

ABET
Annual Report

for the

B.S. in Computer Science

at

Lamar University

Beaumont, Texas

July 7, 2023

CONFIDENTIAL

The information supplied in this Self-Study Report is for the confidentialiation5supplied in this Self

Table of Contents

BACKGROUND INFORMATION	3
SECTION 1. STUDENTS	6
SECTION 2. PROGRAM EDUCATIONAL OBJECTIVES.....	14
SECTION 3. STUDENT OUTCOMES	18
SECTION 4. CONTINUOUS IMPROVEMENT	181
SECTION 5. CURRICULUM.....	27

BACKGROUND INFORMATION

A. Contact Information

D. Organizational Structure

At the department level, the instructor of record has authority over each of his/her courses during the semester taught. For each course there is a course coordinator who assures the correct material is covered. The Undergraduate Curriculum Committee oversees the undergraduate curriculum. Changes to the curriculum or other curriculum issues are voted on by the Undergraduate Curriculum Committee before going to the faculty for a vote. The Department Chair is the chief administrator in the Department and reports to the Dean of the College of Arts and Sciences. The structure from department to upper administration is shown in Figure 1-1.

E. Program Delivery Modes

Courses in the program are taught during both the day and evening. The delivery mode is traditional lecture/laboratory. In addition, the Department offers a sufficient number of online courses to enable a student to graduate with a degree from the program by taking program courses entirely online.

F. Program Locations

All computer science courses are offered on the main campus of Lamar University.

G. Deficiencies, Weaknesses or Concerns from Previous Evaluation(s) and the Actions Taken to Address Them

As a result of the most recent ABET visit in 2019, the following changes were made (text summarized from Final Statement from ABET to Lamar University, dated August 2020).

1. The visiting team from ABET that came in October 2019 had one concern related to the department faculty. The team was concerned the potential exists in the future, there may not be enough faculty numbers to teach all required courses in the program and provide the level of student-faculty interaction necessary to maintain program continuity and stability.
 - a. As of the date of this report, this concern had not yet been resolved. It was later resolved with the hire of a new faculty member to start in Fall 2023.

H. Joint Accreditation

The program is jointly accredited by ABET and by the Commission on Colleges of the Southern Association of Colleges and Schools (SACS). SACS accredits Lamar University to award degrees including _____ accreditation was in 2019. The U _____ last SACS accreditation was in 2020.

