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An In-depth Comparative Study of Different ABET Accredited Computer Engineering Programs Using Self Assessment Reports

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ABSTRACT

Universities all across the world give academic accreditation for degree programs significant attention. This makes sense given that accreditation not only improves the programs' content and delivery but also enables these institutions to recruit teachers and staff of the highest caliber. The Accreditation Board for Engineering and Technology (ABET) is one reputable organization with the authority to accredit Engineering programs. A rising number of academic institutions are requesting ABET accreditation for their computing programs in an effort to raise the standard of their academic programs and student enrollment. This paper's additional value is that it serves as a road map for institutions and their management as they prepare to begin the process of accrediting their computing (or other) programs. The lack of information on the mechanics of implementation presents a problem because it leads to confusion and resource waste, especially in the early stages. Additionally, there is a dearth of literature accessible describing methodology and the use of effective accreditation strategies for computer programs. In light of this, it is necessary to record the methodology, instructional practices, and tactics used by various institutes as they work towards accreditation.

Keywords:

Engineering Accreditation, Self Assessment Report, Continuous Improvement Plan, Student Outcome, Program Educational Objectives.

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1. INTRODUCTION

HIGHER education accreditation is a periodic process of collegial peer assessment. Institutional-based and program-based accreditations are the two different categories. The achievement of the staff and students is generally the emphasis of institution-based accreditation [1]. Depending on the discipline of the educational institution, programs may also receive national accreditation from organizations like ABET. Natural science, computer science and engineering programs are accredited by ABET, a non-profit, non-governmental organization [2]. The accreditation operations involve more than 2,200 volunteers from academia, government, and business. The program's preparation for graduates who can satisfy the demands of the relevant profession is guaranteed by ABET accreditation. The review procedure also confirms that students' educational experiences meet the industry standard for technical training. Obtaining ABET accreditation takes around a year. A Self Assessment Report (SAR) by the program, a peer review to gather data (accreditation visit), and a final determination (accreditation action) by the commission on the accreditation status are all parts of this procedure. By confirming that the curriculum has met the requirements for preparing graduates to enter the crucial sectors in the global workforce, ABET accreditation enhances the program's value. [3]. Program criteria and general criteria are the two sets of requirements that ABET-accredited programs must meet. All programs that have been accredited by the relevant ABET commission must meet the General Criteria. These eight general requirements must all be met [4]:

1. Students: The student enrollment, performance,

progress, counseling, and graduation are all covered by this criterion.
2. Program Educational Objectives: Broad statements that outline what graduates are anticipated to accomplish within a few years of graduation make up a program's educational objectives. The instructional goals of the program are determined by the needs of its target audiences.
3. Student Outcomes: Student outcomes outline what is anticipated of students by the time they graduate. These have to do with the information, abilities, and practices that students pick up as they advance through the curriculum.
5. Curriculum: While this criterion does not specify courses, it addresses curriculum subjects that blend technical, professional, and general education components to enhance student goals.
6. Faculty: This criterion focuses on the faculty's expertise, the extent to which they interact with and advise students, and their capacity to enhance the program.
7. Facilities: This criterion deals with the availability of classrooms, libraries, offices, labs, tools, computing resources, and related equipment to promote student achievement of learning outcomes and to provide a learning environment.
8. Institutional Support: This criterion is focused on the institutional services, funding, and personnel required to meet the program needs.
This paper demonstrates and analyzes the details of 7 successful experiments to acquire ABET accreditation and compares the data recorded in their SARs. The rest of the paper is organized as follows: Section 2 presents the most important previous works related to this article. Section 3 explains the concept and structure of SARs. The research methodology is explained in Section 4 while the gathered data is presented and analyzed in Section 5. Finally, the most important remarks extracted from this work is abstracted in Section 6.

