Computer Engineering DEPARTMENT

Assessment and Evaluation Report
for the Computer Engineering Program
of Term 201

The Program Assessment Committee

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CONTENTS

1. INTRODUCTION

This report gives a brief summary of the ABET related activities at the Computer Engineering Department in the academic term 201. The program assessment committee (PAC) was instructed to conduct an assessment of all student outcomes that have not been assessed over the last year. Although this was not planned at the beginning of this 6-year cycle, it was implemented to have *at least two assessments* of each new SO (when the COE program switched from the a-k SOs to 1-7 SOs in T181). It should be noted that SO3 was assessed in T191 by the PAC chairman to check the effect of the some of the corrective actions related to SO3. Due to the sudden change in teaching mode (from face-to-face to on-line) the University has made emergency steps in T192 that made it unsuitable to assess the remaining SOs. As such, the remaining SOs (1,2, 4-7) were assessed in T201. This report details the assessment process, results, observations, recommendations, and immediate corrective actions.

2. CORRECTIVE ACTION(S)

There were no issues in the last report.

3. CURRICULUM CHANGES

The new curriculum which was approved in 193 is applied to new freshman students. It did not affect the assessment this term since all assessments are carried out in Junior & Senior courses. The changes in the curriculum also does not affect ABET accreditation as it did not affect any of the accreditation criteria. More specifically:

1) The program still has least 32 credit hours of basic sciences and math courses,
2) The program still has a culminating design experience – we have the COE 485 Senior Design Project as the capstone course, all the previous COE core courses that inject design into the program (COE 202/203, COE 233, COE 306, COE 344, remain the same, COE 300 credits were increased, and we added one more core course COE 302 Digital Systems Design & Modeling – so design component increased
3) COE program criteria is not affected – we still have Statistics (STAT 319) and Discrete Math (ICS 253)

4. ASSESSED STUDENT OUTCOMES (SOs)

In Table 2, put the SOs planned to be assessed as per the Master Assessment Plan.

Table 2: Assessment Plan

	SOs						
	1	2	3	4	5	6	7
Direct	X	X		X	X	X	X
Indirect							

List the assessed SOs in Table 3. Each row of the table represents one implemented assessment. State in each row the SO, direct/indirect assessment, the method used for assessment, and the courses. Table 3 helps to check the compliance with the Master Assessment Plan and to track the assessed SOs and courses used in assessment reports.

Table 3: Assessed Student Outcomes

SO	Method of Assessment	Course No.	Course Title
SO1	Quizzes & Projects	COE 241 & COE 306	Data and Computer Communications, and Introduction to Embedded Systems
SO2	Project	COE 351, COE 399, COE 485, COE 405, and COE 444	Coop Training, COE Summer Training, Senior Design Project, Digital Systems Design and Modeling, and Internetwork Design and Management
SO4	Project	COE 300, COE 351, COE 399, and COE 485	Principles of Computer Engineering Design, Coop Training, COE Summer Training, and Senior Design Project
SO5	Interviews	COE 300, COE 351, COE 399, and COE 485	Principles of Computer Engineering Design, Coop Training, COE Summer Training, and Senior Design Project
SO6	Lab Report	COE 301, COE 306, and COE 344	Computer Organization, Introduction to Embedded Systems, Computer Networks
SO7	Project Report & Presentations	COE 351, COE 399, and COE 485	Coop Training, COE Summer Training, and Senior Design Project

5. ASSESSMENT SUMMARY

Table 4 shows the assessed student outcomes in T201. The COE department adopts the following criteria for judging a student's achievement of an outcome based on rubric scores (out of 4):• Achieved (A): Score > 2.6, • Marginally Achieved (M): Score: □ 2.5-2.6• Need Improvement (NI): Score < 2.5. An important measure used to evaluate the overall achievement of a certain student outcome is the percentage of students who achieved 60% (i.e. 2.5/4) or more in the rubrics. This determines the urgency of corrective actions; any percentage less than 70% warrant corrective actions.

We also keep an eye on the maximum and minimum rubric scores; larger spread is indicative of either an outcome delivery/injection problem, an assessment problem, or both.

Table 4: Assessment Summary per Student Outcome (SO)

SO	Achieved Score	Targeted Threshold Level	Result	Comments / Reasons
SO1	2.54	2.5	Pass	Marginally Satisfied/On-Line teaching has adversely affected both attainment and assessment of SOs
SO2	2.89	2.5	Pass	Satisfied
SO4	2.63	2.5	Pass	Satisfied
SO5	2.78	2.5	Pass	Satisfied
SO6	2.5	2.5	Pass	Marginally Satisfied On-Line teaching has adversely affected both attainment and assessment of SOs
SO7	2.88	2.5	Pass	Satisfied

6. ASSESSMENT RESULTS ANALYSIS

This section analyzes and explains all assessments listed in the Assessed Student Outcomes given in Table 3 above.

Table 5: Assessment Analysis

SO	Courses	# of Students	Scores	Aggregated weighted Average	Status
SO1 (Formulation)	COE 241	16	2.5	2.54	Marginally Satisfied
	COE 306	15	2.6		
SO2 (Design)	COE 399	26	3.05	2.89	Satisfied (mostly!)
	COE 351	3	2.6		
	COE 405	8	3.45		

	COE 444	**8**	**2.33**		
	COE 485	**15**	**2.7**		
SO4 **(Ethics** **&** **Professionalism)**	**COE 300**	**17**	**2.79**	**2.63**	**Barely Satisfied**
	COE 399	**26**	**2.38**		
	COE 351	**3**	**2.5**		
	COE 485	**15**	**3.1**		
SO5 (Team Work)	**COE 300**	**17**	**2.71**	**2.78**	**Satisfied**
	COE 399	**26**	**2.69**		
	COE 351	**3**	**2.84**		
	COE 485	**15**	**3**		
SO6 **Experimental Design**	**COE 301**	**18**	**2.83**	**2.5**	**Marginally Satisfied**
	COE 306	**15**	**2.67**		
	COE 344	**19**	**2.08**		
SO7 (Self Learning)	**COE 399**	**26**	**2.55**	**2.88**	**Satisfied**
	COE 351	**3**	**3.17**		
	COE 485	**15**	**3.14**		