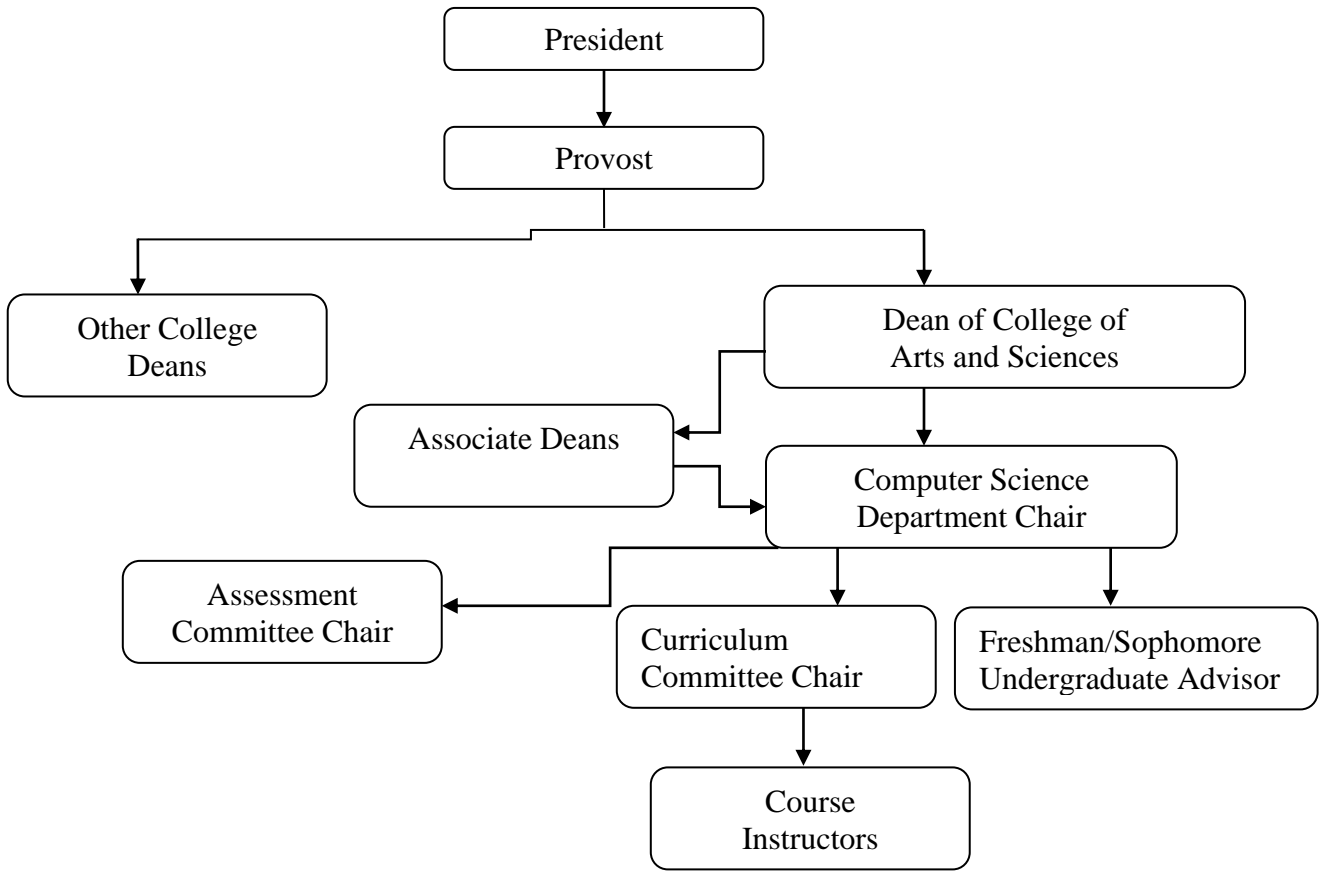


Figure 1-1. The administrative structure of the Department of Computer Science at Lamar University

GENERAL CRITERIA

SECTION 1. STUDENTS

A. Student Admissions

All interested students must apply to Lamar University and satisfy the University admission requirements. Students can indicate at the time of the initial application their interest in the Computer Science program, or they may declare their interest at any time thereafter. Students who are already admitted and wish to declare Computer Science as their major must first go to the University Records Office

transcripts sent to Lamar regardless of the length of attendance and whether credit was earned. Students transferring with fewer than 18 credit hours also should have SAT or ACT test scores sent to the University.

Transfer applicants who have been academically dismissed from the last institution they attended but meet the GPA requirements listed above are not considered for admission until at least one regular semester (fall or spring) has elapsed. After this period, these applicants must submit a new application.

Students who meet the high school requirements but do not have a 2.00 GPA on attempted college coursework may be considered for admission. These applicants are reviewed by the office of Student Advising, and pattern of progress, as well as high school records and standardized test scores, are considered in the admissions process.

Transfer Applicants with 18 Credit Hours or More

Students who are transferring with 18 or more credit hours of college-level coursework must meet the following requirement: Have earned an overall combined 2.00 GPA (as computed by Lamar University) on all transfer hours attempted and be eligible to re-enter all colleges and universities previously attended. Students who have failed any college readiness coursework are not eligible for admission until they have completed these courses with a passing grade.

Students who do not meet the requirement above can be considered for admission at the discretion of the University on an individual basis. These applicants write a one- to two- page statement in which they account for past academic shortcomings, suggest steps they will make to address those weaknesses, and specify the academic goals they plan to achieve while studying at Lamar University. Students may also include letters of recommendation from people familiar with their academic background and pertinent information such as participation in extra-curricular activities or specialized skills.

The Admissions Office evaluates the general education requirements and some lower-designated advisor, Dr. Bo Sun, checks transfer transfer credit for most major courses.