2. Related Works

The many research initiatives to improve the major academic accreditation fields are shown in Table 1 below. One direction is to assist other educational institution in meeting accreditation standards, so that many researchers have documented their ABET accreditation experience as discussed in [1-4]. One of the crucial tasks to ensure that an academic program can achieve the desired student results is program assessment [5–9]. Also, the COVID-19 epidemic and the adoption of remote tools and procedures for accrediting purposes have recently had an impact on accreditation activities in all sectors [10–14]. Finally，there are many studies in the education literature focusing on continuous improvement processes [15-18] and outcome based education [19-22].
The majority of the mentioned references just briefly touch on one or two ABET criteria, such as the assessment process or continuous development, or they address the ABET accreditation experience in an abstracted manner.
As a result, there is a gap in the body of knowledge regarding how to implement the different procedures in order to comply with the ABET requirements in a particular context. In light of this, it is obvious that a thorough description of planning and carrying out of the assessment process of symmetric programs in different universities is necessary, and that constitutes the main contribution of this work. Unlike other attempts, this study records the methodology, instructional practices, and tactics used by various institutes as they work towards accreditation and adopts a comprehensive strategy to offer recommendations on all crucial assessment process issues, including design, evaluation, and continual improvement.

3. Self Assessment Reports

The program Self Assessment Report (SAR) is the key document the program utilizes to certify compliance with all applicable ABET criteria and standards, according to ABET. The review team's assessment of whether the program satisfies the requirements for accreditation is based on the Self-Study. It covers all avenues for earning the degree, all modes of program-related education, and all options for distant study. As a result, the SAR serves as a crucial foundation for the development, implementation, and evaluation of proposed process changes [23-25].
Evaluators are given a picture of a program's compliance with standards defined in criteria by the SAR's organizational structure. ABET offers a SAR template as a reference, however programs are free to employ extra and supplemental methods to present their programs to the evaluation panel in the best possible light. Although creativity and freedom of choice are permitted, programs frequently fall back on the ABET pattern [26-30].
Information that is routine and descriptive in character is referred to as Institutional/Program Data (I/PD). It is possible to create standardized forms and procedures for this kind of data. General reports on counts, categories, and conditions using I/PD data. Little to no interpretation is required to comprehend and

assess this data without a proper data definition. For the evaluation of this data, acceptable criteria, ratios, and other measures may be employed. I/PD data can be reviewed and updated on a regular basis to reflect the state of the university [9].

Assessment and Continuous Improvement Information and Data (A/CIID) refers to information that comes from evaluation procedures. This kind of reported data shows adherence to procedures and standards, as well as faculty ownership and involvement. A/CIID can be broken down into two categories: those that confirm the existence and application of an effective assessment and continuous improvement process, and those that detail how the data resulting from the process have been applied to enhance student learning in pursuit of the program's objectives [15-18].

The mixed type of data currently gathered in the SAR is shown in Fig.1. Data in this set may be owned and maintained by different people, be of various types, and be used by programs differently as well as by evaluators during accreditation. As a result, it is suggested that the SAR as a unified method of gathering, representing, and utilizing this data seems constrained.

4. Research Methodology

In this paper, we investigate the detailed information of 7 different computer engineering programs using their SARs, see Table 2. These SARs span over the last 10 years and represent the outcome of different approaches towards getting accreditation. The study plan involves comparing (objectively and subjectively) the different parameters in each criterion to show their convergence and divergence in dealing with accreditation requirements.

5. Data Presentation and Analysis

The compared data in this study is presented while dividing them into 12 Table (from Table 2 to Table 13). Each one of these tables abstracts the data of a certain ABET criterion. The following remarks could be extracted from this collection:

1. Although they all represent a computer engineering programs, there is a clear divergence among them in many aspects such as Program Educational Objectives (PEOs), study plan, curriculum, faculty, resources, regulations, Continuous Improvement Plan (CIP). Nevertheless, all these programs were eligible to get ABET accreditation.
2. These programs follow different approaches for criterion 4: data gathering, assessment and evaluation. These methods range from classical (extensive) model to light weight (capstone project) model. Also, different software assistance tools were used in different manners for data assessment and archiving.
3. SARs mostly focused on continuous improvement plan which occupied about 50% of the report.
4. There is a real need to enhance the classical methods and models in writing assessment reports in order to reflect a realistic picture about the analyzed programs. Modern multimedia and networking facilities could be utilized for this purpose.

6. Conclusions

An increasing number of academic institutes are applying for ABET accreditation of their computing programs in an effort to improve the quality of academic programs. An issue here is that there isn't much information available for implementation mechanics, which leads to misunderstanding and resource waste, especially in the early stages. Furthermore, there is a scarcity of literature accessible defining the concept and implementation of successful accreditation procedures for computer programs. With this in mind, there is a need to document the methodology, educational practices, and tactics used by various institutes on their path to accreditation. The most essential aspect in the context of ABET is the technique for analyzing and evaluating SOs, which serves as the foundation for continuous improvement initiatives. This problem is addressed in this paper by offering elaborate implementation details of methods and strategies for computer engineering programs pursuing ABET accreditation.

