Program Name: BS in Computer Science (concentration in Software and Scientific Computing)

1. Program Mission

The mission of this program is to provide quality undergraduate education in computer science so as to prepare our graduates to compete in the job market and to contribute to the economic, scientific, and social development of the Middle Tennessee area, the State of Tennessee, and the Nation. The curriculum will be grounded in the fundamental principles of computing and will prepare our students to apply these principles creatively and responsibly with a high degree of professionalism and a clear understanding of ethical and legal issues in computer science. The Department will utilize available resources to impart state-of-the-art technical knowledge, develop students’ verbal and written communication skills, and instill a desire to pursue lifelong learning.

This specific program focuses on developing the skills needed to design and develop software-based solution.

2a. Program Goals

- To provide quality undergraduate education in computer science so as to prepare our graduates to compete in the job market.
- To inspire students to pursue a high level of education and research experience, and to make a lifelong commitment to continuous learning and personal contribution in their chosen field of research, teaching, and/or industry.
- To contribute to the economic, scientific, and social development of the Middle Tennessee area, the State of Tennessee, and the Nation.

2b. Student Learning Outcomes

- An ability to apply knowledge of computing and mathematics appropriate to the discipline
- An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- An ability to function effectively on teams to accomplish a common goal
- An understanding of professional, ethical, legal, security and social issues and responsibilities
- An ability to communicate effectively with a range of audiences
- An ability to analyze the local and global impact of computing on individuals, organizations, and society
- Recognition of the need for and an ability to engage in continuing professional development
- An ability to use current techniques, skills, and tools necessary for computing practice.
- An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
• An ability to apply design and development principles in the construction of software systems of varying complexity.

3. Assessment Methods for Measuring Progress on Objectives

• Major Field Test (MFT)
• Exit interviews
• Interactions with employers
• Experiences with the student both inside and outside of class

4. Results of Assessment

• MFT percentiles are consistently above 50%, but we did notice our score in the systems category was low when we did not require Operating Systems. The highlighted scores in the table below indicated to us that we had a problem that needed to be addressed.

<table>
<thead>
<tr>
<th>MFT category</th>
<th>Sp 05</th>
<th>Fa 05</th>
<th>Sp 06</th>
<th>Fa 06</th>
<th>Sp 07</th>
<th>Fa 07</th>
<th>Sp 08</th>
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<th>Fa 09</th>
<th>Sp 10</th>
<th>Fa 10</th>
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<tbody>
<tr>
<td>Programming Fundamentals</td>
<td>95</td>
<td>45</td>
<td>80</td>
<td>70</td>
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<td>95</td>
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<td>70</td>
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<tr>
<td>Systems</td>
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<td>45</td>
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<tr>
<td>Theory</td>
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<td>60</td>
<td>75</td>
<td>65</td>
<td>85</td>
<td>85</td>
<td>85</td>
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<td>96</td>
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<td>82</td>
</tr>
</tbody>
</table>

• Exit interviews showed that students generally felt well prepared by this program but that they consistently felt they had not had enough time in their project courses and that they want more programming languages taught to them.
• Our employers expressed a desire for us to focus more on C/C++ than Java, give students more exposure to large-scale project experiences, and provide more opportunities to develop communication and teamwork skills.
• Faculty identified courses in which students have not been as prepared as we hoped by the prerequisites. This analysis has helped identify opportunities to improve the intro sequence and to further develop design skills. Specifically, we worked on our Introduction to Programming and the associated lab (CSC 2100, CSC 2101), Data Structures and Algorithms and the associated lab (CSC 2110, CSC 2111), and Object-Oriented Programming and Design and it associated lab (CSC 2120, CSC 2121).

5. Summary of Key Continuous Improvement Achievements and Impact on the Program

• Changing the order of our introductory programming languages has improved our support for many of our constituents.
• Adding software design earlier in the curriculum has improved student preparedness for software engineering.
• Adding computer architecture and operating systems to the required curriculum better prepares our students for the Major Field Test.
• Adding a 2-semester senior design sequence gives our students more meaningful real-world, team-based project experience.
Program Name: BS in Computer Science (concentration in Information Technology)

1. Program Mission

The mission of this program is to provide quality undergraduate education in computer science so as to prepare our graduates to compete in the job market and to contribute to the economic, scientific, and social development of the Middle Tennessee area, the State of Tennessee, and the Nation. The curriculum will be grounded in the fundamental principles of computing and will prepare our students to apply these principles creatively and responsibly with a high degree of professionalism and a clear understanding of ethical and legal issues in computer science. The Department will utilize available resources to impart state-of-the-art technical knowledge, develop students’ verbal and written communication skills, and instill a desire to pursue lifelong learning.

