UNIT REPORT

Computer Science BS - Final Annual Report

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CSC Mission Statement

Start: 07/01/2017

End: 06/30/2018

Providing Department: Computer Science BS

Department/Unit Contact: Doug Talbert

Mission/Vision/Goal Statement:

The mission of the Computer Science Department is

“To graduate computer scientists and information technologists who contribute to society, their community, and the world by solving technical challenges with professionalism and creativity.”

This mission is consistent with the University’s mission to “provide leadership and outstanding programs in engineering, the sciences, and related areas that benefit the people of Tennessee and the nation” and with the University’s commitment to the life-long success of students and to enrich the lives of people and communities in the Upper Cumberland region of Tennessee.

It is also consistent with Flight Plan, the University’s strategic plan, and it’s focus on improving student experience, transforming technology, and creating distinctive programs.

Program Goal 1: Professionalism

Define Goal:

Our graduates will exhibit the clear communication, responsible teamwork, commitment to quality, and professional attitudes and ethics needed to engage in successful careers in industry, academia, and public service.

Intended Outcomes / Objectives:

4. Students will demonstrate an ability to function effectively on teams to accomplish a common goal.

5. Students will demonstrate an understanding of professional, ethical, legal, security and social issues and responsibilities.

6. Students will demonstrate an ability to communicate effectively with a range of audiences.

7. Students will demonstrate an ability to analyze the local and global impact of computing on individuals, organizations, and society.

Program Goal 2: Leadership

Define Goal:

Our graduates will provide technical leadership for their business, profession, and community.

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Intended Outcomes / Objectives:

4. Students will demonstrate an ability to function effectively on teams to accomplish a common goal.

6. Students will demonstrate an ability to communicate effectively with a range of audiences.

CSSC 10. Students will demonstrate 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.

CSIT 12. Students will demonstrate an ability to effectively integrate IT-based solutions into the user environment.

CSIT 14. Students will demonstrate an ability to assist in the creation of an effective project plan.

Program Goal 3: Economic impact

Define Goal:

Our graduates will enhance the economic well being of the Upper Cumberland and the state of Tennessee and the nation through their technical expertise and leadership.

Intended Outcomes / Objectives:

2. Students will demonstrate an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

3. Students will demonstrate an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.

7. Students will demonstrate an ability to analyze the local and global impact of computing on individuals, organizations, and society.

9. Students will demonstrate an ability to use current techniques, skills, and tools necessary for computing practice.

CSSC 11. Students will demonstrate an ability to apply design and development principles in the construction of software systems of varying complexity.

CSIT 10. Students will demonstrate an ability to use and apply current technical concepts and practices in the core information technologies.

CSIT 11. Students will demonstrate an ability to identify and analyze user needs and take them into account in the selection, creation, evaluation and administration of computer-based systems.

CSIT 13. Students will demonstrate an understanding of best practices and standards and their application.

Program Goal 4: Life-long learning

Define Goal:

Our graduates will adapt to new technologies, tools and methodologies to maintain their ability to respond to the challenges of a changing environment.

Intended Outcomes / Objectives:

1. Students will demonstrate an ability to apply knowledge of computing and mathematics appropriate to the discipline.

8. Students will demonstrate recognition of the need for and an ability to engage in continuing professional development.

CSC 3030 (Practical and Professional Issues in Computer Science) components

Goal/ Outcome/ Objective: Goals 1-4/Learning Outcomes 5, 6, 7

Type of Tool: Other

Frequency of Assessment: Every spring semester

Rationale:

This course focuses primarily on social and ethical issues relating to the computing field. It also has a significant communication component. Specific assignments and test questions are used for assessment purposes.

CSC 3300 (Database Management Systems) components

Goal/ Outcome/ Objective: Goals 1-4/Learning Outcomes 9, CSSC 10, CSSC 11

Type of Tool: Other

Frequency of Assessment: Every fall and spring semester

Rationale:

This senior-level course has a significant implementation component. The course requires students to understand and make use of software design principles. Specific assignments and test questions are used for assessment.

CSC 4100 (Operating Systems) components

Goal/ Outcome/ Objective: Goals 1-4/Learning outcomes 3, 9, CSSC 10, CSSC 11

Type of Tool: Other

Frequency of Assessment: Each spring semester

Rationale:

This senior-level course has a significant implementation component. The course requires students to understand and make use of software design principles. Specific assignments and test questions are used for assessment.

California Critical Thinking Skills Test (CCTST)

Goal/ Outcome/ Objective: Goals 1-4/Learning Outcome 2

Type of Tool: Exit Exam

Frequency of Assessment: Each year

Rationale:

The CCTST is based on the Delphi Expert Consensus Definition of Critical Thinking. It is used to predict strength in critical thinking in authentic problem situations and success on professional licensure examinations. We consider it one measure of students' problem analysis/solving ability.