Table 1: Literature Survey

Subject of the Study	Ref. No.	Major Contribution(s)
documentation of ABET accreditation experience	[1]	The authors have compared the accreditation criteria of ABET and the engineering council, both of which are Washington accord signatories and highlighted similarities and differences among their criteria. They proposed the need for alignment among accredited programs of different signatory bodies of the Washington accord.
	[2]	The authors. have highlighted that a deep understanding of accreditation procedures and policies can help an academic program to better prepare for ABET accreditation.
	[3]	The authors have developed a dataset of mapping of program educational objectives and student outcomes from ABET self-study reports of 32 accredited programs and applied different classification techniques to get insights in mapping.
	[4]	The authors have discussed the difficulties in developing self-study report for the accreditation program and has proposed a generic model based on ABET criteria to highlight deffciencies in the academic programs intending to apply for ABET accreditation.
Program assessment	[5]	The author has proposed an assessment approach for program educational objectives and student outcomes for ABET accreditation based on their successful experience
	[6]	The authors have developed eleven critical success factors in pursuit of ABET accreditation and developed their prioritization based on fuzzy analytical hierarchical processing and full consistency method to facilitate institutions in their preparation for ABET accreditation.
	[7]	The authors have used different data mining algorithms to predict student performance in attaining student outcomes based on assessments conducted in course files.
	[8]	The authors have shared the rubric based assessment mechanisms for ABET student outcome attainment for a computer science program.
	[9]	The authors propose to use a discussion based performance task to evaluate six non-technical skills concerning ethical, legal, security and social issues rather than traditional evaluation mechanisms in course based assessments.
Remote ABET Tools & Methods	[10]	The authors have proposed a digital quality management system for program assessment to facilitate virtual accreditation visits due to the COVID-19 pandemic. This model was applied to three engineering programs, and they recommended its usage by academic institutions and accreditation bodies in remote accreditation processes.
	[11]	The authors have documented the challenges of the virtual ABET accreditation process due to the COVID-19 pandemic and provided recommendations for the preparation of accreditation documents for such virtual ABET visits.
	[12]	The authors have provided a design method to emulate power engineering labs in online learning due to the COVID-19 pandemic. In their model, they provide a simulated environment based on textbook examples and discussion that how the experiment contributed to relevant ABET student outcomes.
	[13]	The authors have developed a web based application which can facilitate assessment data collection and reporting processes.
	[14]	The authors. have studied the role of online collaborative learning in students learning outcome attainment at the Education University of Hong Kong. They found that online collaborative learning enhances the attainment of learning outcomes
Continuous Improvement Process	[15]	The authors propose a continuous improvement cycle by combining ABET criteria and gamification theory which resulted in a positive impact on students learning behavior.
	[16]	The authors shared their experience of development and implementation of the program enhancement plan to satisfy the continuous improvement process for ABET accreditation of an undergraduate modeling and simulation engineering program.
	[17]	The author has advocated to make faculty as core of continuous improvement process. He further recommended making a separate committee for each program outcome. These committees should be responsible for summative data collection, assessment review and curricula change management
	[18]	The author has presented a two-tier continuous improvement model for ABET accreditation, where first tier focuses on curriculum improvement whereas the second tier focuses on improvement in the measurement process of learning outcomes
Outcome Based Education	[19]	The authors have described that outcome-based education is student centric in nature, so they have proposed micro-level knowledge structures in teaching power electronic engineering curriculum
	[21]	The authors have described that, in a successful outcome-based education, learning transformation should be observable and formative, and summative assessments can be used to measure the students' attainment
	[21]	The authors have carried out a study and concluded that transformation from conventional education to outcome-based education has a positive impact on students learning experience
	[22]	The authors have developed an outcome-based computational thinking program for teachers in China which helped the teachers to apply computational theory concepts in practical skill development