At the present time, there are no state-mandated articulation requirements impacting transfer students. We do have Articulation Agreements with Lamar State-Orange and Lee College.

Transfer students can use an online credit evaluation tool to determine how completed coursework will be counted towards a degree at Lamar. Credit earned at other accredited institutions is judged for Lamar University credit using the following guidelines:

1. All courses are used to calculate the transfer GPA, which is used to determine admission status.

2.

Sciences requirements, and Computer Science major requirements. Both advisors and students may access DegreeWorks from any Internet-connected computer. Towards the end of every semester, students are required to contact their advisor to review which courses they need to take the next semester. During this time, advisors ensure that students are on the right track for graduation, advise them on how to best complete the requirements given the upcoming course offerings, and inform students of any upcoming changes that may affect their ability to complete the degree. Unless students contact the advisor assigned to them, they are unable to register for classes. The D designated advisors unavailable. In addition, students have access to the University catalog and online unofficial transcripts and a departmentally produced master checklist for the degree. These items allow students to easily keep track of where they are in the program, allowing them to perform some measure of self-advising.

E. Work in Lieu of Courses

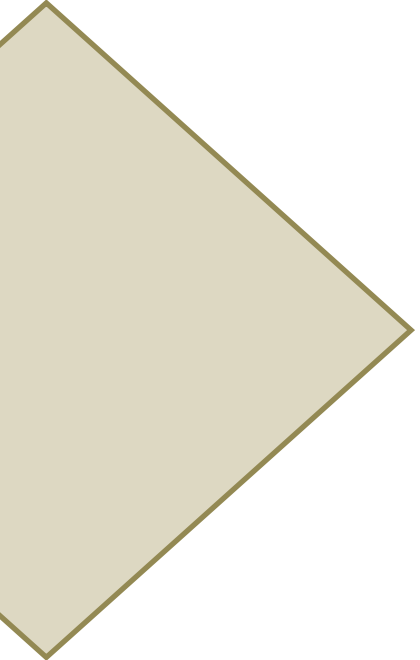
If a student requests credit for work experiences in lieu of enrolling in a class, the student must pass a credit exam in the course for which they wish to receive credit. An exception to this rule is if the student has taken the Advanced Placement Test in Computer Science. Credit is given according to the rules given below to those students who have completed an Advanced Placement Test in computer science.

<u>Test</u>	<u>Score</u>	<u>Courses for which Credit Is Assigned</u>
Computer Science A test	4 or 5	COSC 1336
Computer Science AB test	4 or 5	COSC 1336, COSC 1337

Figure 1-2. Advisement Procedure for Students

Student has more
than 60 university
credit hours?

Please contact Kayla Holloway for
advisement.



Please see your Computer
Science Advisor for advisement.
Check with the Department of
Computer Science office, room
57 of Maes Building to see who
your advisor is.

F. Graduation Requirements

The name of the degree offered by the Department of Computer Science is the Bachelor of Science in Computer Science. To obtain the degree, a student must successfully complete 121 semester hours of credit. There are two categories of requirements that students must complete: Core Curriculum requirements (48-50) hours and Computer Science major requirements (84-85 hours). The Core Curriculum requirements in Mathematics and Science are satisfied by Computer Science major requirements. These requirements are summarized below.

Core Curriculum

- < **English Composition** six semester hours from ENGL 1301, 1360 (Honors), 1302, 1361 (Honors) or 1374
- < **Language, Philosophy and Culture** three semester hours.
- < **Communication or Modern Language** three semester hours from COMM 1315, 1360 (Honors), 1321, FREN 1311, SPAN 1311 or DSDE 1371.
- < **American History** six semester hours from HIST 1301, 1302, 1361 (Honors), 1362 (Honors), 2301
- < **Creative Arts** three semester hours from ARTS 1301, ARTS 1303, DANC 2304, PHIL 1330, MUSI 1306, or COMM 1375.
- < **Social Science** three semester hours from ECON 1301, 2301, 2302, PSYC 2301, SOCI 1301, BULW 1370, or COMM 1375.
- < **Political Science** six semester hours: POLS 2301 and 2302
- < **Mathematical Science** Six to seven semester hours at or above MATH 1314 or 1414 and three to four semester hours in mathematics (at or above the content level of trigonometry, MATH 1316) or quantitative analysis (BUAL 3310, MATH 1342, MATH 3370 or PSYC 2471).
- < **Laboratory Sciences** eight semester hours from BIOL 1406, 1407, 1408, 1409, 2401, 2402, CHEM 1406, 1408, 1411, 1412, 1460 (Honors), GEOL 1403, 1404, PHYS 1401, 1402, 1405, 1407, 1411, 2425, 2426.