SO1 was assessed based on student performance in specially developed quiz in COE 241 and a lab project in COE 306. This outcome was marginally achieved according to the assessment results. It is clear that the on-line teaching has taken a heavy toll both on the delivery and assessment of SOs. Instructors' comments and suggested corrective actions are summarized below:

Course	Instructors' Comments	Proposed Corrective Actions
COE 241	This outcome is marginally achieved. Students had serious issues in formulation and identification of problems. But they showed better performance in solving the problems using engineering methods.	Emphasize the aspect of identifying and formulating the problem in more than one location in the course. Otherwise, we should only rely on

Course	Comments*	Proposed Corrective Actions*
	The obvious reason for this is that this course is taken by Sophomores.	the assessment result coming from mature senior students, e.g., in the senior project course.
COE 306	Both rubrics of this outcome got an average of 2.6, and thus this outcome is marginally achieved.	Emphasize problem formulation and identification in basic level courses.

SO2 was assessed in the COE 351 COOP, COE 399 (Summer Training), COE 405, COE 444 and COE 485. It was assessed in many courses due to the relative importance given to this SO. All assessments were based on course/capstone/field projects. This outcome was achieved by most students. COE 444 instructor has identified some corrective actions to apply to the course to ensure proper injection/assessment of SO2 in next offerings. Instructors' comments and suggested corrective actions are summarized below:

Course	Comments*	Proposed Corrective Actions*
COE 351	The outcome is barely satisfied. Students should be more guided through the later stages of a design project.	No corrective actions were proposed
COE 399	N/A	No corrective actions were proposed
COE 485	Online teaching had a huge effect on the senior design projects during Term 201. 60% of students had very good projects. 40% of students had very poor projects.	Need more vetting in lower courses
COE 405	N/A	No corrective actions were proposed
COE 444	There is a clear weakness in the requirements specifications, approach selection, and system design. Students make selections without justifications and don't study different design approaches. Technical reports are not written properly. Students copy their experiments without proper explanation. Students don't know how to cite references and compare their work.	The instructor is planning to spend one or two lectures with students to address their weaknesses.

SO4 was assessed in the COE 300, COE 351 COOP, COE 399 (Summer Training), and COE 485. In COE 300, the assessment was based on two case studies given to the students to assess their understanding of ethical and professional responsibility. In the other course, the assessment was based on how the students dealt with ethical and professional issues in their final reports and presentations. This outcome was marginally achieved by most students. Instructors' comments and suggested corrective actions are summarized below:

Course	Comments*	Proposed Corrective Actions*
COE 300	1. Although the instrument was designed with the help of an engineer from the industry, it seems it has some issues.	1. The instrument will be revised. The cases will be focused more on Ethics.

Course	Comments*	Proposed Corrective Actions*
	Students reported a wide spectrum of interpretations. Also, previous personal experiences introduced a bias into the discussion.	Other issues like morality and legality will be isolated. 2. The cases will be explained for the students before they fill the evaluation form. This is to eliminate confusions, bias, and presumptions. Emphasize the concept of engineering solutions and their global effect.
COE 399	This outcome needs improvement for both rubrics.	Emphasize the concept of engineering solutions and their global effect.
COE 351	This outcome is marginally achieved.	Emphasize the concept of engineering solutions and their global effect.
COE 485	This outcome is achieved, even though that about 30% of the students do not understand the meaning of engineering solutions.	Emphasize the concept of engineering solutions and their global effect in COE 300.

SO5 was assessed in the COE 300, COE 351 COOP, COE 399 (Summer Training), and COE 485 (Senior Design Project). In the COOP and Sumer training courses, the assessment was based on surveys. In COE 300 and COE 485 the assessment was based on instructor observations, project planning by the students, how they divided the work and lead efforts etc. This outcome was achieved by most students. Instructors' comments and suggested corrective actions are summarized below:

Course	Comments*	Proposed Corrective Actions*
COE 300		1. Go back to face to face teaching
COE 399		2. Have better online teaching and assessment tools
COE 351	The sample set for COE 351 is too small and may result with a false measure. Hence, it proposed not to consider this outcome this session.	
COE 485	1. Online learning due to COVID-19 had a negative impact on this outcome. 2. Extremely weak students that got impacted the worse with the on-line teaching situation. 3. Students cannot lead any effort on their own.	

SO6 was assessed in the labs of the COE 301 (Computer Organization), COE 306 (Embedded Systems), and COE 344 (Computer Networks). All assessments were based

on how students carried experiments, and interpreted results. Also, students were given a problem and ask to design an experiment to solve the problem. The on-line teaching had made this outcome assessment especially more difficult than all other SOs. This outcome was marginally achieved by most students. The networks lab was the most difficult lab for students to design the experiments. Instructors' comments and suggested corrective actions are summarized below:

Course (Labs)	Comments*	Proposed Corrective Actions*
COE 301	Some students lacked the motivation to solve the assignment even though it was worth 3% of their total grade. The topic of performance evaluation is covered a little bit late in the lecture.	Perhaps, it would be best to delay the assignment until performance lectures is finished and students got quizzed on it. However, that would have a conflict with project deadlines.
COE 306	none provided by the instructor.	
COE 344	Poor Communication skills is hindering students ability to understand the requirements and express/communicate their results	

SO7 was assessed in the COE 351 COOP, COE 399 (Summer Training), and COE 485 (Senior Design Project). In the COOP and Sumer training courses, the assessment was based on student surveys that assess the students learning of new subjects they had to deal with in their training. In COE 485 the assessment was based on student performance in project tasks that required new knowledge. This outcome was achieved by most students. Instructors' comments and suggested corrective actions are summarized below:

Course	Comments*	Proposed Corrective Actions*
COE 399		3. Go back to face to face teaching
COE 351	The sample set for COE 351 is too small and may result with a false measure. Hence, it proposed not to consider this outcome this session.	4. Have better online teaching and assessment tools
COE 485	1. Online learning due to COVID-19 had a negative impact on this outcome. 2. Extremely weak students that got impacted the worse with the on-line teaching situation. 3. Students cannot lead any effort on their own.	