TEMPLATE SECTIONS	I/PD	A/CIID	TEMPLATE SECTIONS	I/PD	A/CIID
BACKGROUND INFORMATION			**CRITERION 6. FACULTY**	X	
Contact Information	X		Faculty Qualifications (Table 6-1)	X	
Program History	X		Faculty Workload (Table 6-2)	X	
Options	X		Faculty Size	X	
Program Delivery Modes	X		Professional Development	X	
Program Locations	X		Authority and Responsibility of Faculty	X	
Public Disclosure	X		**CRITERION 7. FACILITIES**		
Summarize last Shortcomings		X	Offices, Classrooms and Laboratories	X	
GENERAL CRITERIA			Computing Resources	X	
CRITERION 1. STUDENTS			Guidance	X	
Student Admissions	X		Maintenance and Upgrading of Facilities	X	
Evaluating Student Performance		X	Library Services	X	
Transfer Students/Courses		X	Overall Comments on Facilities		X
Advising and Career Guidance	X		**CRITERION 8. INSTITUTIONAL SUPPORT**		
Work in Lieu of Courses	X		Leadership	X	X
Graduation Requirements	X		Program Budget and Financial Support	X	
Transcripts of Recent Graduates	X		Staffing	X	
CRITERION 2. PEOs			Faculty Hiring and Retention	X	
Mission Statement	X		Support of Faculty Prof Development	X	
Program Educational Objectives	X		**PROGRAM CRITERIA**		
Consistency PEOs w/ Mission		X	Compliance with	X	X
Program Constituencies	X		**APPENDICES**		
Process for Review of PEOs	X		Appendix A – Course Syllabi	X	
CRITERION 3. STUDENT OUTCOMES			Appendix B – Faculty Vitae	X	
Student Outcomes	X		Appendix C – Equipment	X	
Relationship Outcomes to PEOs		X	Appendix D – Institutional Summary	X	
CRITERION 4. CONTINUOUS IMPROVE			The Institution	X	
Process and Outcome Assesmnt		X	Type of Control	X	
Student Outcomes		X	Educational Unit	X	
Continuous Improvement		X	Academic Support Units	X	
Additional Information		X	Non-academic Support Units	X	
CRITERION 5. CURRICULUM			Credit Unit	X	
Program Curriculum (Table 5-1)	X		Table D-1 Program Enrollment Degree Data	X	
Course Syllabi	X		Table D-1 Personnel	X	
			Signature Attesting to Compliance	X	

Fig.1. SAR Structure

Table 2: Parties Involved in The Comparison

University Name	SAR1[23]	SAR2[24]	SAR3[25]	SAR4[26]	SAR5[27]	SAR6[28]	SAR7[29]
	Navajo Technical University	University of Florida	University of Colorado Colorado Springs	Fitchburg State University	Saint Louis University	University of Washington	Umm Al-Qura University
Country	USA	USA	USA	USA	USA	USA	KSA
Preparation Year	2017	2012	2011	2019	2018	2019	2018
No. of Pages	170	378	194	160	247	291	268

Table 3: Background Information

Reports Details	SAR1	SAR2	SAR3	SAR4	SAR5	SAR6	SAR7
Contact Information	Head of Dept.	6 contacts	Head of Dept.	2 contacts	2 contacts	Head of Dept.	Head of Dept.
Program History	Date of establishment, Historical information about the university and dept., Program description, Curriculum, Faculty, Achievements						
Options	3 options: Computer, Electrical, Manufacturing	1	1	1	1	1	1
Program Delivery Modes	In person-Day mode, Distance Learning	In person-Day mode	In person Day-Evening Modes	In person-Day mode, Distance Learning	In person-Day mode	In person-Day mode	In person-Day mode
Program Locations	University Campus, Distance Learning	University Campus	University Campus	University Campus, Distance Learning	University Campuses at USA and Spain	University Campus, Four international direct exchange agreements	University Campus
Public Disclosure	University Web site	None	None	University Web site	University Web site	University Web site	University Web site

