# Computing Science BS

## Ethical Principles, Technical Skills, And Management Skills (core)

**Goal Description:**

To develop students' knowledge of ethical principles, technical skills, and management skills relevant to the field of computer science.

**Providing Department:** Computing Science BS

**Progress:** Completed

RELATED ITEMS/ELEMENTS - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

RELATED ITEM LEVEL 1

### Acquisition Of Technical Skill, Management And Ethical Principles

**Learning Objective Description:**

Students will develop and demonstrate knowledge of ethical principles, technical skills, and management skills relevant to the field of computer science.

RELATED ITEM LEVEL 2

### Finding: ABET Assessment data

**Indicator Description:**

To assess the B.SC program in computer science, ABET results were collected during fall and spring semesters. We have implemented a course-based evaluation.

The following provide a list of courses used during the assessment cycle:

- COSC 3318 Data Base Management System
- COSC 3319 Data Structure and Algorithm
- COSC 4318 Advanced Language Concepts
- COSC 4319 Software Engineering
- COSC 4349 Professionalism and Ethics

Standardized departmental syllabuses were developed for each of the above classes. Course contents were mapped directly to ABET students learning outcomes and used as indicators to measure students performance on these classes and ultimately measure the program overall performance. During the assessment period, students grades were collected from these five courses and processed to estimate the program overall performance. In our course-based evaluation, we considered a score of 70% on selected ABET student learning outcomes per course as passing criteria. The following provide a list of ABET students learning outcomes that are used to assess this program.

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions.

In addition to course-based evaluation, we have deployed the following measurement tools.

- Exit survey.
- Ethic Quiz

**Criterion Description:**

The expected score used for course-based evaluation is 70% for measuring success. Average scores for each ABET students learning outcomes were computed based on (COSC 3318, COSC 3319, COSC 4319, and COSC 4349). Computed average scores were used to measure the overall program's performance.

See attached figure for ABET course summary evaluation.

Attached Files

📄 SE Evaluation (Fall 2023)(1).png
📄 Project Presentation (Fall 2023)(1).png
📄 Project Evaluation (Fall 2023)(1).png
📄 Course Evaluation (Fall 2023)(1).png
📄 COSC 4319 (Fall 2023)(1).png
📄 COSC 3318 (Fall 2023)(1).png
📄 COSC 3319 (Fall 2023)(1).png
📄 COSC 4319(12).xlsx
📄 COSC 3318(8).xlsx
📄 Peer Evaluation(7).xlsx
📄 COSC 4349(10).xlsx
📄 Project Evaluation(10).xlsx
📄 Project Presentation(8).xlsx
📄 ABET Summary Evaluation (Fall 2023)(1).png
📄 evaluate4ABET_spring2023(2).m
📄 COSC 4349 (Fall 2023)(1).png
📄 COSC 3319(8).xlsx
📄 COSC 4349 (SPRING 2023)(1).png
📄 COSC 4319(9).xlsx
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📄 Exit_survey_Answer_sheet_Spr_23(1).xlsx
📄 Peer Evaluation (SPRING 2023)(1).png
📄 Project Presentation (SPRING 2023)(1).png

**Findings Description:**

ABET data were collected during spring and fall semester of the academic year 2023-2024. Results were collected and shared with the department during UCC meeting. The collected data showed that above 70% of the students were able to pass selected courses

**New Action Item**

**Action Description:**

- ABET data is to be collected and results will be discussed during the department UCC meetings.

- Two UCC meetings will be held during the year to discuss courses contents or the addition of new courses to improve the CS program.
- Analyze ABET collected scores every semester to identify areas that needs improvement.

## Specialized Competencies

**Goal Description:**

To develop students' skills and knowledge in their concentration areas. The department offers three concentration areas: Computer Science, Information Systems, and Information Assurance.

**Providing Department:** Computing Science BS

**Progress:** Completed

RELATED ITEMS/ELEMENTS ------------------------------------------------------------

### RELATED ITEM LEVEL 1

**Specialized Skills**

**Learning Objective Description:**

Students will develop and demonstrate skills and knowledge in their concentration areas. The department offers three concentration areas: Computer Science, Information Systems, and Information Assurance and Security.

Indicator: ABET data collected from five classes samples, COSC 3318, COSC 3319, COSC 4349, COSC 3319, and COSC 4318. These courses will be use to assess students' performance in developing various skills such as software design, advanced programming, ethical computing, data base programming, and team work and communication skills. During each semester, data will be collected from these five different classes, results are shared and analyzed with department during UCC meeting. Various computing metrics are extracted from the collected data, class averages, senior project development and presentation, and various terms projects and homework assignments.

### RELATED ITEM LEVEL 2

**Finding: ABET Assessment data**

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The following provide a list of courses used during the assessment cycle:

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- COSC 4349 Professionalism and Ethics

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6. Apply computer science theory and software development fundamentals to produce computing-based solutions.

In addition to course-based evaluation, we have deployed the following measurement tools.

- Exit survey.
- Ethic Quiz

**Criterion Description:**

The expected score used for course-based evaluation is 70% for measuring success. Average scores for each ABET students learning outcomes were computed based on (COSC 3318, COSC 3319, COSC 4319, and COSC 4349). Computed average scores were used to measure the overall program's performance.

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**Findings Description:**

ABET data were collected during spring and fall semester of the academic year 2023-2024. Results were collected and shared with the department during UCC meeting. The collected data showed that above 70% of the students were able to pass selected courses

RELATED ITEM LEVEL 3

**New Action Item**

**Action Description:**

- ABET data is to be collected and results will be discussed during the department UCC meetings.
- Two UCC meetings will be held during the year to discuss courses contents or the addition of new courses to improve the CS program.
- Analyze ABET collected scores every semester to identify areas that needs improvement.


