1. Basis for the current plan
   a. Departmental self-study (May 2001)
   b. Curricular and staffing changes
      i. New computer science position
      ii. Revised mathematics and computer science majors
         (During the Spring Semester, 2004, the mathematics major was significantly altered. See attached description)
   c. Rationale
      With respect to outcomes and assessment strategies, the department will focus on the technology standard in a series of meetings throughout the 2004 – 2005 academic year. We chose this standard for the following reasons. (1) Our new computer science position created discussions that resulted in revisions of the computer science major. The courses required did not change much, but the need for students to master technology has shifted.  (2) The mathematics major has been revised considerably. One component this revision includes an emphasis on clear exposition. We believe such exposition is encouraged when students are exposed to sophisticated mathematical typesetting software. To use the latter, of course, involves, again, the mastery of new technology. (3) The department’s self-study gave specific rationale why we want to pay specific attention to technology. (For example, “We must have ability and fluency in the usage of technology without allowing technology to take the place of human relationships and personal interactions.”)

2. Goals
   Overview
   The mission of the department is to provide opportunities for our students to educate themselves in the disciplines of mathematics and computer science, and to assist in their general intellectual, moral, and spiritual growth as Christian thinkers. The educational opportunities include: an understanding of and an ability to articulate the broad content, historical context, and philosophical questions naturally connected with these disciplines; a critical appreciation of the disciplines for their own sake as well as of role they play in society; an understanding of the relationship between these disciplines and other spheres of knowledge; a vision for the use of knowledge acquired for service as a disciple of Christ.

   In the department’s self-study we identified three goals relevant to the technology standard.

   a. Students will be familiar with technology and software relevant to their majors.
   b. Students will be proficient in the use of electronic resources in research and critical evaluation of data.
   c. Students will develop sound ethical perspectives on technology.
3. Inputs Relating to Assessment in Technology

There are many ways in which we assess the use of technology. Primarily, we intend to evaluate the end products that students create through the use of technology, but in some cases the process of using the technology is observed as well. By *end products*, we mean:

- Papers that are prepared using word processor software. (Such papers are graded for professional appearance as well as content.)
- Computer programs completed as graded assignments that make use of an integrated development environment for development, debugging, and testing.
- Oral presentations by students that make use of visual aids, including PowerPoint slides.
- Use of graphing calculators during class.
- Graded assignments that require the use of graphing calculators.
- Graded statistics journals that document the use of statistics in media.
- Supervised computer laboratory sessions.
- Monitoring of online threaded discussions.
- Required online submission of assignments.

The following, taken from the department’s self-study, clarifies the goals mentioned on the previous page.

a. **Students will be familiar with technology and software relevant to their majors.**

   **General software:**
   Students are to be proficient in
   - Word processing programs (*most courses*)
   - Communication through email (*most courses*)
   - World wide web access (materials posted on our course websites include syllabi, assignments, PowerPoint lecture slides, links to related online materials, Java applets, and exemplary student solutions) (*most courses*)
   - Blackboard, WebCT (*CS 10, 20, 30: Introduction to Computer Science, CS 120: Data Structures and Algorithms, CS 105: Programming Languages, and numerous courses in the near future*)
   - PowerPoint slides created by students for oral presentations (*CS 120: Data Structures and Algorithms*)
   - Excel usage (*Math 5: Introduction to Statistics*)

   **Discipline-specific software:**
   In addition to general software, the department requires the learning and/or use of various software packages specific to mathematics and computer science. Such software includes integrated development environments for developing software, simulation packages, and graphing software.
   - Visual C++ (*CS 10, 20, 30: Introduction to Computer Science, CS 120: Data Structures and Algorithms*)
   - Java JDK (*CS 130: Software Development*)
   - Lisp (*CS 116: Artificial Intelligence*)
   - Visual Prolog (*CS 105: Programming Languages*)
Many majors are expected to acquire knowledge of additional discipline specific software through work in the Information Technology department and through internships. In addition to teaching students to use software, we also make use of technology as a teaching aid during class sessions. For example, we demonstrate various algorithm animations as an aid to visualizing algorithms in a number of our computer science courses. We also use computer animations to enhance the learning of calculus ideas, which focus on quantities that are continually changing.

Hardware:
Students in our program are expected gain familiarity with a variety of computers and other hardware items through usage in class and during laboratory sessions.

- Windows NT computer lab (laboratory sessions for CS 10 and 20: Introduction to Computer Science)
- Sun workstation (Unix) lab (research projects in distributed systems and CS 140: Networks)
- Microprocessor boards (CS 45: Computer Organization and Architecture)
- Computer, digital projector and visualizer in technology classrooms (most courses)

b. Students will be proficient in the use of electronic resources in research and critical evaluation of data.
Students are expected to access electronic resources routinely. Materials are available through our departmental and course websites for almost all of our courses, and students are required to access this information. Several courses also make use of materials available at Blackboard or WebCT. A number of our courses require papers or projects in which students are expected to conduct research using online resources as well as print media. With regard to the critical evaluation of data, in one class, students keep a notebook that includes examples of the misuse of statistics in the media. Students also are taught to perform estimation in order to evaluate the correctness of calculations.

- Access information using departmental and course web pages (most courses)
- Blackboard/WebCT (CS 10, 20, 30: Introduction to Computer Science, CS 120: Data Structures and Algorithms, CS 105: Programming Languages, and numerous courses in the near future)
- Research project using online resources (CS 105: Programming Languages)
- Use of online documentation for C++, Java languages (CS 30: Introduction to Computer Science, CS 130: Software Development)
• Students keep a statistics notebook that includes examples of the use and misuse of statistics in media (*Math 5: Introduction to Statistics*)
• Estimation to evaluate the correctness of calculations (*numerous mathematics courses*)

c. **Students will develop sound ethical perspectives on technology**
   With the proliferation of internet access, all our students are expected to know what constitutes plagiarism in terms of using internet resources. In addition, our introductory computer science courses (CS 5, 10, and 30) include a component on ethics in technology. Students are expected to have sound ethical values relating to
   • Software piracy, intellectual property rights (including an online discussion about the ethics of Napster)
   • Security and privacy of electronic information
   • Safety and dependability of electronic systems
   • Illicit use of computer resources
   • The “digital divide” between those with access to technology and those without
   • Pornographic materials on the internet