7. NECESSARY CORRECTIVE ACTIONS

The suggested corrective actions are listed in item 6 above along with the instructors observations.

8. APPENDICES

8.1. RUBRICS AND PIs TEMPLATES

SO1: *an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.*

Indicator	Score (1 - 4)	Exemplary (4)	Proficient (3)	Apprentice (2)	Novice (1)
Engineering problem identification and formulation		Captures the complete set of design specifications for an engineering problem.	Captures most of the design specifications for an engineering problem but misses some of the design specifications.	Captures some of the design specifications for an engineering problem but misses most of the design specifications.	Unable to capture the design specifications for an engineering problem.
Applying concepts, governing math or physics equations and algorithms to solve an engineering problem		Applies correct concepts, chooses correct governing equations and optimum algorithms (or methods) to solve an engineering problem.	Applies correct concepts, chooses correct governing equations but use sub-optimum algorithms (or methods) to solve an engineering problem.	Applies some correct concepts and chooses some correct governing equations but makes mistakes.	Applies incorrect concepts and/or chooses incorrect governing equations, or cannot solve problems.

SO2: *Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.*

Performance Indicator	Score (1 - 4)	Exemplary (4)	Proficient (3)	Apprentice (2)	Novice (1)
Requirements المتطلبات **(user's needs)** **& Specifications** المواصفات**(what designers need to target)** **Are properly identified and stated.**		Requirements are clear and represent all stakeholders' needs (users, public, environment etc.) Properly translated to specifications (system, sub-systems) with adequate precision/resolution	Requirements are mostly correct but missing some non-user requirements (e.g. missing health, environment, legal requirements) Translated into right specs with minor errors in precision and/or resolution.	Some requirements are stated but many are missing, some vagueness. No consideration of non-user requirements. The specs are incomplete with many requirements not mapped to any spec.	Very few requirements, mostly vague and incomplete, some design decisions appear in the requirements (shows misunderstanding), specs are not directly relatable to requirements.
Approach Selection		All possible approaches are identified, properly analyzed (Pros * Cons) and the most suitable one selected with proper justification (using appropriate decision criteria). Criteria include economic (cost), and other factors.	Most possible approaches are identified and analyzed. The selection process does not give clear (convincing justification) or incomplete criteria are used in the decision making process.	Some possible approaches are identified. Student recognize that the selection should follow a certain process but chose inappropriate criteria or use flawed logic to make the selection.	Only one approach is identified and selected with almost no decision making process.
System Design		System's behavior is correctly identified and	System's behavior is correctly identified and	System's behavior is missing some *minor* use	System's behavior is missing some *major* use

		documented, system's architecture is properly developed and documented, and a proper physical deployment of the system is devised to satisfy all requirements and specifications.	documented, some system's architecture is proposed but is not ideal or more of a structural view of the system, the proposed physical deployment of the system is not satisfying some of requirements and specifications.	cases (other than the main use cases), no architectural view just physical deployment representation, documentation is incomplete.	cases, no architectural view, the physical deployment is missing major components or very naive, almost no documentation or incomplete documentation.
Detailed Design		Requirements and system specs are properly translated to component specs, components design/selection follows best known methods (proper design decisions), proper tools are used for the design and verification of components. All relevant standards are considered and properly taken into account in the design.	Requirements and system specs are translated to component specs but some specs are missing, components design/selection follows best known methods except for some components (e.g. unjustified decisions or mistakes), proper tools are used for the design but lacking in verification of components. Some but not all standards are taken into account.	Components are designed/selected in an ad-hoc trial and error manner (specs are not derived beforehand). Inferior design techniques, little use of tools or use of improper tools leading to design mistakes, no verification, some evidence of following standards but no mention of standards compliance.	Very little design of components. Missing components, little or no use of tools at all no evidence of understanding standards at all.

Prototyping		Proper integration of all components, prototype is a truthful representation of the end product (almost production quality), proper emulation of non-available components, proper documentation and demonstration of final prototype.	Proper integration of most components, prototype contains more emulated components than it should but still a truthful representation of the end product, not all use cases are properly documented and demonstrated.	Little integration (prototype is made of disjoint systems that are demonstrated separately), many unnecessarily emulated components, prototype is far from the end product, poor documentation.	No prototype, just some demonstrated components, poor documentation.

SO4: *Ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.*

Performance Indicator	Score (1 - 4)	Exemplary (4)	Proficient (3)	Apprentice (2)	Novice (1)
Awareness of global effects of engineering solutions (product, practice, event)		Deep understanding of the immediate and long-term issues involving the solution on users and non-users locally and globally	Good understanding of the widespread effects of the solution but with somewhat limited perspective about long-term factors	Some awareness of the more extended effects of the solution	Seems to have considered only effects on immediate users
Understanding of ethical and professional issues		Deep understanding of the professional issues involved and the ethical implications of the solution; careful, convincing analysis of all relevant factors	Good understanding of all the professional/ethical issues related to the solution; reasonable analysis of the relevant issues	Some consideration of professional, ethical issues raised directly by the solution	Little or no understanding of professional/ethical issues even where there are serious questions involved

Awareness of Contemporary issues (Social, Economic, Political, others …)		Deep understanding and good analysis of ALL relevant issues and how they might impact the general acceptance of the solution and how this might affect the future development of similar solutions	Good understanding of directly relevant contemporary issues to the creation and use of the solution.	Moderate understanding of the main relevant contemporary issues directly related to the creation and use of the solution	Little understanding of contemporary issues directly related to the creation and use of the solution

