications and graduate mathematical statistics and probability exams, to form a summative portfolio of work in statistics.
 - B. An objective final has been developed by the faculty to test the acquisition and retention of statistical language and knowledge of necessary techniques as outlined in the Goals and Objectives. Rather than test the hands-on nature of the education emphasized in A above, the objective test evaluates the understanding of the student in using the procedures and language studied during the program. This measure permits tracking of deficiencies in the program by discipline area in the first year of the program.
2. Students must pass the comprehensive MS examination in Statistics. Students are required to complete the majority of their master's level program before taking these exams. The exams comprise two parts:
 - A. A closed book exam, covering theoretical and applied problems designed to measure their comprehension of and ability to apply the skills in 1-7 above. This measure permits the evaluation of the student's understanding of theoretical statistics and probability.
 - B. An open book examination, requiring the use of high end statistical programming packages designed to measure the student's ability to apply the methodology of statistics and the skills in 1-7 above. This exam is designed to test the hands-on application of the skills utilizing cutting-edge computer technology.

Departmental Support

We offer appropriate and necessary support for students to complete the Statistics MS requirements, including:

1. Advising to ensure that students select courses appropriate to their needs, interests, and preparation.
2. An adequate number and variety of approved courses each quarter with a variety of instructors over time.
3. Periodic review of courses for frequency of offering (at least once a year), number of sections, variety of perspectives represented, and achievement of departmental objectives (at least at the five-year-review).
4. Active intervention for students identified as at risk of not completing the requirements.
5. Previous exams are held in the Reserve Book Room of the Library and are available for study.
6. Where appropriate, the Department of Statistics will assist students and graduates to meet their goals of applying and attending advanced graduate programs in Statistics or other allied fields. We will advise and provide letters reflecting the character of their work in the programs of the Department of Statistics.

Student Preparation

Students entering the MS degree program in Statistics must complete a foundation of coursework in mathematics through three-quarters of calculus and an introduction to linear algebra. Deficiencies in calculus are noted prior to entry, and students are encouraged to repeat calculus and/or the required background courses if necessary before entry to the program. Normally an introductory course in probability and one in statistics must be completed before entry. Flexible entry points are allowed for students coming from a variety of backgrounds who have completed the minimum requirements.