Table 4: Criterion 1: Students

Student Admissions	SAR1	SAR2	SAR3	SAR4	SAR5	SAR6	SAR7
	college admission test scores, co-curricular activities and attempted college course work	college admission test scores, co-curricular activities and attempted college course work	secondary school grades, college admission test scores	secondary school grades	college admission test scores, co-curricular activities and attempted college course work	college admission test scores, co-curricular activities and attempted college course work	secondary school grades, college admission test scores
Evaluating Students Performance	**Examination and Grading System** Student performance is monitored by professors in individual classes via pre- and post- tests, homework, quizzes, tests, rubrics and projects. GPA System (1 to 4) is used for evaluation.						
Transfer Students and Transfer Courses	Transfer from Other Universities Transfer of students within the University Transfer to a department within the College						
Advising and Career Guidance	Registration Procedure Academic advising Functions of the Academic Advisor						
Work in Lieu of Courses	SAR1	SAR2	SAR3	SAR4	SAR5	SAR6	SAR7
	Limited credit is offered towards achieving life experience, advanced placement, dual enrollment, military experience.	credit is offered towards advanced placement, dual enrollment.	credit is offered towards advanced placement, dual enrollment.	credit is offered towards achieving life experience, advanced placement, dual enrollment, military experience.	participation in at least one internship or co-op experience	does not award course credit for work	only grants credit(s) for the academic courses that are successfully completed.
Graduation requirements	SAR1	SAR2	SAR3	SAR4	SAR5	SAR6	SAR7
	120 credit hours – 4 Years Program	118 credit hours – 5 Years Program	128 credit hours – 5 Years Program	120 credit hours – 5 Years Program	125 credit hours – 5 Years Program	180 credit hours – 4 Years Program	165 credit hours – 5 Years Program
Transcripts of Recent Graduates	The program will provide transcripts from some of the most recent graduates to the visiting team along with any needed explanation of how the transcripts are to be interpreted.						

Table 5 Criterion 2: Program Educational Objectives

Mission Statement	Mission of the University College Mission Department Mission						
	Program Educational Objectives (PEOs)						
	SAR1	SAR2	SAR3	SAR4	SAR5	SAR6	SAR7
	4	4	3	7	3	4	4
	Consistency of the Program Educational Objectives with the Mission of the Institution Program Constituencies						
	Process of Revision of PEOs (Period (Years), Who?)						
	SAR1	SAR2	SAR3	SAR4	SAR5	SAR6	SAR7
	3, Industrial Advisory Board	4, Industrial Advisory Board	3, Faculty Advisory Committee	Not Determined, Industrial Advisory Board	3, Industrial Advisory Board	Not Determined, Industrial Advisory Board	3, Assessment and Evaluation Committee

Table 6: Criterion 3: Student Outcomes

Student Outcomes	SAR1	SAR2	SAR3	SAR4	SAR5	SAR6	SAR7
	ABET (a to k)	ABET (a to k)	ABET (a to k)	Criterion 3 of ABET Criteria Version 2.0 (1 to 7)	ABET (a to k)	Criterion 3 of ABET Criteria Version 2.0 (1 to 7)	ABET (a to k)
Relationship of Students Outcomes (SOs) to Program Educational Objectives (PEOs)	SAR1	SAR2	SAR3	SAR4	SAR5	SAR6	SAR7
	1 OR 0	Strong OR Moderate relation	1 OR 0	0 OR 1 OR 2	1 OR 0	Objective description	1 OR 0

Table 7: Criterion 5: Curriculum

Program Curriculum	SAR1	SAR2	SAR3	SAR4	SAR5	SAR6	SAR7
	Math & Basic Science:32 Hours Engineering Topics:48 Hours Others:19 Hours	Math & Basic Science:42 Hours Engineering Topics:65 Hours Others:18 Hours	Math & Basic Science:35 Hours Engineering Topics:75 Hours Others:18 Hours	Math & Basic Science:18 Hours Engineering Topics:43 Hours Others:59 Hours (Not an Eng. Dept.)	Math & Basic Science:36 Hours Engineering Topics:57 Hours Others:18 Hours	Math & Basic Science:45 Hours Engineering Topics:70 Hours Others:65 Hours	Math & Basic Science:35 Hours Engineering Topics:72 Hours Others:58 Hours

Table 8: Criterion 6. Faculty

Faculty Qualifications	SAR1	SAR2	SAR3	SAR4	SAR5	SAR6	SAR7
	PHD:4 Others:1	PHD:70 Others:3	PHD:6 Others:1	PHD:7 Others:2	PHD:5 Others:1	PHD:69 Others:10	PHD:26 Others:5
Faculty Workload (Average)	5Courses/ semester	2 to 5 Courses/ Academic Year	5 Courses/ Academic Year	12 Credit Hours/ Semester	18 Credit Hours/ Semester	3Courses/ Academic Year	10-16 Credit Hours/ Semester
Professional Development	Training Courses – Membership in Scientific Organizations – Participation in International Conferences, Workshops and Events – Joint Research Work – Proficiency & Skills Development						
Authority and Responsibility of Faculty	Management – Teaching – Research – Other Duties						

