

**Universidad de Puerto Rico en Bayamón**  
**Department of Computer Science**

# Continuous Improvement Plan

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**August 2019-May 2022 Cycle**

This document presents the Continuous Improvement Plan (CIP) for both programs: Information Systems, and Computer Science. The report describes each of the 8 stages of the CIP and a schedule to perform it.

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## Acronyms

- AAC – Accreditation and Assessment Coordinator
- CIP – Continuous Improvement Plan
- CS – Computer Science
- FDPD - Faculty Professional Development Plan
- IS – Information Systems
- PEO – Program Educational Objectives
- PD - Professional Development
- PI – Performance Indicators
- SO – Student Outcomes

## Timeline of Recent Events

This section contains a series of important events that impacted the assessment cycle. Also it includes several revisions that have been performed specifically to this document:

- November 2018
  - New ABET Criteria was introduced
  - Some grammatical errors were corrected on this document.
- January 2019:
  - We received a visit by ABET during November 2018.
- July 2019
  - ABET decided to arrange an Interim Visit to address the shortcomings found on the Accreditation Visit of 2018 related to Criterion 6 and 7.
- March 2020:
  - Lockdown began on the UPR System as well as all the dependencies of the government in response to the COVID-19 global pandemic.
- June 2020
  - An Interim Report was drafted to address the shortcoming found by the ABET Visiting Team
- October 2020
  - We received a Virtual Interim Visit during lockdown.
- December 2020
  - A revision was made to include the Faculty Professional Development Plan (FPDP) as part of the CIP.
- March 2021
  - This document was again revised to reschedule our assessment cycle.

## The Three Year Cycle (August 2019-May 2022)

We continue using a three year cycle for assessment purposes. This was scheduled to begin in August 2017, however, we received two category 5 hurricanes, Irma and Maria. We are still in the process of

recovery in some areas<sup>1</sup>. Our focus in 2017 and 2018 was to recover from the aftermath of these two consecutive hurricanes and received an accreditation visit. We received an ABET On Site Visit in 2018 and an Interim Visit in 2020. Also the COVID-19 epidemic and the Lockdown imposed by the government in 2020 delayed important events of this cycle. Therefore, the AAC chose to shift the schedule of the assessment cycle. The three year cycle used for assessment purposes started in August 2019 and ends in May 2022. The AAC refers to cycles using the *month-year to month-year* nomenclature.

## Continuous Improvement Plan

### Overview

The Continuous Improvement Plan (CIP) for this cycle is presented in this document. Figure 1 presents the CIP. Every phase of our CIP is presented separately in the following sections. The begins at stage 1 however, it gets input from Stage 8. This is the last phase or our previous cycle. We will define Stage 8 as well as every other stage in this document.

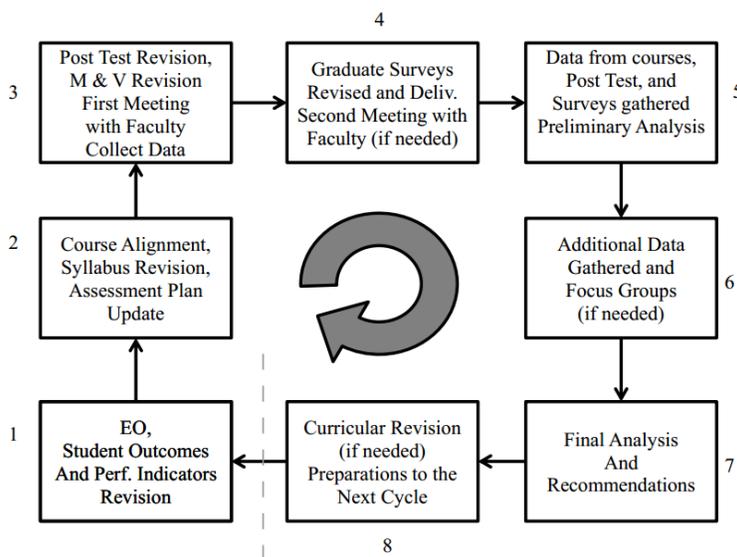


Figure 1 CIP for August 2017- May 2020

### Stage 1 – PEOs, Student Outcomes and Performance Indicators Revision.

Revision of the Student Outcomes (SO) or their corresponding Performance Indicators (PI) could surface as a result of the previous cycle. This could arise by reviewing the document prepared at Stage 8 from the previous cycle. This document is called *Implementation of Recommendations*. As a result our Program Educational Objectives (PEO)s could change. The AAC must revise them based on the recommendations obtained from the previous cycle. If there is a change on our SOs or PIs or PEOs, the AAC should prepare a document stating the change.

