# ASSESSMENT PLAN — BACHELOR'S DEGREE IN MATHEMATICS

(Program of Study / Major / Degree Level, etc.)

Program Contact: Prof. Rebecca Herb Phone: ext. 55056 E-mail: rah@math.umd.edu

Date submitted to Academic Unit Head: 9/29/06

Program Goals: The Department of Mathematics educates its majors in a broad range of modern mathematics while instilling in them a strong ability to solve problems, apply mathematics to other areas, and create rigorous mathematical arguments. The program prepares the majors to further their mathematical education in graduate school, or to teach at the secondary school level, or to work in government or business.

Relevance of goals to the mission statements and/or strategic plans of the University, College, or Program as applicable: These goals are aligned with the CMPS Mission Statement to "advance modern science through its nationally competitive research and educational programs."

| **Student Learning Outcomes** (list the three-to-five most important) | **Assessment Measures and Criteria** (describe one or more measures for each outcome and criteria for success) | **Assessment Schedule** (initial year, and subsequent cycle) |
|---|---|---|
| 1. Students will acquire problem-solving skills in a broad range of significant Mathematics. | **Assessment Measures:** The Mathematics Department Assessment Committee (MDAC) will select one or more sections of the courses MATH 406 (Number Theory), MATH 463 (Complex Variables), STAT 400 (Probability), or AMSC 460 (Numerical Analysis). In consultation with the faculty members teaching | Begin assessment in 2006, and thereafter assess every third year. |

| | | |
|---|---|---|
| | the course, the MDAC will determine an appropriate problem from each final examination and analyze the solutions of a random sample of the students from the class. In addition, the MDAC will consult with the faculty members teaching that course to ascertain the strengths and weaknesses of the course and the level of preparation of the students.<br><br>**Criteria**: The final exam question used (or constructed with the help of the MDAC) will be one that makes extensive use of the concepts of the course in the solution of the problem. The following criteria will be used when the MDAC evaluates solution:<br><br>1. Correctness: Is the solution correct and is the method of solution appropriate?<br>2. Clarity: Are the steps in the solution clearly presented and relevant to the solution?<br><br>We will expect a 75% success rate for the MDAC evaluation based on the above criteria. | |
| 2. Students will gain an understanding of what constitutes mathematical thinking, including the ability to produce and judge the validity of rigorous mathematical arguments. | 2a. **Assessment Measure**: MATH 410, which is required for the B.S degree in mathematics, emphasizes the student's transition from the problem-solving mode in lower-division calculus courses to more sophisticated mathematical thinking, and simultaneously gives students a firm foundation in the theoretical underpinnings of the calculus. At a minimum, each graduating Math major should | Begin assessment in 2007, and thereafter assess every third year. |

| | | |
|---|---|---|
| | demonstrate an ability to write clear and correct simple proofs and should demonstrate a working knowledge of the concept of approximating more complicated functions by simpler ones and measuring the error. Because of the central role of MATH 410 in the undergraduate mathematics curriculum, each Math Major is required to achieve at least a C in this course. In consultation with the faculty members teaching MATH 410, the MDAC will determine one or more appropriate problems from each MATH 410 final examination and analyze the solutions of a random sample of students from the class. In addition, the MDAC will consult with the faculty members in that course to ascertain strengths and weaknesses of Math 410 and the level of preparation of the students.<br><br>**Criteria**: The final exam question chosen will involve the proof of a significant result drawn from the concepts in Advanced Calculus. The proof will be judged using the following criteria:<br><br>1. Correctness: Is the result rigorously proved?<br>2. Clarity: Is the proof presented in a readable manner?<br>3. Conciseness: Are all of the steps relevant to the proof and are they presented in a concise manner?<br><br>We will expect a 75% success rate for the | |

| | | |
|---|---|---|
| | MDAC evaluation based upon the above criteria.<br><br>2b. **Assessment and Measure**: Each Math Major must take one of three two-course sequences in an advanced undergraduate mathematics subject. The choices are: Analysis: MATH 410, and either 411 or 412; Algebra: MATH 403, and either 404 or 405; Statistics: STAT 410 and 420. One of the courses MATH 411, 412, 403, 404, 405 and STAT 410, 420, will be singled out and in consultation with each faculty member teaching the course, the MDAC will determine an appropriate proof oriented problem from the final examination and analyze the students' solution to the problem. In addition, the MDAC will consult the faculty members to assess the strengths and weakness of the course and the level of preparation of the students.<br><br>**Criteria**: Same as Goal 2a except for the course chosen and the fact that the sophistication expected for the proof will be higher. | |
| 3. Students will be able to communicate mathematical ideas and arguments. | **Assessment and Measure**: The MDAC will solicit a volunteer from the professors teaching one of the Math Major Upper Level courses. Toward the end of the semester, the chosen faculty member will give a short written assignment to the students in the class, which assignment will be assessed for this goal with a carefully worked out rubric and an appropriate rating scale based on this rubric, assessing the students' ability to write coherent mathematics. | Begin assessment in 2008, and thereafter assess every third year. |

| | | |
|---|---|---|
| | The results will be analyzed by the MDAC.<br><br>**Criteria**: In this goal a short, expository essay on a small body of mathematics included in the course will be written by the student (as opposed to an original solution of a problem or an original proof constructed by the student). The exposition will be judged by the following criteria:<br><br>1. Correctness: Are all of the statements made in the essay valid?<br>2. Clarity: Is the topic well motivated and can it be read without undue difficulty?<br>3. Conciseness: Is the exposition to the point?<br>4. Is the exposition in good English?<br><br>We will expect a 75% success rate on this goal. | |
| 4. Students will be prepared to use mathematics in their future endeavors, not only in the discipline of mathematics but also in other disciplines. | **Assessment and Measure**: Students with a B.S. in Mathematics from the University will be surveyed approximately one year after graduation and again four years after graduation. The survey instrument will be designed to assess their preparation for the three main directions in which students with a B.S. in Mathematics from the University tend to go upon graduation: graduate school in a quantitative discipline, secondary school teaching, or working in government or business. | The Math Department in coordination with the CMPS Dean's office will organize and enhance its database on graduates with Math Majors. It will develop an appropriate survey instrument by the end of Fall 2006. The first survey will be conducted in 2007. The |

| | | |
|---|---|---|
| | | MDAC will be responsible for analyzing this data and making recommendations from their analysis for the Math Major Program. |