Computer Science Major

- < **Mathematics (20 hours)** MATH 2413, MATH 2414, MATH 3328, MATH 3370, MATH 3322 or MATH 3435, and COSC 2375.
- < **Laboratory Sciences (12 hours)** Three lecture/lab courses from the collection PHYS 2425, PHYS 2426, CHEM 1311/1111, CHEM 1312/1112, BIOL 1406, AND BIOL 1407.

◁ **Computer Science (5**

1. Graduates of the Computer Science Program will develop the professional skills and the necessary technical knowledge both in breadth and in depth to prepare them for employment and advanced study in Computer Science.
 - ◁ Implementation: using Student Outcomes 1, 2 and 6
 - ◁ Measurement: using Curriculum Outcomes 1, 2 and 3.
2. Graduates of the Computer Science Program will have sufficient awareness of the local and global societal impact of technology and of the related legal and ethical issues in computer science to make decisions regarding their personal and professional responsibilities.
 - ◁ Implementation: using Student Outcome 4
 - ◁ Measurement: using Curriculum Outcomes 4 and 5.
3. Graduates of the Computer Science Program will have the critical thinking, communication, teamwork, and leadership skills necessary to function productively and professionally.
 - ◁ Implementation: using Student Outcomes 3 and 5
 - ◁ Measurement: using Curriculum Outcomes 6, 7 and 8.
4. Graduates of the Computer Science Program will be able to demonstrate intellectual curiosity and the independent study skills necessary for life-long learning.
 - ◁ Implementation: using Student Outcome 7
 - ◁ Measurement: using Curriculum Outcome 9.

Student Learning Outcomes

See Criterion 3. Student Outcomes

C. Consistency of the Program Educational Objectives with the Mission of the Institution

The educational objectives of the Department of Computer Science align with the Lamar University Mission and the College of Arts and Sciences Mission statements since the Department of Computer Science seeks to produce graduates who can be productive in careers in the Computing Sciences and who embrace and excel at lifelong learning. Our program provides students both theoretical and practical foundations needed to be successful. Through classroom and lab activities, opportunities for research, and early involvement in professional organizations, including programming competitions, the Department of Computer Science seeks to educate a well-rounded computing professional capable of independent thinking.

The educational objectives meet the needs of faculty by providing opportunities for faculty to impart their knowledge of computing and advance their careers in academia. In addition, for faculty interested in research, the program offers students opportunities to engage with faculty in faculty-sponsored research.

The educational objectives are enhanced by the work of staff since all students need to interact with staff members on academic issues, such as maintaining the grade records, advisement records, preparing the payment for all undergraduate and graduate assistants, and more administrative tasks.

The educational objectives meet the needs of industry partners since graduates of the program are well prepared to enter the workforce. Since the program receives and evaluates continual feedback from industry partners, the program is kept up-to-date with and responds to industry needs.

E. Process for Review of the Program Educational Objectives

Undergraduate Curriculum Committee

The Undergraduate Curriculum Committee meets regularly each academic year to review how various components of the program continue to meet the educational objectives of the program. These include review and adoptions of textbooks, proposals for the deletion or addition of courses to the program, and student feedback.