<sup>1</sup> Hurricane Maria impacted the island on September 20, 2017. This paragraph was revised in December 2020 and later on March 2021.

After the PEOs, SOs, PIs have been revised; the alignment with the Institutional Goals (Institutional Objectives) must be done. It is very important to check if the institutional objectives have changed. If there is a change a document must be drafted that contains this alignment. Table 1 presents a **sample table** that must be used in this document.

PEO	UPRB Institutional Objectives							
	1a	1b	2	3	4	5	6	7
1			X	X	X	X	X	
2			X	X	X	X	X	
3						X		X
4								X
5	X	X						
6								

Table 1 Institutional Objectives and Program Educational Objectives Alignment Sample

### Documents prepared at this stage

- Student Outcomes and Performance Indicators Revision
- Program Educational Objectives and UPRB Educational Objectives Alignment.

## Stage 2 – Course Alignment, Syllabi Revision and Update to Our Assessment Plan.

Syllabi must be revised after the PIs changed. After the PIs revision, a modification to the alignment of the SOs with the courses for each program must be performed. A Sample of these tables is presented in Appendix A. During this stage, the AAC requests sample coursework to each professor that has given the course already. This is done to find evidence that the PIs that are measured within the course **are covered**. If this evidence is not presented, the AAC evaluates if some of these PIs included in the Syllabus must be reclassified<sup>2</sup> or eliminated. This impacts directly the alignment presented in Appendix A.

It is possible that some courses need to be revised in order to include instruments that measured some PIs. Therefore, a faculty meeting is held to present the course alignment. These meetings could be held with all the professors or individually. The purpose of these meetings is to refocus some courses.

During this stage the professors make a compromise with the AAC of what they will perform to cover each PIs.

### Documents prepared at this stage

- Course alignment table shown in Appendix A.
- Revised Syllabi.

<sup>2</sup> The AAC envisions classifying the Student Outcomes that are covered but not measured as introductory or supportive. However, the ones that are going to be used for further assessment are the ones measured.

### **Stage 3 – Post Test Revision, Mission and Vision Revision, First Meeting with Faculty, Collect Data.**

The AAC should study and revise the Post Test. The Post Test is extremely important since the Post Test is the **main direct measure** we use for most of the SOs. The Post Test is administered using our Moodle web site.

Also, the AAC could consider the revision of the Mission and Vision based on the feedback from the constituents of the program. The AAC must consult with the faculty of our department first. Further changes need to be suggested and approved by all the constituents if and only if there is a change in the wording of the Vision and Mission.

A faculty meeting is held to discuss the updated course alignment, and the assessment tools that will be used to measure the Student Outcomes. Also deadlines are set so the professors could hand in the material needed by the AAC on time.

#### **Documents prepared or revised at this stage**

- Post Test Revision document
- Mission and Vision revision document (optional).
- Course alignment tables (if needed).

### **Stage 4 –Surveys Revision, Second Meeting with Faculty.**

The AAC foresees that during this stage a revision of the surveys delivered to our graduates and employers is performed. Also the administration of the surveys begins at this stage. These surveys tend to capture quantitative and qualitative data of our program. The results are used to evaluate our Program Educational Objectives. The data gathered by these surveys have to be analyzed as part of the Final Analysis at stage 7.

It is possible that we need another faculty meeting as a follow up of our continuous improvement process. Sometimes this meeting is needed to keep in touch with the schedule. If the Mission and Vision was modified it is presented to the faculty during this meeting.

#### **Documents revised at this stage**

- Employee Survey.
- Graduate Survey.

### **Stage 5 – Data is gathered from courses, Post Test and Surveys, a Preliminary Analysis is Performed.**

The AAC envisions compiling all the data obtained from the assessment tools identified and performed a preliminary analysis during this stage. This is a semi formal document and a first draft of the Final CIP Report. The AAC will request extra materials or organized focus groups based on this preliminary analysis.

### Documents drafted at this stage

- Continuous Improvement Report (Final CIP Report) is drafted as a very early stage.