Table 9: Criterion 7. Facilities

Offices, Classrooms and Laboratories	Furnished, Private and highly tech Offices for all staff Stranded Classrooms with adequate logistics Available Laboratory Facilities
Computing Resources	Available and Accessible
Guidance	Highly Trained Guidance Staff and Efficient Strategies
Maintenance and Upgrading of Facilities	Highly Trained Staff and Efficient Procedures
Library Services	Proper Reading Locations, Updated Periodicals, Textbooks, Journals, Magazines and Internet Resources

Table 10: Criterion 4: Continuous Improvement

SAR1	**A. Student Outcomes** 1. Assessment Processes: Direct (Exams)/Indirect(Surveys, Interviews). 2. Frequency of Direct Assessment Processes: Annually 3. The expected level of attainment: 80% of the students achieve Grade Points more than 2 (0 to 4 Range) in each outcome 4. No. of Selected Topics for Direct Assessment: One (Capstone Design II) Out of 38 Course Topics 5. No. of Surveys/Year (Indirect Assessment): 3 6. Documentation: Electronic & Hard Copy 7. Assessment & Analysis Tools: Manual 8. Length of Assessment Cycle: 3 Years **B. Continuous Improvement** Actions: Analyzing collected data – Taking Actions (Splitting Courses, Topics Elimination, Replacing Topics, Adding Topics, Modifying Teaching Methods AND/OR Persons, Modifying Time Table AND/OR Course Schedule). .
SAR2	**A. Student Outcomes** 1. Assessment Processes: Direct (Exams)/Indirect(Surveys, Interviews). 2. Frequency of Direct Assessment Processes: Each Semester 3. The expected level of attainment: 80% of the students achieve Grade Points more than 3(1 to 5 Range) in each outcome 4. No. of Selected Topics for Direct Assessment: 17 out of 42 5. No. of Surveys/Year (Indirect Assessment): 5 6. Documentation: Electronic & Hard Copy 7. Assessment & Analysis Tools: Manual 8. Length of Assessment Cycle: 4 Years **B. Continuous Improvement** Actions: Analyzing collected data – Taking Actions (Splitting Courses, Topics Elimination, Replacing Topics, Adding Topics, Modifying Teaching Methods AND/OR Persons, Modifying Time Table AND/OR Course Schedule). .
SAR3	**A. Student Outcomes** 1. Assessment Processes: Direct (Exams)/Indirect(Surveys, Interviews). 2. Frequency of Direct Assessment Processes: Each Semester 3. The expected level of attainment: 60% of the students achieve Grade Points more than 2(0 to 4 Range) in each outcome 4. No. of Selected Topics for Direct Assessment: 8 out of 33 5. No. of Surveys/Year (Indirect Assessment): 3 6. Documentation: Electronic & Hard Copy 7. Assessment & Analysis Tools: Manual 8. Length of Assessment Cycle: 4 Years **B. Continuous Improvement** Actions: Analyzing collected data – Taking Actions (Splitting Courses, Topics Elimination, Replacing Topics, Adding Topics, Modifying Teaching Methods AND/OR Persons, Modifying Time Table AND/OR Course Schedule).
SAR4	**A. Student Outcomes** 1. Assessment Processes: Direct (Exams) 2. Frequency of Direct Assessment Processes: Each Semester 3. The expected level of attainment: 80% of the students achieve score more than 70% in each outcome 4. No. of Selected Topics for Direct Assessment: 11 out of 40 5. No. of Surveys/Year (Indirect Assessment): Not Mentioned 6. Documentation: Electronic & Hard Copy 7. Assessment & Analysis Tools: Manual 8. Length of Assessment Cycle: 2 Years **B. Continuous Improvement** Actions: Analyzing collected data – Taking Actions (Splitting Courses, Topics Elimination, Replacing Topics, Adding Topics, Modifying Teaching Methods AND/OR Persons, Modifying Time Table AND/OR Course Schedule).
SAR5	**A. Student Outcomes** 1. Assessment Processes: Direct (Exams)/Indirect(Surveys, Interviews). 2. Frequency of Direct Assessment Processes: Each Semester 3. The expected level of attainment: 6 randomly selected students works achieve average Grade Points more than 2.5(1 to 3 Range) in each outcome 4. No. of Selected Topics for Direct Assessment: 9 out of 47 5. No. of Surveys/Year (Indirect Assessment): 2 6. Documentation: Electronic & Hard Copy 7. Assessment & Analysis Tools: Manual 8. Length of Assessment Cycle: 6 Years **B. Continuous Improvement** Actions: Analyzing collected data – Taking Actions (Splitting Courses, Topics Elimination, Replacing Topics, Adding Topics, Modifying Teaching Methods AND/OR Persons, Modifying Time Table AND/OR Course Schedule).
SAR6	**A. Student Outcomes** 1. Assessment Processes: Direct (Exams)/Indirect(Surveys, Interviews). 2. Frequency of Direct Assessment Processes: Each Semester 3. The expected level of attainment: 80% of the students achieve High or Medium level in each outcome 4. No. of Selected Topics for Direct Assessment: Capstone courses 5. No. of Surveys/Year (Indirect Assessment): 4 6. Documentation: Electronic & Hard Copy 7. Assessment & Analysis Tools: Manual 8. Length of Assessment Cycle: 3 Years **B. Continuous Improvement** Actions: Analyzing collected data – Taking Actions (Splitting Courses, Topics Elimination, Replacing Topics, Adding Topics, Modifying Teaching Methods AND/OR Persons, Modifying Time Table AND/OR Course Schedule).
SAR7	**A. Student Outcomes** 1. Assessment Processes: Direct (Exams)/Indirect(Surveys, Interviews). 2. Frequency of Direct Assessment Processes: Each Semester 3. The expected level of attainment: 60% of the students achieve 70% (or C) Grade marks 4. No. of Selected Topics for Direct Assessment: 15 out of 53 5. No. of Surveys/Year (Indirect Assessment): 5 6. Documentation: Electronic & Hard Copy 7. Assessment & Analysis Tools: CLOSO software 8. Length of Assessment Cycle: 2 Years **B. Continuous Improvement** Actions: Analyzing collected data – Taking Actions (Splitting Courses, Topics Elimination, Replacing Topics, Adding Topics, Modifying Teaching Methods AND/OR Persons, Modifying Time Table AND/OR Course Schedule).