This specific program focuses on developing the skills needed to succeed as a system or network administrator

2a. Program Goals

- To provide quality undergraduate education in computer science so as to prepare our graduates to compete in the job market.
- To inspire students to pursue a high level of education and research experience, and to make a lifelong commitment to continuous learning and personal contribution in their chosen field of research, teaching, and/or industry.
- To contribute to the economic, scientific, and social development of the Middle Tennessee area, the State of Tennessee, and the Nation.

2b. Student Learning Outcomes

- An ability to apply knowledge of computing and mathematics appropriate to the discipline
- An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- An ability to function effectively on teams to accomplish a common goal
- An understanding of professional, ethical, legal, security and social issues and responsibilities
- An ability to communicate effectively with a range of audiences
- An ability to analyze the local and global impact of computing on individuals, organizations, and society
- Recognition of the need for and an ability to engage in continuing professional development
- An ability to use current techniques, skills, and tools necessary for computing practice.
- An understanding of processes that support the delivery and management of information systems within a specific application environment.

3. Assessment Methods for Measuring Progress on Objectives
4. Results of Assessment

- Exit interviews showed many of the initial students in this program felt ill prepared for the job market. In open-ended questions, multiple students across multiple years cited concerns about the lack of certification-oriented classes and about the lack of hands-on IT experiences.
- Students and faculty both identified a need for a culminating experience (like senior design).
- Faculty noted problems with ability of IT students to take classes due to our prerequisite structure and to class availability. This led to an inordinate number of exceptions & substitutions.
- Comparing our curriculum to recommendations from ACM and ABET highlighted some content we were missing.
- Interviews with students showed that this program was considered the “easier” of our undergraduate programs.

5. Summary of Key Continuous Improvement Achievements and Impact on the Program

- To help with reducing exception and substitutions, we replaced non-CS courses that were not regularly taught and we revisited our prerequisite structure in light of this program.
- To increase job market preparedness, we added a certification-oriented storage course and a two-semester internship to provide real-world experience and to further develop communication and teamwork.
- To address concern with rigor and to support a common first year with our CSSC program, we now require Calculus I.
- To help us comply with recommended curricula we replaced some non-CS courses with a Foundations of IT course, a Networking for IT course, a Web Programming course, and a Human/Computer Interfaces course.
Program Name: MS in Computer Science (concentration in Internet-Based Computing)

1. Program Mission

The mission of this program is to provide quality graduate education in computer science so as to prepare our graduates to compete in the job market and to contribute to the economic, scientific, and social development of the Middle Tennessee area, the State of Tennessee, and the Nation. The curriculum will be grounded in the fundamental principles of computing and will prepare our students to apply these principles creatively and responsibly with a high degree of professionalism and a clear understanding of ethical and legal issues in computer science. The Department will utilize available resources to impart state-of-the-art technical knowledge, develop students’ verbal and written communication skills, and instill a desire to pursue lifelong learning.

This specific program focuses on developing skills and the knowledge needed to understand and apply research in Internet-Based Computing with an emphasis in information assurance and security, intelligence and informatics, or distributed computing.

2a. Program Goals

- To provide industry, academia, and society with highly qualified graduate Computer Scientists who possess state-of-the-art knowledge in the field of CS, as well as the research, critical-thinking, and leadership skills necessary to be globally competitive.
- To inspire students to pursue a high level of education and research experience, and to make a lifelong commitment to continuous learning and personal contribution in their chosen field of research, teaching, and/or industry.
- To establish and foster a culture of curiosity, excitement, collaboration, and engagement in the global research community, with a commitment to quality and academic integrity, thereby gaining national and international recognition for TTU’s CS program.

2b. Student Learning Outcomes

- An ability to critically analyze computer science research literature
- An ability to synthesize state-of-the-art computer science research literature into their professional work.
- An ability to communicate effectively with a range of audiences
- Recognition of the need for and an ability to engage in continuing professional development
- An ability to demonstrate a high degree of proficiency in their chosen track of study

3. Assessment Methods for Measuring Progress on Objectives

- Graduate Oral Exams
- Graduate Projects
- Graduate Theses
- Computer Programs/Projects, Papers, Exams, and Presentations in Graduate Classes
4. Results of Assessment

- Oral exams have been too ad hoc and need more structure to provide more meaningful feedback.
- Students were relying on too many special topics courses.
- Weak projects/theses cause us to examine our processes. We have noticed that weak theses often didn’t follow the suggested milestone timeline indicating that they were rushed.
- Daytime courses often weren’t accessible to working students

5. Summary of Key Continuous Improvement Achievements and Impact on the Program

- We have added more structure to our curriculum (common core + track courses + elective). We are basing revised oral exams on this new curriculum structure.
- Developed additional courses that support our research areas. There has been a dramatic decrease in the use of special topics courses.
- Reinforced milestone timeline with advisors and we are seeing an improved in timeline adherence that should result in higher quality theses and projects.
- Added asynchronous distance education sections. Access has been improved. Students who could not otherwise attend our courses.