### Stage 6 – Additional Data Gathered and Focus Groups (optional stage)

This is an optional stage that depends on stage 6. Since this is a continuous improvement process it may be possible that not all the evidence needed to close the cycle is available to make a final analysis. During this stage, the AAC needs to revise if all the evidence is there to start the Final Analysis. If evidence is missing the AAC could request to gather additional data on specific courses. Also, the AAC could even create ad hoc focus groups to analyze some PIs.

### Documents drafted at this stage

- Focus Group purpose key discussion topics and final recommendations (optional).

### Stage 7 – Final Analysis and Recommendations.

During this stage the Final Analysis is performed. The AAC meets regularly to analyze all the data gathered from previous stages. The Final (CIP) Report is drafted for the IS and CS programs.

#### The Final Analysis

Results from the Post Test and the Graduate Questionnaire are analyzed. Triangulation is performed if there is a discrepancy between these two assessment tools. The AAC could decide if it will use the assessment tools from the courses if this happens.

The AAC knows that there are some PIs that cannot be measured via the Post Test or the Graduate Survey. These PIs are analyzed with other assessment tools (usually rubrics). For example SOs:

- (d) An ability to function effectively on teams to accomplish a common goal.
- (f) An ability to communicate effectively with a range of audiences.

Notice that (d) and (f) cannot be measured using the Post Test or the Graduate Survey. Therefore we need to use rubrics to measure them.

The achievement of each and every student outcome is classified based on the level of achievement of each performance indicator. The classifications used are

- Met
- Partially Met
- Not Met

#### Recommendations

Finally, recommendations are drafted and presented to the faculty. A document named as Implementation of Recommendations is drafted for each program of the Computer Science Department. This report must contain the recommendations to improve on each and every criterion that is evaluated by the Accreditation Agency (or Agencies) that review our programs.

### Documents drafted at this stage

- A final version is drafted of the Continuous Improvement Report.

- Implementation of Recommendations and Status Report

## Schedule for the cycle that started in August 2019

### Non-Recurrent Events Schedule

Table 2 CIP Schedule presents the CIP Schedule planned for this cycle. Last revision of this schedule was performed in March 2021.

Stage	Begins at:	Ends at:
Preparations to next cycle (8) and Stage 1	August 2019	December 2019
Stage 1 and Stage 2	January 2020	May 2020
Stage 3	August 2020	December 2020
Stage 4	January 2021	May 2021
Stage 5	August 2021	December 2021
Stage 6 and 7	January 2022	May 2022
Stage 8 (preparations to next cycle)	August 2022	December 2022

Table 2 CIP Schedule

### Recurrent Events Schedule

There are some events that are recurrent.

- Administration the Continuous Education and Career Path Questionnaire
- Administration of the Graduate/Exit Questionnaire
- Administration of the Post Test
- Gather evidence of faculty professional development

These events are presented in Table 3.

Event	Schedule
Continuous Education and Career Path Questionnaire	Every time Capstone Course (SICI 4038) is offered
Gather evidence from faculty professional development	Every semester
Graduate/Exit Questionnaire (administration)	Every time Capstone Course (SICI 4038) is offered
Post-Test (administration)	Every time Capstone Course (SICI 4038) is offered

Table 3 Schedule for Non Recurrent Events

## **Faculty Professional Development Plan**

The Faculty Professional Development Plan (FPDP) was incorporated in our department in January 2019, however, it was not included in this document until December 2020. The purpose of this plan is to compile and organize evidence related to the professional development activities of the faculty of the CS and IS programs.

### **Professional Development Activities**

Three types of PD activities are evaluated:

- Professional development activities of a technical nature
- Professional development activities that impact teaching and learning
- Additional Professional development activities

#### **Professional Development Activities of Technical Nature**

Professional development activities of a technical nature include activities that are directly related to the technical aspects of the program. For example: Microsoft, Oracle or any other technical certifications, academic courses, seminars and workshops related to CS and IS.

#### **Professional Development Activities that Impact Teaching and Learning**

Professional development activities that impact teaching and learning should be those that improve the way in which courses are taught. For example: workshops on the use of Blackboard, Moodle or any other similar tool; workshops in distance learning, assessment, and new teaching strategies.

#### **Additional Professional Development**

Additional Professional development activities are those that impact the student indirectly and enrich the department and its faculty. For example: Proposal writing workshops, Research seminars, Math and Science workshops/seminars not related exactly to Computing, Ways to organize hackathons or computer science programming contests, etc.