SO5: *an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.*

Outcome	Score (1 - 4)	Exemplary (4)	Proficient (3)	Apprentice (2)	Novice (1)
Contributions		Routinely provides useful ideas when participating in the group and in classroom discussion. <u>A leader who contributes a lot of effort</u>.	Usually provides useful ideas when participating in the group and in classroom discussion. <u>A strong group member who tries hard</u>!	Sometimes provides useful ideas when participating in the group and in classroom discussion. <u>A satisfactory group member who does what is required</u>.	Rarely provides useful ideas when participating in the group and in classroom discussion. May refuse to participate.
Problem-solving		Actively looks for and suggests solutions to problems.	Refines solutions suggested by others.	Does not suggest or refine solutions, but is willing to try out solutions suggested by others.	Does not try to solve problems or help others solve problems.
Working with others		Almost always listens to, shares with, and supports the	Usually listens to, shares, with, and supports the efforts of others. Does not cause "waves" in the group.	Often listens to, shares with, and supports the efforts of others, but	Rarely listens to, shares with, and supports the efforts of others. Often is not a good team player.

		efforts of others. Tries to keep people working well together.		sometimes is not a good team member.	
Teamwork		1. The project was carried out by more than TWO members 2. The work load and variety on each member seems fair 3. Leadership role being assumed by each member for different tasks is evident 4. Scheduled meetings minutes are Always recorded and the contribution of each team members are identified	1. The project was carried out by more than TWO members 2. The workload and variety on each member seem fair 3. Leadership role being assumed by each member for different tasks is NOT apparent 4. Scheduled meetings minutes are Usually recorded, and the contribution of each team members are identified	1. The project was carried out by more than TWO members 2. The workload and variety on each member does not seem to be fair or at least one member has been assigned trivial non-technical tasks (e.g. writing the report) 3. Scheduled meetings minutes are Often recorded, and the contribution of each team members are NOT identified	1. The project was carried out by more than TWO members 2. The work load and variety on each member does not seem to be fair or at least one member has been assigned trivial non-technical tasks (e.g. writing the report) 3. Scheduled meetings minutes are Rarely recorded, and the efforts are scattered.

SO6: *an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.*

Outcome	Score (1 - 4)	Exemplary (4)	Proficient (3)	Apprentice (2)	Novice (1)
Pre-Experiment: Identifying clear goals for the experiment – Hypothesis testing, Knowledge Discovery, etc.		Experiment objectives are clear and well articulated, expected results, and possible pitfalls of the experiment	Identifies most of the objectives of the experiment and some of the expected results but does not state possible pitfalls	Identifies some of the objectives of the experiment but omits the expected results and possible pitfalls.	Does not identify any objectives for the experiment and/or expected results
Designing a valid and appropriate experimental setup that achieve the experiment objective		Designs a fully valid testbed suitable for achieving the objectives with proper justification	Designs a valid testbed suitable for achieving the objectives with some justification	Designs a testbed that partially achieve the objectives without enough justification	Fails to designs a valid testbed for achieving the objectives
Conducting the experiment using a well defined valid procedure for achieving the experiment result		Conducts the experiment with no flaws at all, all procedural steps are correct, documented and justified, observations are recorded appropriately.	Conducts the experiment with some minor errors that do not affect the objectives significantly, procedural steps are mostly *correct*, and documented but not fully justified, observations are recorded appropriately.	Conduct the experiment with some errors that affect the results and the objectives	Conduct the experiment with major conceptual or procedural errors that render the results useless and leave the objectives unachieved

Analyzing and interpreting data and drawing conclusions		Analysis, visualization, interpretation of results, and conclusions exceed requirements of experiment and demonstrate significant higher-order thinking ability.	Analysis, interpretation of results, and conclusions meet requirements of experiment and demonstrate good thinking ability	Results are analyzed but not interpreted; conclusions are drawn but not well supported, very limited evidence of higher-order thinking ability was shown	No evidence of significant analysis and interpretation of results; fail to make proper conclusions; demonstrate only lower-level thinking ability

SO7: *An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.*

Performance Indicator	Score (1 - 4)	Exemplary (4)	Proficient (3)	Apprentice (2)	Novice (1)
Capable of recognizing the need for learning new knowledge to solve an engineering problem		• The student is <u>fully</u> aware of the exact knowledge that he lacks and that is needed to solve an engineering problem.	• The student is <u>mostly</u> aware of the exact knowledge that he lacks and that is needed to solve an engineering problem.	• The student is <u>partially</u> aware of the exact knowledge that he lacks and that is needed to solve an engineering problem.	• The student is <u>unable</u> to recognize the exact knowledge that he lacks and that is needed to solve an engineering problem.

Capable of using appropriate learning strategies to acquire new knowledge, and applying this knowledge to solve an engineering problem		• The student is <u>fully</u> capable of using appropriate learning strategies (such as reading textbooks or technical magazines/journals, watching video tutorials, interacting with technical forums, …) to acquire the new knowledge that is needed to solve an engineering problem. • The student <u>correctly</u> applies the newly acquired knowledge to solve an engineering problem.	• The student is <u>mostly</u> capable of using appropriate learning strategies (such as reading textbooks or technical magazines/journals, watching video tutorials, interacting with technical forums, …) to acquire the new knowledge that is needed to solve an engineering problem. • The student applies the newly acquired knowledge to solve an engineering problem but <u>makes minor mistakes</u>.	• The student is <u>partially</u> capable of using appropriate learning strategies (such as reading textbooks or technical magazines/journals, watching video tutorials, interacting with technical forums, …) to acquire the new knowledge that is needed to solve an engineering problem. • The student applies the newly acquired knowledge to solve an engineering problem but <u>makes major mistakes</u>.	• The student is <u>incapable</u> of using appropriate learning strategies (such as reading textbooks or technical magazines/journals, watching video tutorials, interacting with technical forums, …) to acquire the new knowledge that is needed to solve an engineering problem. • The student is <u>either incapable of applying or incorrectly applies</u> the newly acquired knowledge to solve an engineering problem.