Capstone project external customer reviews

Goal/ Outcome/ Objective: Goals 1-4/Learning Outcomes 2, 3, 5, 6, 9, CSSC 11

Type of Tool: Capstone Project

Frequency of Assessment: Every fall and spring semester

Rationale:

This allows us to get direct measures on a number of learning outcomes from an external evaluator. This is an excellent tool because the capstone projects are large-scale, real world, and team-based. There is no other place in the CSSC curriculum that combines such a project experience with an external customer. The software engineering committee summarizes the tool results, and the full faculty and the external advisory board discuss the summary and identify corrective steps (if needed).

Capstone project peer reviews by teammates

Goal/ Outcome/ Objective: Goals 1-4/Learning Outcome 4

Frequency of Assessment: Every fall and spring semester

Rationale:

These are used to evaluate the ability of CSSC students to function effectively as a team. Each student in this course participates as part of a 4- to 5-person team for two semesters. Because of that, it is an ideal time to capture scores for teamwork ability. The software engineering committee summarizes the tool results, and the full faculty and the external advisory board discuss the summary and identify corrective steps (if needed).

ETS Computer Science Major Field Test (CS-MFT)

Goal/ Outcome/ Objective: Goals 1-4/Learning Outcome 1 and 9

Frequency of Assessment: Each fall and spring semester

Rationale:

This standardized test provides direct assessments of programming/software engineering, discrete structures/algorithms, and architecture/OS/networks/databases. Since this test is given to graduating seniors, it is an appropriate tool to measure of student's abilities at the time of graduation. It is a standardized test based on nationally defined expectations for computer science graduates. The department chairperson summaries the results, and the full faculty and the external advisory board discuss the summary and identify corrective steps (if needed).

Faculty Course Surveys

Goal/ Outcome/ Objective: Goals 1-4/Learning Outcomes 1-9, CSSC 10-12, CSIT 10-14

Type of Tool: Survey

Frequency of Assessment: Every fall and spring semester

Rationale:

At the end of each semester, we ask faculty to fill out a survey for each courses they taught to indicate how well they believe students achieved attainment on the student outcomes addressed in that course. They also address student preparedness, evaluate changes to course, and suggest future changes.

Internship Evaluations

Goal/ Outcome/ Objective: Goals 1-4/Learning Outcomes CSIT 10-14

Type of Tool: Other

Frequency of Assessment: Each semester

Rationale:

These are the CSIT counterparts to the CSSC program's capstone evaluations. It is the best opportunity to get external evaluation of real world, team-based project work. The internship coordinator reviews the performance reports and brings any concerns to the full faculty and the external advisory board to discuss and identify corrective steps (if needed).

Recent Alumni Survey

Goal/ Outcome/ Objective: Goals 1-4

Type of Tool: Survey

Frequency of Assessment: Every other year

Rationale:

These are used to assess our program goals since those goals can only be measured after graduation. There are no other mechanisms available to us to measure goal attainment. Survey results and their implications are discussed at faculty meetings and with our department's external

advisory board. Both groups contribute to determining which (if any) corrective actions should be taken.

Security modules throughout multiple courses

Goal/ Outcome/ Objective: Goals 1-4/Learning Outcome 5

Type of Tool: Other

Frequency of Assessment: Each fall and spring semeter

Rationale:

These modules have been developed by our faculty under an NSF grant and have been incorporated into a number of upper division required courses to better integrate security education throughout our curriculum. They each include a learning outcome assessment component.

Student Exit Survey

Goal/ Outcome/ Objective: Goals 1-4/Learning Outcomes 1-9, CSSC 10-12, CSIT 10-14

Type of Tool: Survey

Frequency of Assessment: Each fall and spring semester

Rationale:

These surveys provide an opportunity for graduating seniors to reflect on their experiences at TTU and for us to ask several questions related to student learning outcomes. We must wait until this point to ensure that the student can reflect on all of his or her experiences. The results are summarized, and the full faculty discuss the summary and identify corrective steps (if needed).

3030/3040 Knowledge Area Assessments

Results:

We consider a score of 80 to be satisfactory.

