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Dartmouth

COLLEGE OF ENGINEERING

Computer and
Information Science
Department

Raymond N. Laoulache, PhD
Associate Dean, College of Engineering
Professor, Mechanical Engineering Department
University of Massachusetts Dartmouth

January 9, 2020

Re: Subject: ABET Continuous Improvement over AY 2016-2017, 2017-2018, and 2018-2019

Dear Dr. Laoulache,

The Program Assessment and Continuous Improvement Handbook developed by the CIS department requires *biennial* program improvement plan recommended by CIS Program Assessment Committee (PAC) and CIS Undergraduate Curriculum Committee (UCC). The improvement plan identified in Academic Year 2017-18 is described as follows.

Improvement Plan Academic Year 2017-18
Biennial Program Improvement Plan BS in Computer Science

Goal:

Improve student outcome (a): *“An ability to apply knowledge of computing and mathematics appropriate to the discipline.”*

Rationale:

In AY2017-18 the measures of all program educational outcomes were above the thresholds established for meeting these outcomes.

Student outcome (a) was selected as the focus of BS in CS Program improvement for AY2017-18 as it is a high-priority outcome for the CIS Department. In addition, the CIS 362 course, where outcome (a) is measured (in conjunction with CIS 272), calls for updates given the most recent development of the discipline and related fields.

Summary:

The improvement plan calls for changes in CIS 362 that will:

1. Provide students with more comprehensive experience/knowledge of statistical tools for evaluation of empirical methods.
2. Enforce implementation and monitoring of the said methods through teamwork.
3. Teach students hands-on skills (instead of only through lectures) about the relationships among empirical

research, its evaluation and applicable threats to validity.

Proposed Changes for CIS 362 - Empirical Methods in Computer Science

Currently, the basic statistical tools are presented in the second half of the semester after the presentation of empirical methods. Conventional methods, such as sampling, parameter estimation, statistical inference using sampling distributions, hypothesis testing using confidence intervals, and regression analysis, are the standard statistical tools presented to validate students' work. Each student team works on two team projects to design and conduct two surveys: one is a survey of research literature on an assigned topic, and the second one is a traditional survey of population sample on a selected topic. In addition, the teams also design and conduct a case study on a chosen topic. The students will use basic statistical tools and data visualization to draw useful conclusions. The statistical analysis is conveyed to the class through lectures and examples.

The proposed changes for CIS 362 are listed as follows:

- a. Update the presentation material with additional statistical tools including classification trees, cluster analysis, and factor analysis.
- b. Illustrate the updated material with examples, which are reviewed and discussed among students during lectures (five such discussion-type lectures are prepared).
- c. Encourage students to utilize the expanded knowledge to provide more in-depth analysis and discussions, and to draw more useful conclusions in their course assignments.

In modern computer science, the ability to capture large amounts of experimental data and the need to analyze that data requires a deeper understanding and wider coverage of empirical methods. It is expected that the proposed changes will not only add new techniques to the course and incorporate them into student projects, but also allow students to gain more comprehensive experience in connecting the activities of empirical methods and their evaluation. In addition, they will prepare the students to use the knowledge in the senior design course as well as related technical electives.

The above changes were supported by documented PAC minutes (PAC_Minutes-AY2017-18.pdf), which have been implemented in AY 2018-19.

Projected Improvement Plan in AY 2019-2020 and beyond:

As indicated in PAC Meeting minutes on May 22, 2018, the following specific areas of concern have been identified and shall be considered for implementation in the next ABET Continuous Improvement cycle:

Student outcome **b** - "An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution" - has relatively low PME and COS scores in CIS280 and CIS498/499, which require our attention for potential improvement on this outcome.

Student outcome **d** - "An ability to function effectively on teams to accomplish a common goal" - has increasing PME scores along the path: 49% in CIS280, 91% in CIS 362, and 96% in CIS498/499, which indicate students have been trained for improvement along the time to meet this outcome. However, the very low PME and COS scores in CIS280 require our attention for potential improvement/revision in this course.

According to the Program Assessment and Continuous Improvement Handbook (Continuous_Improvement_Handbook.pdf), the CIS PAC is responsible for collecting and analyzing program assessment data; while the CIS UCC, in consultation with PAC, evaluates the effectiveness of improvements made during previous cycles. Any appropriate adjustments are incorporated in the biennial improvement plan submitted to the Department.

In addition, the PAC and UCC are currently working on mapping of the new ABET outcomes to the CIS required courses and a number of critical curriculum improvement for BS in Computer Science program, respectively. Their activities have been documented in PAC and UCC minutes (PAC_Minutes_AY2018-19.pdf and UCC_Minutes_AY-2018-19.pdf).

Best Regards,



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Cc: Dr. Firas Khatib, CIS PAC Chair
Dr. Iren Valova, CIS UCC Chair

Encl.:
PAC_Minutes-AY2017-18.pdf
PAC_Minutes_AY2018-19.pdf
UCC_Minutes_AY-2018-19.pdf
Continuous_Improvement_Handbook.pdf