Assessment Committee

The Assessment Committee meets regularly each academic year. The committee reviews proposals for changes to the assessment procedures for the program based on feedback from students and instructors. The committee also reviews feedback from other sources included, but not limited to the program Advisory Board, other University departments and University administration. As the content of some courses may change or evolve over time, the committee makes sure the assessment procedures for each course are aligned with the educational objectives of the program. At the end of each academic year, the committee reviews assessment data gathered for the program and decides on changes, if any. For this reason, the committee is one of the most important venues for changes that ensure continuous program improvement.

Advisory Board

The program has an Advisory Board consisting of representatives of local, regional, and national companies. Many of the Advisory Board members are Alumni of Lamar University. Each spring the Advisory Board meets for a one-day conference on the Lamar campus. Faculty members, including the Chair of the program, make presentations to highlight important changes in the program such as new facilities, new courses, and progress on research grants or new

objectives of the program, the Chair is responsible for moving any recommendations to the appropriate Department committees for further consideration and possible action.

All recommendations and proposed changes by the above committees are presented to the faculty and are subject to vote.

SECTION 3. STUDENT OUTCOMES

A. Student Outcomes

Published on the Department of Computer Science website:

1. Graduates of the program will have an ability to analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Graduates of the program will have an ability to design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of
3. Graduates of the program will have an ability to communicate effectively in a variety of professional contexts.
4. Graduates of the program will have an ability to recognize professional responsibilities and make informed judgments in computing pra

- ◁ Operating systems
 - ◁ Database systems
 - ◁ Computer architecture
 - ◁ Computer networks and distributed computing concepts
- 3.** Scientific Method: Graduates will be able to gather requirements, analyze, design and conduct simulations or other computer experiments

SECTION 4. CONTINUOUS IMPROVEMENT

The mission of the Bachelor of Science in Computer Science (BSCS) program is to provide graduates with the fundamental knowledge and habits of critical thinking required for future leadership roles in the numerous fields that depend on the underlying discipline of computer science. We intend to give each graduate a foundation in both the theory and the practice of computer science and to prepare each graduate to take advantage of opportunities for generating new knowledge after graduation. We intend to introduce each graduate to the challenges and joys involved in research that leads to new kinds of computer software and hardware. We intend to provide the knowledge and skills necessary to foster a commitment to lifelong learning and ethical behavior. The faculty believes the mission can only be accomplished through a commitment to assisting student learning through analysis and application, continuous improvement of the program through assessment and evaluation of student needs, and responsiveness to changes in the discipline within a global, social and ethical context.

Our process for regular assessment and evaluation is adopted from the ABET 2012 Symposium sample Self-Study Report from the Lebanese American University and follows the flow shown in Figure 4-1. Definitions of terms used in the flow chart are shown in Table 4-1. The definitions are consistent with similar terms in the ABET Self-Study Questionnaire: Template for a Self-Study Report 2017-2018 Review Cycle.

Figure 4-1

Below we present each of the assessment processes listed in Table 4-2 in more detail, including:

- 1) How the data is collected;
- 2) Is the data direct or indirect;
- 3) What is the target level of attainment;
- 4) How the results are documented and maintained.

Student Performance in CS Courses on Program SLOs

This data is collected by instructors during the semester the course is tal/P MCID 6BDC 2s5W*ndata TJETC

Exit Interview & Exit Survey

This data is collected in COSC 4272 and indirect assessments. A common form is used for both the Exit Interview and Exit Survey. The Exit Interview form is listed in Appendix F.2. The Exit Survey Form is listed in Appendix F.3.

See Appendix E.2 (Criteria for Satisfactory Performance) for a complete listing of the targets for level of attainment on the Exit Interview and Exit Survey.

Results are maintained by the Department secretary and a summary of the results are included in the Department Annual ABET Report. Data from this year is listed in Appendix G.4 (Exit Interview) and G.5 (Exit Survey).

Alumni Survey

This data is collected via U.S. mail and is an indirect assessment. A common form is used and is listed in Appendix F.4. The survey is sent to alumni who have graduated at least 3 years previous and not more than 8 years and who have not responded to another alumni survey.

See Appendix E.2 (Criteria for Satisfactory Performance) for a complete listing of the targets for level of attainment on the Alumni Survey.

