# PROGRAM EDUCATIONAL OBJECTIVES

Program educational objectives (PEOs) are broad statements that describe what graduates are expected to achieve in their professional and career practice three to five years after graduation. PEOs are based on the needs of the program's constituencies.

## A. Institution's Vision and Mission

The articulation of the PEOs is based on the University's vision, mission, and goals. The vision and mission of the University serve as the foundation for the development of the appropriate learning environment, i.e. teaching-learning and support mechanisms.

SLU's Vision and Mission

"Saint Louis University is envisioned as an excellent missionary and transformative educational institution zealous in developing human resources imbued with the Christian Spirit and who are creative, competent and socially involved".

The statement above refers to the vision of SLU to be an excellent missionary and transformative educational institution. The second part contains the mission of the University, which is to develop students as well as faculty and staff imbued with the institution's inter-related core values of competence, creativity, social involvement, and Christian spirit. Thus, from the vision-mission statement, four (4) core values are evident: Christian Spirit, Competence, Creativity, and Social Involvement.

## B. The PEOs (PEOs)

The PEOs of the Electrical Engineering program of SLU are as follows:

**PEO 1**: Demonstrate technical competence in the analysis of problems and design of systems, keeping in mind the technical, professional, societal, environmental, economic and ethical dimensions of any solution.

**PEO 2**: Apply their talents and full potentials in the practice of their profession guided by the Christian tenets of honesty, service, dedication and a deep sense of moral responsibility.

**PEO 3**: Pursue advance education, research and development, and other creative efforts in science and technology.

**PEO 4:** Participate actively to address social, technical and business challenges vital to national progress and development.

## C. The Process for the Formulation, Review, and Revision of the Program Educational Objectives

The process of the development of the PEOs is incorporated in the SLU-SEA OBE Framework shown in Figure 1-1. Relevance in education means addressing the needs of the students and the employees of today and providing the future graduates a curriculum of global compatibility (CMO 37, S2012). SLU is cognizant of this global movement and has proactively implemented OBE in the undergraduate programs starting AY 2014-2015.