8.2. DATA AND ANALYSIS SHEETS

Outcome, Course, Semester	SO1	COE 241	T201
Number of Students	16		
Prepared by:	shraf Mahmou	Date:	11-Dec-20

Performance Indicator	Avg.	Min.	Max.	Std. Dev.	s201630160	s201648940	s201687840	s201692140	s201722770	s201726310	s201736510	s201739610	s201741210	s201761430	s201771450	s201773910	s201777430	s201815600	s201820680	s201832320	s201842420	s201847700	s201847740	s201853540	s201972210
Engineering problem identification and formulation	2.31	1.00	4.00	0.68	2.00	1.00	2.00		2.00			4.00	2.00		2.00	3.00		2.00	2.00	2.00	3.00	3.00	2.00	3.00	2.00
Applying concepts, governing math or physics equations and algorithms to solve an engineering problem	2.88	1.00	4.00	0.93	3.00	2.00	2.00		2.00			4.00	2.00		2.00	3.00		1.00	4.00	3.00	4.00	3.00	4.00	4.00	3.00
	2.59	1.00	4.00	0.58																					

Comments/Suggestions:

Score for Indicator 1 is 2.3 out of 4 which is on the low side. I suggest emphasizing this aspect of identifying and formulating the problem in more than one location in the course. The suggested locations are: (1) Design of RF terrestrial microwave link; knowedge

covered in Chapter 4 is required, (2) design of mod/demod system for given R b/s; knowledge covered in Chapter 5 is required; and (3) datalink design problem; knowledge covered in Chapter 7 is required.

Outcome, Course, Semester	SO1		COE 306	T201
Number of Students	15			
Prepared by:	Hazem Selmi		Date:	11-Dec-20

Performance Indicator	Avg.	Min.	Max.	Std. Dev.	201424820	201425600	201443840	201448580	201623600	201630400	201631760	201648980	201660380	201665640	201679720	201723610	201728970	201750750	201769010
Engineering problem identification and formulation	2.60	1.00	3.50	0.80	2.50	1.00	2.50	1.00	3.50	3.50	3.00	3.00	2.50	2.50	3.00	3.50	2.00	3.50	2.00
Applying concepts, governing math or physics equations and algorithms to solve an engineering problem	2.67	1.00	3.50	0.70	2.50	1.00	2.50	2.00	3.50	3.50	3.00	3.00	2.50	2.50	3.00	3.50	2.00	3.50	2.00
	2.63	1.00	3.50	0.71															

Comments/Suggestions:

This outcome is barely achieved as some students had problems in problem identification and formulation part. It looks like the online learning has affected the ability of those students to achieve better results. Another factor is that the course kit was not received on time this semester and the students did not recieve their lab kits on time. This has greatly affected the performance of the students in this outcome. I would suggest that we mail the lab kits at the beginning of the semester in case online learning continues.

Outcome, Course, Semester	SO2, COE 351, Term 201							
Number of Students								
Prepared by:	Dr. Osais							

	SO2 Performance Indicators							
Student ID	Requirements Specifications	Approach Selection	System Design	Detailed Design	Prototyping	Avg.	Min.	Max.
201325050	2	2	2	2	2	2.00	2.00	2.00
201535050	4	3	4	4	3	3.60	3.00	4.00
201554930	2	3	2	2	2	2.20	2.00	3.00
Average	2.67	2.67	2.67	2.67	2.33	2.60	2.33	3.00
Std. Dev.	1.15	0.58	1.15	1.15	0.58	0.87	0.47	0.82

Outcome, Course, Semester	SO2, COE 399, Term 201			
Number of Students				
Prepared by:	Dr. Osais			

	SO2 Performance Indicators					
Student ID	Requirements Specifications	Approach Selection	System Design	Detailed Design	Prototyping	Av
201418240	2	2	2	3	2	
201424820	3	3	3	3	4	
201435380	2	2	2	3	3	
201443080	3	3	3	3	3	
201443840	3	3	3	3	4	
201448580	3	3	3	3	4	
201456580	2	2	2	2	2	
201465620	2	2	2	2	2	
201526270	3	3	3	3	4	

201536270	3	3	2	2	2	
201545410	3	3	3	3	4	
201565430	3	3	3	3	4	
201594190	3	3	3	3	3	
201614800	3	3	3	3	4	
201614820	3	3	3	3	4	3.
201630400	2	2	3	2	3	2.
201636500	3	3	3	4	4	3.
201641740	3	3	3	3	4	3.
201642100	2	2	3	2	3	2.
201642320	4	3	3	3	3	3.
201646740	3	3	3	3	3	3.
201668940	3	3	3	3	4	3.
201674560	3	3	3	3	3	3.
201675760	4	3	3	3	4	3.
201776310	3	3	3	3	4	3.
Average	3.00	2.82	3.00	2.91	3.55	**3.**
Std. Dev.	0.63	0.40	0.00	0.54	0.52	**0.**

Outcome, Course, Semester	SO2, COE 444, Term 201							
Number of Students	8							
Prepared by:	Dr. Tarek Sheltami							

Student ID	SO2 Performance Indicators					Avg.	Min.	Max.
	Requirements Specifications	Approach Selection	System Design	Detailed Design	Prototyping			
s201337310	2	3	2	3	3	2.60	2.00	3.00
s201443080	1	1	1	1	1	1.00	1.00	1.00
s201515890	2	2	3	3	3	2.60	2.00	3.00
s201554930	3	3	3	3	3	3.00	3.00	3.00
s201579030	1	2	2	2	2	1.80	1.00	2.00
s201616140	3	3	3	3	3	3.00	3.00	3.00
s201668940	1	2	2	3	3	2.20	1.00	3.00
s201687160	1	2	2	3	3	2.20	1.00	3.00
Average	1.75	2.25	2.25	2.63	2.63	2.30	1.75	2.63
Std. Dev.	0.89	0.71	0.71	0.74	0.74	0.67	0.83	0.70

Outcome, Course, Sem	SO 2, COE 405, T201: Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.								
Number of Students	8								
Prepared by:	Elrabaa, December 14th, 2020								

Student ID	P.I.	Proper Identification of Requirements & Specifications	Approach Selection	System Design	Detailed Design	Prototyping	Avg.	Min.	Max.	
201635180		3	3	3	3	3	3.00			
201636500		4	4	4	4	4	4.00			
201642320		4	4	4	4	4	4.00			
201646740		3.5	4	3	3	3	3.30			
201657800		3	3	3	3	3	3.00			
201668940		3	3	3	3	3	3.00			
201674560		3.5	4	3	3	3	3.30			
201723610		4	4	4	4	4	4.00			
Std. Dev.		0.46291005	0.51754917			0.51754917	3.45		Totals	
							0.47			