Combined scores for 3030 and 3040

Knowledge assessed	Outcome	Spring 13	Spring 14	Spring 15
Professional	5	79.5	76.6	64.9
Ethical	5	72.1	85.3	72.8
Legal	5	91.4	87.8	76.3
Security	5	85.9	82.7	79.2
Social issues and responsibilities	5	77.9	79.8	77.9
Local and global impact	7	85.2	91.6	70.5

Scores for just 3040

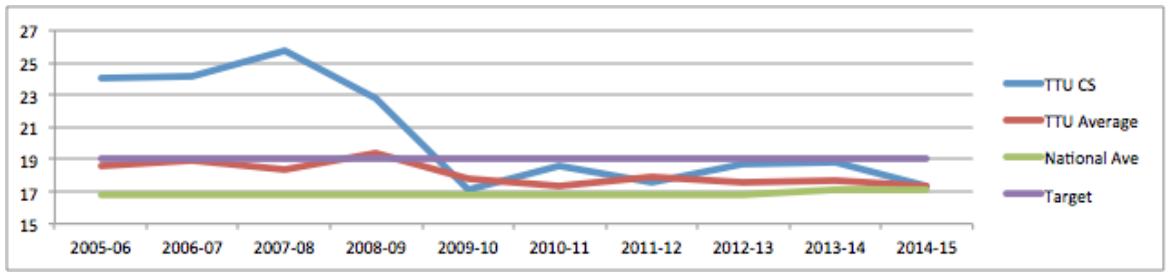
Knowledge assessed	Outcome	Spring 15
Professional	5	71.9
Ethical	5	78.1
Legal	5	83.9
Security	5	88.4
Social issues and responsibilities	5	89.1
Local and global impact	7	81.3

CCTST Results

Results:

We consider a score of 19 to be satisfactory.

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
TTU CS	24	24.2	25.7	22.8	17.1	18.6	17.6	18.7	18.8	17.3
TTU Average	18.6	18.9	18.4	19.4	17.8	17.4	17.9	17.6	17.7	17.3
National Ave	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	17.1	17.1



CSC 3300 Knowledge Area Assessments

Results:

The desired level of attainment for each assessment is 80%.

Learning outcome	Assessment tool(s)	S13	F13	S14	F14	S15
9	Selected questions on quizzes & homework assignments	86.4	86.32	81.42	75.6	73.6
CSSC 10	Selected questions on quizzes & homework assignments	78.2	80.04	80.45	73.7	70.9
CSSC 11	Selected questions on quizzes	86.5	89.53	86.53	73.6	78.3

CSC 4100 Knowledge Area Assessments

Results:

The desired level of attainment for each assessment is 80%.

Learning outcome	Assessment tool(s)	S13	S14	S15
3	Selected questions on quizzes	91.4	94.32	87.2
9	Selected questions on quizzes & programming assignments	76.7	80.29	77.6
CSSC 10	Selected questions on quizzes	86	80.73	69
CSSC 11	Selected questions on quizzes & programming assignments	93.9	90.01	77.1

Capstone results

Results:

The desired level of attainment for external evaluations is 8.0.

CSC 4610 External Evaluations

Category rated	Learning outcome	F12 score (out of 10)	F13 score (out of 10)	F14 score (out of 10)
Team Professionalism	5	9.6	9.1	9.1
Handling of Questions and Concerns	6	9.2	9.4	9.9
Analysis/Identification of Requirements	2	8.6	9.4	9.9
Communication	6	9.4	9.6	9.3
Meeting Overall Expectations	N/A	9.6	9.9	9.9

CSC 4620 External Evaluations

Category rated	Learning outcome	S13 score (out of 10)	S14 score (out of 10)	S15 score (out of 10)
Team Professionalism	5	9.2	9.3	8.3
Appropriate Use of Technologies	9	9	9.7	9.1
Analysis/Understanding of Requirements	2, 3	9.2	9.6	8.9
Communication	6	8.6	9.1	8.9
Meeting Overall Expectations	N/A	9.4	9.7	8.9

The desired level of attainment for peer reviews is 80%.

CSC 4610/4620 Peer Reviews

Course	Term	Average Peer Review
CSC 4610	Fall 2012	95.2
CSC 4620	Spring 2013	93.5
CSC 4610	Fall 2013	93.2
CSC 4620	Spring 2014	92.3
CSC 4610	Fall 2014	90.2
CSC 4620	Spring 2015	89

Exit Survey Results

Results:

The desired level of attainment for each assessment is 80%.