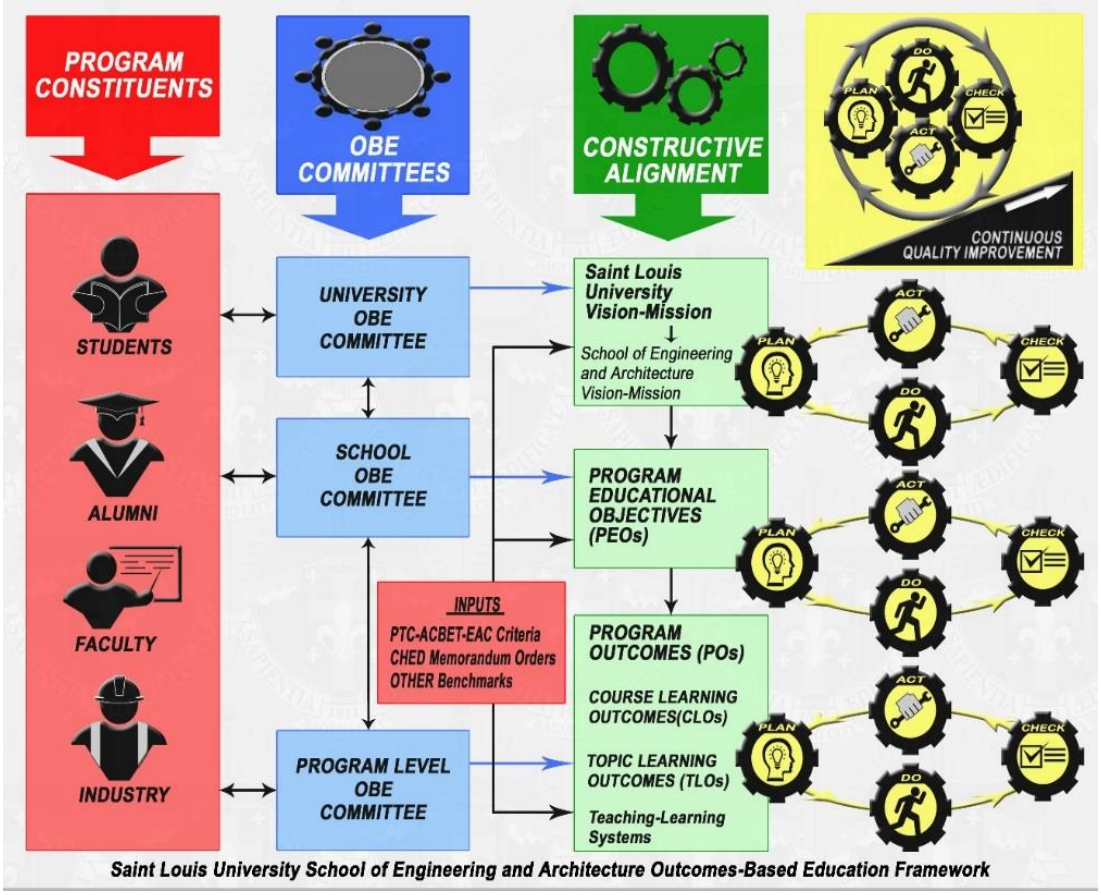


**Figure 1-1. SLU –SEA OBE Framework**

The OBE Paradigm of SLU-SEA can be deconstructed into three major sections namely: the SLU OBE Committees that oversee the conduct of OBE at different levels of the university in coordination with program constituencies; the Alignment of OBE Components from the institutional mission vision statement to teaching learning systems as well as with established criteria in CHED CMOs, PTC-ACBET Criteria and other benchmarks; and the Continuous Quality Improvement processes that occur at different levels of the OBE system.

# PROGRAM OUTCOMES

Program outcomes (POs) specify what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire as they progress through the program.

## A. Program Outcomes

The POs of the EE Program are based from CMO 9, series of 2008 and synonymous with the PTC-ACBET-EAC required program or student outcomes.

There are a total of fifteen (15) POs numbered as PO1 to PO15. PO1 to PO12 are equivalent to the program outcomes a to l of CMO 9, series of 2008 and PTC-ACBET-EAC. PO13 was adopted from one of the CHED mandated program outcomes common to all programs in all types of schools while PO14 was adopted from CHED mandated programs common to a horizontal type as defined in CMO 46, s.2012. PO15 is an institutional program outcome.

The 15 POs are enumerated as follows. Table 2-2 of part C provides the mapping of the said program outcomes to those of the PTC – ACBET – EAC student outcomes.

By the time of graduation, the EE students of shall be able to:

PO1: apply a wide range of skills in mathematics, physical sciences, and engineering sciences to the practice of Electrical Engineering;
PO2: design and conduct experiments as well as to analyze and interpret data;
PO3: design a system, component, or process to meet desired needs within realistic constrains such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability in accordance with standards;
PO4: work effectively as a member and leader in multi-disciplinary and multi-cultural teams;
PO5: formulate and solve Electrical Engineering problems;
PO6: act in accordance to professional, social and ethical responsibility
PO7: apply an in-depth understanding of the impact of engineering solutions in a global, economic, environmental and societal context;
PO8: communicate effectively in written and oral forms using both English and Filipino as well as in graphical forms;
PO9: practice life-long learning and exhibit the willingness and capability to be current and relevant with the developments in the field of Electrical engineering;
PO10: apply current trends and developments in the field of Electrical engineering;
PO11: use appropriate techniques, skills and modern Electrical engineering tools for Electrical engineering practice;

PO12: demonstrate a keen awareness of contemporary issues and their impact on the practice of Electrical engineering profession;

PO13: participate in the generation of new knowledge and developmental projects;

PO14: preserve and promote "*Filipino historical and cultural heritage*" by showing a deep and principled understanding of how engineering is related to a larger historical, social, cultural, and political processes;

PO15: practice Christian values in their personal and professional endeavors as Louisians in the service of the CICM mission.

## B. Relationship of Program Outcomes to Program Educational Objectives

The attainment of the Program Outcomes by the time of graduation will consequently lead to the attainment of the Program Educational Objectives three to five years after graduation.

Table 2-1 shows the relationship of the Program Outcomes to the Program Educational Objectives.