Results are maintained by the Department secretary and a summary of the results are included in the Department Annual ABET Report. Data from this year is listed in Appendix G.6.

Advisory Board Questionnaire

This data is collected by providing Advisory Board members a paper copy of the questionnaire during the day-long Advisory Board meeting each spring. The questions and responses for this year are listed in Appendix G.7.

Since this data is neither a direct nor an indirect measure of the program, there is no specific level of attainment expected. The information gathered is used by the Department to better understand more fully the needs of these constituents. Thought-provoking ideas are relayed to the general faculty for discussion as appropriate.

Results of the questionnaire are included in this report, and we expect to continue to document these results in each annual ABET report.

Major Field Test

This data is an indirect measure of the program. The test and the contents of the test are administered by the Educational Testing Service (ETS).

See Appendix E.2 (Criteria for Satisfactory Performance) for a complete listing of the targets for level of attainment on the Major Field Test.

Results are maintained by the Department secretary and a summary of the results are included in the Department Annual ABET Report. Data from this year is listed in Appendix G.8.

B. Continuous Improvement

The process of gathering, archiving, assessing and summarizing the data used to continuously improve the program culminates in meetings of the Department Assessment Committee during the spring and summer semesters. See Appendix J for a complete list of meeting minutes of this committee during the recent academic year. Based on direct and indirect measures, the committee makes recommendations for improvement. These are summarized by outcome. There are 15 individual program student learning outcomes. See Appendix G.1 for a complete list by outcome of the analysis of direct and indirect results from the most recent assessment cycle as well as recommendations for actions and second-cycle results, if any. The second-cycle results represent follow-up actions based on actions recommended during the previous year assessment.

Detailed analyses of the assessment and actions taken, by outcome, are included in each annual ABET report, including this report (Appendix G.1). Following are summaries of the most important actions taken to improve the program during each of the last five years.

Changes made in 2023

These changes will take effect in the 2023-2024 academic year.

1. Since our assessment did not meet the direct target for criteria 2.5.1, we discussed this with the instructor of the course involved. The instructor has agreed to put a plan in place to update the course content accordingly. We will reevaluate next year to see if this action plan was successful.
2. Since our assessment did not meet the direct targets all three criteria in Outcome 2.7, we discussed this with the instructor of the course involved. The instructor agreed to go into more detail on the appropriate content in the course and perform additional review with students during the course. We will reevaluate next year to see if this action plan was successful.

Required Computer Science courses cover these areas:

COSC 1172 Thinking, Speaking, and Writing
COSC 1173 Programming Lab I
COSC 1174 Programming Lab II
COSC 1336 Principles of Computer Science I
COSC 1337 Principles of Computer Science II
COSC 2336 Data Structure & Algorithms
COSC 2372 Computer Organization & Assembly
COSC 3304 Algorithm Design & Analysis
COSC 3308 Survey of Programming Languages
CPSC 4360 Software Engineering

- ii. Introduction to a variety of programming languages and systems.

Students also select to take Computer Security, Real Time System, Embedded System, Graphics, Game Development, Artificial Intelligence, Machine Learning, Multimedia Processing, Network System Administration, and Simulation as COSC/CPSC electives.

b. One year of science and mathematics

i. Mathematics.

Students pursuing the BSCS degree are required to take the following Mathematics courses (21 hours):

- COSC 2375 Discrete Structures
- MATH 3328 Linear Algebra I
- MATH 2413 Calculus and Analytic Geometry I
- MATH 2414 Calculus and Analytic Geometry II
- MATH 3435 Calculus and Analytic Geometry III
- MATH 3370 Introduction to the Theory of Statistical Inference

ii. Science.

Students pursuing the BSCS degree are required to take three of these courses from the following Lab Science courses (12 hours), in no particular sequence:

- BIOL 1406 General Biology I
- ~~BIOL 2414 Calculus and Analytic~~
- W*BT/F1 12 Tf1 0 0 1 310.73 35pwF1 T/F1 12 Tf1 0 0 1 306.65 365.23 TmA912 0d6C12 C