Outcome, Course, Sem	SO 2, COE 485, T201: Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
Number of Students	15
Prepared by:	Elrabaa, December 14th, 2020

Student ID	P.I.	Proper Identification of Requirements & Specifications	Approach Selection	System Design	Detailed Design	Prototyping	Avg.	Min.	Max.	
201686720		3.92	3.2	3.4	3.28	3.8	3.52	3.20	3.92	
201594190		3.92	3.2	3.4	3.28	3.8	3.52	3.20	3.92	
201565430		3.92	3.2	3.4	3.28	3.8	3.52	3.20	3.92	
201535050		3.8	3.8	3.8	3.8	4	3.84	3.80	4.00	
201675760		3.8	3.8	3.8	3.8	4	3.84	3.80	4.00	
201651740		3.2	3.2	3	3	3.6	3.20	3.00	3.60	
201526270		4	4	4	4	4	4.00	4.00	4.00	
201554930		4	4	4	4	4	4.00	4.00	4.00	
201515890		4	4	4	4	4	4.00	4.00	4.00	
201526390		1	1	1	1	2	1.20	1.00	2.00	
201443080		1	1	1	1	2	1.20	1.00	2.00	
201151850		2	1	1	3	2	1.80	1.00	3.00	
201325050		1	1	1	1	1	1.00	1.00	1.00	
201458120		1	1	1	1	1	1.00	1.00	1.00	
201342010		2	2	2	2	2	2.00	2.00	2.00	
Std. Dev.		1.321857279	1.291437			1.173517302	2.776	1.00	4.00	Totals
							1.24			

Observations: Peculiar distribution .. very good students (60%) and very poor students (40%) .. On-line taching probably has a huge effect.

Corrective Actions: Need more vetting in lower courses.

Outcome, Course, Semester	SO4	COE 300	T201
Number of Students	17		
Prepared by:	Yahya Osais	Date:	11-Dec-20

Performance Indicator	Avg.	Min.	Max.	Std. Dev.	201337310	201580250	201614800	201618400	201621240	201626140	201636080	201658380	201660380	201665640	201682960	201723610	201728970	201729330	201732990	201761690	201766550
Awareness of global effects of engineering solutions (product, practice, event) (Report)	2.06	1.00	3.00	0.64	3.00	1.00	2.00	2.00	2.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	1.00	2.00	3.00	3.00	3.00
Understanding of ethical and professional issues (Ethics Cases)					3.00	3.00	3.00	0.00	3.00	3.00	2.00	0.00	3.00	3.00	0.00	3.00	2.00	3.00	2.00	3.00	3.00
Awareness of Contemporary issues (Social, Economic, Political, others ...) (Report)	2.06	1.00	3.00	0.64	3.00	1.00	2.00	2.00	2.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	1.00	2.00	3.00	3.00	3.00
	2.06	1.00	3.00	0.84																	

Outcome, Course, Semester	SO4	COE 399	T201
Number of Students	17		
Prepared by:	Yahya Osais	Date:	11-Dec-20

Performance Indicator	Avg.	Min.	Max.	Std. Dev.	201418240	201424820	201435380	201443080	201443840	201448580	201456580	201465620	201526270	201536270	201545410	201565430	201565730	201594190	201614800	201614820	201630400	201636500	201641740	201642100	201642320	201646740	201668940	201674560	201675760	201776310
Awareness of global effects of engineering solutions (product, practice, event) (Report)	2.24	2.00	3.00	0.42	2.00	2.00	2.00	2.00	2.00	3.00	2.00	2.00	3.00	2.00	2.00	2.00	3.00	3.00	2.00	2.00	2.00	3	2	2	3	3	2	2	3	2
Understanding of ethical and professional issues (Survey + Observation)					2.00	2.00	2.00	2.00	3.00	3.00	2.00	1.00	2.00	3.00	2.00	2.00	1.00	2.00	2.00	2.00	1.00	2	1	1	3	3	1	2	3	1
Awareness of Contemporary issues (Social, Economic, Political, others ...) (Report)	2.53	2.00	3.00	0.50	3.00	2.00	3.00	2.00	2.00	3.00	2.00	2.00	3.00	3.00	3.00	2.00	3.00	3.00	2.00	3.00	2.00	4	2	2	4	3	2	3	3	2
	2.38	2.00	3.00	0.55																										

Outcome, Course, Semester	SO4	COE 351	T201
Number of Students	17		
Prepared by:	Yahya Osais	Date:	11-Dec-20

Performance Indicator	Avg.	Min.	Max.	Std. Dev.	201325050	201535050	201554930
Awareness of global effects of engineering solutions (product, practice, event) (Report)	2.33	2.00	3.00	0.47	2.00	3.00	2.00
Understanding of ethical and professional issues (Ethics Cases)					2.00	3.00	1.00
Awareness of Contemporary issues (Social, Economic, Political, others ...) (Report)	2.67	2.00	3.00	0.47	2.00	3.00	3.00
	2.50	2.00	3.00	0.67			

Outcome, Course, Semester	SO 4, COE 485, T201: Ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.						
Number of Students	15						
Prepared by:	Elrabaa, December 19th, 2020						

Student ID	P.I.	Awareness of global effects of engineering solutions (product, practices, events)	Understanding of ethical and professional issues	Awareness of Contemporary issues (Social, Economic, Political, others)	Avg.	Min.	Max.
201686720		4	4	4	4.00		
201594190		4	4	4	4.00		
201565430		4	4	4	4.00		
201535050		4	4	4	4.00		
201675760		4	4	4	4.00		
201651740		4	4	4	4.00		
201526270		2	4	2	2.67		
201554930		2	4	2	2.67		
201515890		2	4	2	2.67		
201526390		2	2	2	2.00		
201443080		2	2	2	2.00		
201151850		2	3	3	2.67		
201325050		3	3	3	3.00		
201458120		2	2	2	2.00		
201342010		3	3	3	3.00		
Std. Dev.		0.961150105	0.828078671	0.9258201	3.111111		Totals
					0.81		