Table 11: Criterion 8: Institutional Support

Leadership	The departmental leadership consists of the chairman of the department, and the department council which consists of all faculty members.
Program Budget and Financial Support	B-1 Sources of Financial Support (Governmental Funding, University Budget, Grants, Others) B-2 Support for Teaching Activities (The university provides salaries of all its employees and full time staff. Also, the instructional budget is provided by the Campus on a continuing basis to support part-time instruction, course assistants, and graders. The College uses temporary funds to support graduate assistantships with teaching assignments. Instructional resources are pooled at the College level, and allocated to the Departments based on factors including enrollment, faculty workload policy, and personnel changes). B-3 Support for Facilities (Permanent improvements of the facilities are planned during the Budget process. The college programs have adequate teaching infrastructure, facilities and laboratory equipment for students to attain their student outcomes). B-4 Adequacy of Resources (The fund and the budget allocated by the University is adequate to enable the Program achieving its academic goals and objectives).
Staffing	The staff (administrative, instructional and technical) is adequate to support the program to meet the Program Educational Objectives and to support the students in achieving student outcomes.
Faculty Hiring and Retention	To hire new faculty members, the department announces publicly for its needs then selects suitable persons and then requests the University to make arrangements for hiring him. There is no problem in retaining faculty as faculty member receives a good salary (and other benefits), and attractive working environment which responds well to specialty concerns.
Support of Faculty Professional Development	The institution supports and funds faculty scholarship, research, and creative activity. Faculty members use these funds to attend conferences, for subscriptions, membership in professional organizations, and to build personal libraries of materials. Each department receives a budget for Travel Funds, which is distributed according to departmental policies.