# Update to Previous Cycle's Plan for Continuous Improvement Item

**Previous Cycle's Plan For Continuous Improvement (Do Not Modify):**

**Closing Summary**

The following items were discussed during UCC meetings.

1.  Possible revision of COSC 1436 and COSC 1437 courses' contents to strengthen students' knowledge in keys areas that might be relevant concepts covered in COSC 3319 course (Data Structure). The following is a list of topics that Dr. Burris has suggested for inclusion in COSC 1436 and COSC 1437:

- Multi-threading
- Synchronized methods
- OOD, OOP and templates/generics
- Inheritance and polymorphism

- Curriculum development and improvement
    - Redesign COSC 2329 course: The contents of the course will be fully revised during Fall 2023. The revisions include adapting a new textbook, replacing MIP architecture with ARM architecture, and utilizing a new ARM assembler simulating toolset for coding.


- We are proposing to update the course's requirements/prerequisites for COSC 4349. Based on the current course requirements, only senior level students are able to register for the course. The main objective of relaxing COSC 4349 course's requirements is to allow junior level students to get into the course.


- We are proposing the replacement of COSC 4340 special topic course by a new course. The new course will be related to hardware design and implementation. it will be offered during each Fall semester.

**Update of Progress to the Previous Cycle's PCI:**

- A group a discussion has been held during the spring 2024 semester to discuss contents revisions for COSC 1436 and COSC 1437. During the meeting, the faculties members agreed to modify the contents

courses to include concepts that cover the following topics:
- Multi-threading
- Synchronized methods
- OOD, OOP
- Inheritance and Polymorphism

- The content of COSC2329 has been fully revised during Fall 2023 and Spring 2023. The course now cover topics related ARM processor. A new textbook that cover the ARM architecture has been added to syllabus and its used to teach this course.
- Course requirements for COSC4349 has been updated during Spring 2024, some course's previous requirement has been lifted. Students with junior standing are now allow to register for the course.
- During the spring 2024 semester, FormB has been submitted to the college curriculum committee for replacement of COSC4340 (Special topic) with a new course in embedded system. FormB has passed the college curriculum and we are in the process of offering this course in the following Fall semester (Fall 2025.

## New Plan for Continuous Improvement Item

**Closing Summary:**

The BSc in computer science is an ABET-accredited program. During the past five years we have measured student retention of fundamental concepts in computing, especially the knowledge they acquired from five core classes in CS. Every fall and spring semester, a list of five core classes in the CS program is used for our yearly assessment. These classes are COSC 3318 Database management systems, COSC 3319 Data structures and algorithm, COSC 4319 Software engineering, COSC4349 professionalism and ethics, and COSC 4318 advanced language concepts. Each of these classes' learning outcomes were directly mapped to ABET learning outcomes. The following provides a list of ABET students learning outcomes that we measure via the application of various assessment tools:

LO1: Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.

LO2: Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

LO3: Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

LO4: Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.

LO5: Communicate effectively in a variety of professional contexts

LO6: Apply computer science theory and software development fundamentals to produce computing-based solutions.

Each of the listed ABET learning outcomes was measured using class-specific assessment methods. For example, the COSC 4319 software engineering has specified six Course Learning Outcomes (CLO). The following table describes the CLO to ABET learning outcomes mapping

Course learning outcomes for COSC 4319

CLO1: Be able to identify, formulate, and solve software engineering problems, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance, and quality requirements.

CLO2: Be able to elicit, analyze, and specify software requirements through a productive working relationship with various stakeholders of a software development project.

CLO3: Work and collaborate effectively in teams possibly with multidisciplinary backgrounds as a leader or a member

CLO4: Participate in design, development, deployment, and maintenance of a large-scale software development project including various testing and security issues

CLO5: Communicate effectively through effective written reports/documents, effective presentations, and other means of verbal/written communications

CLO6: Be able to evaluate the impact of potential solutions to software engineering problems in a global society, using the knowledge of contemporary issues and emerging software engineering trends, models, tools, security, and techniques

Table1: CLO software engineering to ABET learning outcomes mapping

| CLO software Engineering | ABET Learning Outcomes |
|---|---|
| CLO1, CLO2, CLO4, CLO6 | LO1 |
| CLO3, CLO5 | LO5 |
| CLO3 | LO3 |
| CLO1, CLO2, CLO4, CLO6 | LO6 |

Assessment tools based on class project presentation and demonstration, exams, assignments, quizzes, and labs were deployed to assess students' success rates on ABET predefined learning outcomes. Similar assessment tools were employed by COSC 3318, COSC 3319, COSC 4349, COSC 4318 to measure students' retention on foundational concepts and skills they acquired during their study.

 Two UCC meetings were held during the fall and spring semesters of each year to discuss ABET assessment data. Data collected for the past five years shows that student's retention of knowledge in COSC 3318, COSC 4318, COSC 4319, and COSC 4349 were acceptable. Meanwhile, data collected from COCS 3319 shows that the majority of students were unable to complete the course with a high success rate. The also data showed that students struggled to complete major coding problems.  It shows that students are missing key concepts in fundamental programming that are required for the COC 3319 course. The following measures were considered to help improve students' performance in COCS 3319.

1.    Key programming concepts that improve student success rate in COSC 3319 will be incorporated into COSC 1436 and COCS 1437 courses. The two courses serve as introductory programming courses that are required for COCS 3319.

2.    Students in COSC 3319 are now capable of using their preferred programming language for coding. This gave the students the ability to focus more on the algorithmic side of the course than learning a new programming language.

3.    UCC and the instructor of COSC 3319 will continue to measure students' success rate in the course via observing and analyzing data collected from ABET assessment process.