

5b. Department Profile of Institutional Effectiveness (PIE) (prepared by Department)

William & Mary is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools (SACS). In order to meet the SACS standards of institutional effectiveness, each academic department and program has defined a “profile of institutional effectiveness” that describes what the faculty expects students to learn, how the curriculum is organized to provide experiences that promote and reinforce learning expectations, and methods for evaluating program level learning. As institutional effectiveness is fully implemented, the profiles also will show how the process is used to make decisions designed to improve and enhance student learning. Specifically, at William and Mary academic profiles of institutional effectiveness focus on the following elements:

- A clearly stated PURPOSE that links each department, program, or office to the institutional mission or general operations of the College
- Clearly stated FACULTY EXPECTATIONS FOR STUDENT LEARNING
- Clear statements about LEARNING EXPERIENCES
- STUDENT WORK used to evaluate learning
- DECISIONS oriented to improving student learning

The profile for the Mathematics Department is presented below.

<p>Purpose: Mathematics</p> <p>The Mathematics Department has four main distinct roles to play in the instructional life of the University. It offers an undergraduate concentration in Mathematics, it is largely responsible for curriculum and instruction in the Computational Operations Research (COR) Master’s degree program, it provides a variety of beginning and advanced courses needed by students in the sciences and other curricula, and, finally, it is the primary provider of courses offered for GER-1 (Mathematics and Quantitative Reasoning) credit. In the process of responding to these tasks, faculty in the Department are regularly engaged in research. Topics of interest include pure and applied mathematics and mathematics education. Specific research interests of particular faculty members, occasionally draw students to the department to write PhD theses; the degree being awarded in cooperation with the Applied Science Department.</p>		
<p style="text-align: center;">Expectations What Should Students Learn?</p>	<p style="text-align: center;">Experiences How Will Students Learn It?</p>	<p style="text-align: center;">Evaluations What Student Work Will Be Used as Evidence of Learning?</p>
<p style="text-align: center;">Major Expectations: Mathematics</p>	<p style="text-align: center;">Major Experiences: Mathematics</p>	<p style="text-align: center;">Major Evaluations: Mathematics</p>
<p>1. Students will be able to understand and write mathematical proofs.</p>	<p>1. This is the primary goal of the required course Math 214 and of the courses Math 307 and 311 (Math 307 and 311 are required in the "standard track" within the math major, and students in the "applied" and "pre-college teaching" tracks choose one of 307 and 311). In addition, every upper division mathematics course includes a large component of proofs, and some -- such as Math 403 (Intermediate Analysis), Math 426(Topology), and Math 430 (Abstract Algebra II) -- are deeply devoted to building proof skills. Each of these courses require frequent graded homework as well as multiple exams where the students practice their developing proof-skills.</p>	<p>1. Students’ accomplishments in understanding and writing proofs are evaluated by assigned homework and examinations in Math 214, 307, and 311 and in students’ upper division elective courses.</p>

<p>2. Students will be able to make mathematical models of applied problems.</p>	<p>2. Students begin to learn mathematical modeling skills in the three required Calculus Courses, and the required Linear Algebra course (Math 211) gives them familiarity with matrix algebra whose techniques are central to applications. In addition, applications skills and some important supporting mathematics are further developed in upper division elective courses such as Math 302(Differential Equations), Math 323 and 424 (Operations Research), Math 345 (Mathematical Biology), Math 351 (Applied Statistics), Math 413-414 (Numerical Analysis), Math 417 (Vector Calculus), and Math 441 (Applied Mathematics for Sciences).</p>	<p>2. Students' abilities in mathematical modeling are evaluated through laboratory assignments and examinations in our Calculus courses, and through graded homework and examinations in the courses listed in point 2 under "Experiences".</p>
<p>3. Students will be able to explain mathematics orally and in writing to others.</p>	<p>3. Students' ability to communicate mathematics (pure or applied) to others is developed through the graded homework and examinations in all upper division courses. In addition, the department's Major Writing Requirement involves a mixture of independent study of some advanced mathematical topic, combined with written and oral presentations of their topic to others. Students normally fulfill this Major Writing Requirement through Math 490 (Senior Seminar) or Math 495-6 (Honors Thesis).</p>	<p>3. Students' ability to explain mathematics in writing is evaluated through graded homework and examinations in all upper division mathematics courses, and students' oral presentation skills are evaluated in the department's Major Writing Requirement (normally fulfilled through Math 490 or Math 495-6).</p>