The AAC must gather all the evidence of the faculty professional activities every semester. A record must be kept of these activities. The AAC envisions that a website could be created during this cycle to track the PD activities of the Faculty.

## **Appendix A**

Sample table for Course and Outcome Alignment for the Computer Science Program

Course	A.1	A.2	A.3	B.1	B.2	B.3	C.1	c.2	C.3	D.1	D.2	E.1	e.2	E.3	f.1	F.2	F.3	g.1	G.2	G.3	H	I.1	I.2	J.1	J.2	J.3	J.4	J.5	k.1	k.2	
COTI 3101 - Algorithms and Progs. Devel. 1	0	I	I	I			I	I														I							I		
COTI 3102 - Algorithms and Progs. Devel. 2	0	I	I	I			I	I														I	I						I	I	
COTI 3205 - Computer Organization	0	I	I	I			I	I																							
COTI 3305 - Computing, Ethics and Society Seminar	6											X	X	X				X	X	X											
COTI 4039 (SICI 3039) - Comparative Prog. Languages	2						X																					X			
COTI 4250 - Intro. Theory of Computation	3		X																					X			X				
COTI 4255 - Introduction to the Analysis of Algorithms	10	X	X	X			X	X	X														X		X	X	X	X			
COTI 4306 - Undergraduate Seminar	4														X	X	X				X										
SICI 3015 - Analysis and Design of Info. Sys.	14			X	X	X	X	X	X	X	X	X	X	X	X	X	X					X							X		
SICI 4019 - Computer Architecture	3														X	X	X														
SICI 4028 - Operation Research for Computer Science+	5		X	X					X															X	X						
SICI 4029 - Fund. Of Operating Systems	10	X	X	X			X								X							X	X		X			X	X		
SICI 4030 - Database Program Development	4		X	X	X	X	X																								
SICI 4036 - Data Structures	9	X	X	X	X			X	X													X			X	I		X			
SICI 4037 - Data Communications	4		X							X	X				X																
SICI 4038 - Research Workshop	7			X	X	X	X	X														X	X							X	
		3	2	7	6	3	2	3	5	3	3	2	2	1	2	5	3	3	1	1	1	2	3	2	3	1	3	2	2	3	2

Sample table for Course and Student Outcome Alignment for the IS Program

Course	A.1	A.2	A.3	A	B.1	B.2	B.3	B	C.1	C.2	C.3	C	D.1	D.2	D	E.1	E.2	E.3	E	f.1	F.2	F.3	F	g.1	G.2	G.3	G	H	I.1	I.2	I	J.1	J.2	J.3	J.4	J.5	J	
COTI 3101 - Algorithms and Progs. Devel. 1	0	0	I	I	I				I	I																												
COTI 3102 - Algorithms and Progs. Devel. 2	0	0	I	I	I				I	I																												
COTI 3205 - Computer Organization	0	0	I	I	I				I	I																												
COTI 3305 - Computing, Ethics and Society Seminar	6	2														X	X	X	@					X	X	X	@											
COTI 4150 - Information Systems Programming	7	2	X	X	X	X	X	@		*																			X	X	@							
COTI 4210 - Web Applications Programming	4	1																						X	X				X	X	@							
SICI 3211 - Info. Systems Foundations	3	0										*	*		I	I	I						I	I	I							X	X	X				
COTI 4430 - Systems Project Management	6	3			*	*	*		X	X	X	@	X	X	@												X	@	*	*			X	X	X			
SICI 3015 - Analysis and Design of Info. Sys.	11	2			X	*	X	@	*	X		X	X	@	X		X		*	*	*							*	*		X	X	X	X				
SICI 4019 - Computer Architecture	3	1																		X	X	X	@															
SICI 4028 - Operation Research for Computer Science	0	0	*	*	*							*																										
SICI 4029 - Fund. Of Operating Systems	3	1	*	*	*				X										*									X	X	@								
SICI 4030 - Database Program Development	2	0	*	*	*	X			X																				*									
SICI 4036 - Data Structures	3	1	X	X	@	*			*	X																			*									
SICI 4037 - Data Communications	2	1		*								X	X	@					*																			
SICI 4038 - Research Workshop	8	2			X	X	X	@	*				X	X	@					*							X	@	*		X	*	X	X	X	X		
		2	1	1		3	3	3	3	1	3		3	3		2	1	2		1	1	1		2	2	1		2	3	3		3	2	3	2	1		