Observations & Corrective Actions: Many students (~30%) cannot even understand the meaning of Impact of Engineering solutions. This need t be emphasized more in COE 300

Outcome, Course, Semester: SO5 — COE 399 — T201

Number of Students: 26
Prepared by: | Date:

Performance Indicator	Avg.	Min.	Max.	Std. Dev.	1 201418240	2 201424820	3 201435380	4 201443080	5 201443840	6 201448580	7 201456580	8 201465620	9 201526270	10 201536270	11 201545410	12 201565430	13 201565730	14 201594190	15 201614800	16 201614820	17 201630400	18 201636500	19 201641740	20 201642100	21 201642320	22 201646740	23 201668940	24 201674560	25 201675760	26 201776310
Contributions	2.60	1.00	4.00	0.80	2.00	2.00	2.00	3.00	2.00	4.00	2.00	1.00	2.00	4.00	3.00	3.00	3.00	3.00	2.00	3.00	3.00	4.00	2.00	2.00	4	2	2	3	3	3
Problem-solving	2.45	1.00	4.00	0.67	2.00	2.00	2.00	3.00	2.00	3.00	2.00	1.00	2.00	3.00	2.00	3.00	3.00	3.00	2.00	3.00	3.00	4.00	2.00	2.00	4	2	2	3	3	3
Working with others	2.85	1.00	4.00	0.73	2.00	3.00	2.00	3.00	3.00	4.00	2.00	1.00	3.00	4.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	3.00	2.00	4	3	3	3	3	4
Teamwork	2.85	1.00	4.00	0.85	2.00	3.00	2.00	3.00	3.00	4.00	2.00	1.00	4.00	2.00	4.00	3.00	3.00	3.00	3.00	3.00	2.00	4.00	4.00	2.00	4	3	4	3	3	4

Outcome, Course, Semester: SO5 — COE 351 — T201

Number of Students: 3
Prepared by: | Date:

Performance Indicator	Avg.	Min.	Max.	Std. Dev.	201325050	201535050	201554930
Contributions	2.67	2.00	3.00	0.47	2.00	3.00	3.00
Problem-solving	2.67	2.00	3.00	0.47	2.00	3.00	3.00
Working with others	3.00	2.00	4.00	0.82	2.00	3.00	4.00
Teamwork	3.00	2.00	4.00	0.82	2.00	3.00	4.00
	2.83	2.00	4.00	0.69			

Outcome, Course, Semester: SO5 — COE 300 — T201

Number of Students: 17
Prepared by: | Date:

Performance Indicator	Avg.	Min.	Max.	Std. Dev.	201337310	201580250	201614800	201618400	201621240	201626140	201636080	201658380	201660380	201665640	201682960	201723610	201728970	201729330	201732990	201761690	201766550
Contributions	2.79	2.00	4.00	0.64	4.00	2.00	3.00	3.00	3.00	3.00	2.00	2.00	2.00	2.00	3.00	3.00	2.00	3.00	3.50	3.50	3.50
Problem-solving	2.56	2.00	3.50	0.62	3.00	2.00	3.00	3.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	2.00	3.00	3.50	3.50	3.50
Working with others	2.71	2.00	4.00	0.82	4.00	2.00	3.00	3.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	2.00	3.00	2.00	4.00	4.00	4.00
Teamwork	2.76	2.00	4.00	0.81	4.00	2.00	3.00	3.00	3.00	2.00	2.00	2.00	2.00	2.00	3.00	2.00	3.00	2.00	4.00	4.00	4.00
	2.71	2.00	4.00	0.73																	

Outcome, Course, Semester	SO 5, COE 485, T201: *Ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.*
Number of Students	15
Prepared by:	Elrabaa, December 19th, 2020

Student ID	P.I.	Contributions	Problem Solving	Working With Others	Teamwork	Avg.	Min.	Max.	
201686720		4	4	4	4	4.00			
201594190		4	4	4	4	4.00			
201565430		4	4	4	4	4.00			
201535050		4	4	4	4	4.00			
201675760		4	4	4	4	4.00			
201651740		3	3	3	3	3.00			
201526270		4	4	4	4	4.00			
201554930		3	3	3	3	3.00			
201515890		4	4	4	4	4.00			
201526390		2	2	2	2	2.00			
201443080		2	2	2	2	2.00			
201151850		2	2	2	2	2.00			
201325050		1	1	1	2	1.25			
201458120		1	1	2	2	1.50			
201342010		3	2	2	2	2.25			
Std. Dev.		1.133893419	1.162919151	1.069044968	0.961150105	3			Totals
						1.06			

Observation: Extremely weak students, got impacted the worse with the on-line teachnig situation. They cannot lead any effort on their own!

Outcome, Course, Semester		SO6	COE 301	T201
Number of Students		18		
Prepared by:		Saleh AlSaleh	Date:	28-Jan-21

Performance Indicator	Avg.	Min.	Max.	Std. Dev.	201618400	201650400	201692140	201727670	201729330	201735750	201741170	201742650	201745750	201755130	201755310	201773270	201773910	201774350	201774910	201775150	201776890	201782450
Pre-Experiment: Identifying clear goals for the experiment – Hypothesis testing, Knowledge Discovery, etc.	2.82	1.00	4.00	0.72	2.50	1.00	3.00	3.50	2.50	2.00	2.00	4.00	3.00	3.00	2.25	2.50	3.50	3.50	3.50	3.50	3.00	2.50
Designing a valid and appropriate experimental setup that achieve the experiment objective	2.69	1.00	4.00	0.73	2.50	1.00	3.00	3.50	3.00	2.50	1.50	3.00	4.00	2.50	2.50	3.50	2.50	3.00	3.00	3.00	1.50	3.00
Conducting the experiment using a well defined valid procedure for achieving the experiment result	3.03	1.50	4.00	0.54	3.00	2.50	3.50	3.50	3.50	2.50	1.50	3.00	3.50	3.00	3.00	3.50	3.00	2.50	3.00	4.00	3.00	3.00
Analyzing and interpreting data and drawing conclusions	2.78	1.00	4.00	0.71	3.00	1.00	2.00	3.00	3.00	2.50	1.50	3.50	4.00	3.00	3.00	3.00	3.00	3.00	3.00	3.50	2.00	3.00
	2.83	1.00	4.00	0.70																		