Table 12: Institutional Summary

The Institution	SAR1	SAR2	SAR3	SAR4	SAR5	SAR6	SAR7
Type of Control	Public	Public	State institution	State institution	Private - non-profit	State-assisted Public Research University	State institution
Educational Unit	No Comparable Data						
Academic Support Units							
Non-academic Support Units							
Credit Unit	One semester credit hour represents one class hour or three laboratory hours per week. One academic year is composed of 30 weeks of classes, exclusive of final examinations.	One semester credit hour represents one class hour or three laboratory hours per week. One academic year is composed of 28 weeks of classes, exclusive of final examinations.	One semester credit hour represents one class hour or three laboratory hours per week. One academic year is composed of 28 weeks of classes, exclusive of final examinations.	One semester credit hour represents one class hour or three laboratory hours per week. One academic year is composed of 28 weeks of classes, exclusive of final examinations.	One semester credit hour represents one class hour or three laboratory hours per week. One academic year is composed of 30 weeks of classes, exclusive of final examinations.	One semester credit hour represents one class hour or three laboratory hours per week. The standard academic year consists of three 10-week quarter terms.	One semester credit hour represents one class hour or three laboratory hours per week. One academic year is composed of 28 weeks of classes, exclusive of final examinations.

Table 13: Program Enrollment and Personal

Table D1: Program Enrollment and Degree Data (Total Undergrad (Maximum) = FT + PT) FT: Full Time, PT: Part Time	SAR1	SAR2	SAR3	SAR4	SAR5	SAR6	SAR7
	FT:43 PT:6	FT:435 PT:0	FT:41 PT:8	FT:147 PT:34	FT:45 PT:3	FT:145 PT:20	FT:284 PT:0
Table D2: Personal (FT, PT, FTE) FT: Full Time, PT: Part Time	SAR1	SAR2	SAR3	SAR4	SAR5	SAR6	SAR7
Administrative	(0,2,1)	Not Mentioned	(1,0,0.5)	(0.375,0,0.375)	(0,1,0.5)	(42,6,45.7)	(2,0,2)
Faculty (tenure-track)	(0,0,0)	(39,0,39)	(7,0,6.5)	(5.875,0,5.875)	(6,0,1)	(69,1,66)	(23,0,18.5)
Other Faculty (excluding student Assistants)	(1,2,2)	(9,16,17)	(1,10,2.3)	(0,0.833,0.833)	Not Mentioned	(10,0.5,10.5)	(8,0,8)
Student Teaching Assistants	(0,8,4)	(37,0,37)	None Research Assistants (0,5,2)	(0,0,0)	Not Mentioned	(154,132,286)	(0,0,0)
Technicians/Specialists	(1,1,1.5)	(9,0,9)	(0,1,0.4)	(0,0,0)	Not Mentioned	(47,4,49.1)	(1,0,1)
Office/Clerical Employees	(0,0,0)	(25,0,25)	(1,0,1)	(1,0,1)	Not Mentioned	(10,0,10)	(2,0,2)

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دراسة مقارنة متعمقة لمختلف برامج هندسة الحاسوب المعتمدة باستخدام تقارير التقييم الذاتي

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الملخص

تُولي الجامعات في جميع أنحاء العالم اهتمامًا كبيرًا لمنح الاعتماد الأكاديمي لبرامج الدرجات الأكاديمية. وهذا أمر مفهوم، حيث أن الاعتماد لا يحسن فقط محتوى وتقديم البرامج، بل يمكن أيضًا للمؤسسات من استقطاب معلمين وموظفين من أعلى الكفاءات. هيئة الاعتماد للهندسة والتكنولوجيا (ABET) هي منظمة مرموقة تتمتع بالسلطة لاعتماد برامج الهندسة. وعدد متزايد من المؤسسات الأكاديمية تطلب اعتماد ABET لبرامج هندسة الحاسوب بهدف رفع مستوى برامجها الأكاديمية وتسجيل الطلاب. القيمة الإضافية لهذا البحث تكمن في أنه يعمل كخريطة طريق للمؤسسات وإدارتها وهما يستعدان لبدء عملية اعتماد برامجهم في مجالهندسة الحاسوب او غيره. نقص المعلومات حول ميكانيكية التنفيذ يشكل مشكلة لأنه يؤدي إلى الارتباك وإهدار الموارد، خاصة في المراحل الأولى. بالإضافة إلى ذلك، هناك نقص في المصادر المتاحة التي تصف منهجية واستراتيجيات الاعتماد الفعّالة لبرامج الحوسبة. في ضوء ذلك، من الضروري توثيق منهجيات وممارسات التدريس والتكتيكات المستخدمة من قبل مختلف المعاهد أثناء العمل نحو الاعتماد.

الكلمات الداله :

الاعتماد الهندسي ، تقرير التقييم الذاتي ، خطة التحسين المستمر ،محصلات الخريجين ، أهداف البرنامج التعليمية.