Responses from CSSC students

1. Percent rating the program as good or excellent at achieving each CSSC objective

% ‘excellent’ or ‘good’	S12-F13	F12-S14	S13-F14	F13-S15
# of graduates	29	39	43	57
# of responses	25	33	36	40
outcome 1	92%	91%	92%	93%
outcome 2	88%	91%	92%	95%
outcome 3	100%	97%	94%	95%
outcome 4	84%	82%	81%	83%
outcome 5	76%	76%	75%	83%
outcome 6	80%	70%	69%	70%
outcome 7	81%	74%	73%	75%
outcome 8	88%	91%	92%	95%
outcome 9	96%	91%	92%	85%
CSSC 10	92%	88%	89%	90%
CSSC 11	100%	97%	94%	93%

2. Percent of respondents participating in professional clubs/activities while at TTU

Semesters	% in professional activities	# of respondents
F12-S14	84.8	33
S13-F14	86.1	36
F14-S15	92.5	40

Responses from CSIT students

1. Percent rating the program as good or excellent at achieving each CSIT objective

% ‘excellent’ or ‘good’	S12-F13	F12-S14	S13-F14	F13-S15
# of graduates	43	44	49	55
# of responses	24	20	22	27
outcome 1	78%	75%	77%	81%
outcome 2	87%	80%	82%	89%
outcome 3	70%	60%	73%	81%
outcome 4	96%	90%	82%	85%
outcome 5	91%	90%	95%	93%
outcome 6	83%	85%	82%	93%
outcome 7	74%	75%	77%	78%
outcome 8	78%	80%	86%	93%
outcome 9	96%	85%	82%	85%
CSIT 10	91%	90%	86%	89%
CSIT 11	87%	80%	86%	89%
CSIT 12	78%	75%	77%	85%
CSIT 13	87%	85%	86%	85%
CSIT 14	74%	70%	73%	81%

2. Percent of respondents participating in professional clubs/activities while at TTU

Semesters	% in professional activities	# of respondents
F12-S14	85.7	21
S13-F14	95.7	23
F14-S15	100	28

Internship Evaluation Results

Results:

Percent of intern students who believe their internship contributed positively to the specified learning outcomes. The desired level of attainment for each assessment is 80%.

learning outcome	% Agree or Strongly Agree
CSIT 10	100
CSIT 11	93.33
CSIT 12	100
CSIT 13	100
CSIT 14	86.67

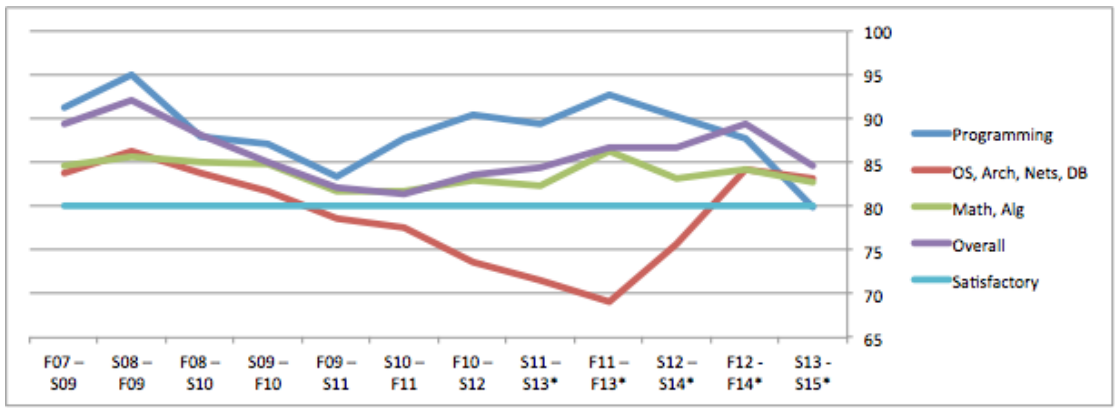
Major Field Test

Results:

We consider a score of 80 to be satisfactory.

Time period	Programming	OS, Arch, Nets, DB	Math, Alg	Overall
S13 - S15*	**79.9**	83.2	82.7	84.7
F12 - F14*	87.8	84.3	84.3	89.4
S12 – S14*	90.3	**75.7**	83.2	86.8
F11 – F13*	92.7	**69.1**	86.2	86.8
S11 – S13*	89.4	**71.6**	82.4	84.4

*We had too few graduates in Fall 2012 to get a report from ETS, so we had to combine Fall 2012 and Spring 2013 into a single cohort. We believe this is due to the implementation of our new two-semester capstone course that starts every fall semester. Thus, more students will complete their coursework in spring.



Security Module Scores

Results:

The desired level of attainment for each assessment is 80%.

Course with SecKnitKit module	2012-13	2013-14	2014-15
Operating Systems	90.9	90.9	94.1
Databases	93.5	93.5, 97.9*	88.3, 97.9*
Networks	N/A**	87.2	87.7
Software Engineering/Capstone I	N/A**	86.4	92.6
Software Engineering/Capstone II	93.5	90.1	84.4

*Databases was offered both in the Fall and the Spring this year. So we have two scores.

**In 2012-13, we did not obtain security scores for Software Engineering/Capstone I or Networks because they were not part of the SecKnitKit evaluation that year.