Outcome, Course, Semester		SO6	COE 306	T201
Number of Students		15		
Prepared by:		Hazem Selmi	Date:	5-Dec-20

Performance Indicator	Avg.	Min.	Max.	Std. Dev.	201424820	201425600	201443840	201448580	201623600	201630400	201631760	201648980	201660380	201665640	201679720	201723610	201728970	201750750	201769010
Pre-Experiment: Identifying clear goals for the experiment – Hypothesis testing, Knowledge Discovery, etc.	2.63	1.50	4.00	0.83	2.00	3.00	2.00	2.00	3.00	2.00	4.00	3.00	4.00	2.00	2.00	2.00	4.00	3.00	1.50
Designing a valid and appropriate experimental setup that achieve the experiment objective	2.70	1.00	4.00	0.87	2.00	3.50	2.00	2.00	4.00	2.00	4.00	3.00	3.00	2.50	1.00	2.00	4.00	3.00	2.50
Conducting the experiment using a well defined valid procedure for achieving the experiment result	2.67	1.00	4.00	0.92	2.00	3.00	2.00	1.00	4.00	2.00	3.00	3.00	4.00	2.50	1.00	3.00	4.00	3.00	2.50
Analyzing and interpreting data and drawing conclusions	2.67	1.00	4.00	0.91	2.00	2.50	2.00	1.00	4.00	3.00	3.50	3.50	3.00	2.00	1.00	3.00	4.00	3.00	2.50
	2.67	1.00	4.00	0.88															

Outcome, Course, Semester		SO6	COE 344 Lab	T201
Number of Students		19		
Prepared by:		Hakim Adiche	Date:	27/11/20

Performance Indicator	Avg.	Min.	Max.	Std. Dev.	201591930	201690400	201669620	201755130	201775150	201734650	201766550	201448580	201631760	201727670	201753170	201732990	201657800	201761690	201621240	201648980	201673280	201580250	201773270
Pre-Experiment: Identifying clear goals for the experiment – Hypothesis testing, Knowledge Discovery, etc.	2.21	1.00	3.00	0.77	2.00	3.00	3.00	2.00	2.00	3.00	3.00	1.00	2.00	3.00	1.00	2.00	3.00	3.00	1.00	2.00	1.00	2.00	3.00
Designing a valid and appropriate experimental setup that achieve the experiment objective	1.95	1.00	3.00	0.60	2.00	2.00	3.00	2.00	2.00	2.00	3.00	1.00	2.00	3.00	1.00	2.00	2.00	2.00	2.00	1.00	1.00	2.00	2.00
	2.08	1.00	3.00	0.70																			

Outcome, Course, Semester	SO7	COE 351	T201
Number of Students		3	
Prepared by:		Date:	

Performance Indicator	Avg.	Min.	Max.	Std. Dev.	201325050	201535050	201554930
Capable of recognizing the need for learning new knowledge to solve an engineering problem	3.00	3.00	3.00	0.00	3.00	3.00	3.00
Capable of using appropriate learning strategies to acquire new knowledge, and applying this knowledge to solve an engineering problem	3.33	3.00	4.00	0.47	3.00	4.00	3.00
	3.17	3.00	4.00	0.37			

Outcome, Course, Semester	SO7	COE 399	T201
Number of Students		26	
Prepared by:		Date:	

Performance Indicator	Avg.	Min.	Max.	Std. Dev.	201418240	201424820	201435380	201443080	201443840	201448580	201456580	201465620	201526270	201536270	201545410	201565430	201565730	201594190	201614800	201614820	201630400	201636500	201641740	201642100	201642320	201646740	201668940	201674560	201675760	201776310
Capable of recognizing the need for learning new knowledge to solve an engineering problem	2.60	1.00	3.00	0.58	2.00	3.00	2.00	3.00	3.00	3.00	2.00	3.00	2.00	3.00	2.00	3.00	3.00	3.00	1.00	3.00	3.00	3.00	3.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00
Capable of using appropriate learning strategies to acquire new knowledge, and applying this knowledge to solve an engineering problem	2.50	1.00	3.00	0.59	2.00	3.00	2.00	3.00	3.00	3.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	1.00	3.00	3.00	3.00	3.00	2.00	4.00	3.00	3.00	3.00	3.00	3.00
	2.55	1.00	3.00	0.59																										

Outcome, Course, Semester	SO 7, COE 485, T201: *Ability to acquire and apply new knowledge as needed, using appropriate learning strategies.*					
Number of Students	15					
Prepared by:	Elrabaa, December 19th, 2020					

Student ID	P.I.	Recognize the need for learning new knowledge to solve an engineering problem	Can use appropriate learning strategies to acquire and apply new knowledge to solve an engineering problem	Avg.	Min.	Max.
201686720		4	4	4.00	4.00	4.00
201594190		4	4	4.00	4.00	4.00
201565430		4	4	4.00	4.00	4.00
201535050		4	4	4.00	4.00	4.00
201675760		3	3	3.00	3.00	3.00
201651740		3	3	3.00	3.00	3.00
201526270		4	4	4.00	4.00	4.00
201554930		3	3	3.00	3.00	3.00
201515890		3	3	3.00	3.00	3.00
201526390		3	3	3.00	3.00	3.00
201443080		3	3	3.00	3.00	3.00
201151850		3	3	3.00	3.00	3.00
201325050		2	1	1.50	1.00	2.00
201458120		3	1	2.00	1.00	3.00
201342010		3	2	2.50	2.00	3.00
Std. Dev.		0.59361684	1	3.133333	3	3.266667	Totals
				0.77		

Observation: Extremely weak students, got impacted the worse with the on-line teachnig situation. They cannot learn much on their own or lead any effort.