**Table 2-1 Relationship of Program Outcomes to Program Educational Objectives**

| Program Outcomes | Program Educational Outcomes | | | |
|---|---|---|---|---|
| | PEO1 | PEO 2 | PEO 3 | PEO 4 |
| PO1: apply a wide range of skills in mathematics, physical sciences, engineering sciences to the practice of Engineering; | ✓ | | | |
| PO2: design and conduct experiments as well as to analyze and interpret data; | ✓ | | | |
| PO3: design a system, component, or process to meet desired needs within realistic constrains such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability in accordance with standards; | ✓ | ✓ | | ✓ |
| PO4: work effectively as a member and leader in multi-disciplinary and multi-cultural teams; | ✓ | | | ✓ |
| PO5: formulate and solve Engineering problems; | ✓ | | | |
| PO6: act in accordance to professional, social and ethical responsibility | ✓ | ✓ | | |
| PO7: apply an in-depth understanding of the impact of engineering solutions in a global, economic, environmental and societal context; | ✓ | | | |

| Program Outcomes | Program Educational Outcomes | | | |
|---|---|---|---|---|
| | PEO1 | PEO 2 | PEO 3 | PEO 4 |
| PO8: communicate effectively in written and oral forms using both English and Filipino as well as in graphical forms; | ✓ | | | |
| PO9: practice life-long learning and exhibit the willingness and capability to be current and relevant with the developments in the field of Engineering; | ✓ | | ✓ | |
| PO10: apply current trends and developments in the field of Engineering; | ✓ | | ✓ | |
| PO11: use appropriate techniques, skills and modern engineering tools for Engineering practice; | ✓ | | | |
| PO12: demonstrate a keen awareness of contemporary issues and their impact on the practice of Engineering profession; | ✓ | | | |
| PO13: participate in the generation of new knowledge and developmental projects; | ✓ | | ✓ | |
| PO14: preserve and promote "*Filipino historical and cultural heritage*" by showing a deep and principled understanding of how Engineering is related to a larger historical, social, cultural, and political processes; | | | | ✓ |
| PO15: practice Christian values in their personal and professional endeavors as Louisians in the service of the CICM mission. | | ✓ | | |

The PO-PEO alignment table ensures that POs are constructively aligned to contribute to the attainment of PEOs. All POs are aligned with at least one PEO indicating that such POs are necessary in the development of the PEOs. There are five POs that are constructively aligned for the attainment of two PEOs while one particular PO, PO3 substantially contributes to the attainment of three PEOs.

PO1 to PO13 are aligned with PEO1 which is the PEO pertaining to technical competence. This means that the attainment of the said range of POs substantially contribute to the graduates' ability to demonstrate technical competence in the analysis of problems and design of systems, keeping in mind the technical, professional, societal, environmental, economic and ethical dimensions of any solution.

PEO2 which pertains to the graduates' ability to apply their talents and full potentials in the practice of their profession guided by the Christian tenets of honesty, service, dedication and a deep sense of moral responsibility can be developed through the attainment of PO3, PO6, and PO15. These are namely the students' ability to: design a system, component, or process to meet

desired needs within realistic constrains such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability in accordance with standards; act in accordance to professional, social and ethical responsibility; and practice Christian values in their personal and professional endeavors as Louisians in the service of the CICM mission.

PEO3 which is the graduates' ability to pursue advance education, research and development, and other creative efforts in science and technology can be realized through the attainment of PO9, PO10, and PO13. These are the students' ability to: practice life-long learning and exhibit the willingness and capability to be current and relevant with the developments in the field of Engineering; apply current trends and developments in the field of Engineering; and participate in the generation of new knowledge and developmental projects.

The final PEO which aims to develop the graduates' ability to participate actively to address social, technical and business challenges vital to national progress and development can be attained by developing PO3, PO4, and PO14 while the students are in the program. These develop the students ability to: design a system, component, or process to meet desired needs within realistic constrains such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability in accordance with standards; work effectively as a member and leader in multi-disciplinary and multi-cultural teams; and preserve and promote "*Filipino historical and cultural heritage*" by showing a deep and principled understanding of how Engineering is related to a larger historical, social, cultural, and political processes.

The program outcomes were based on CMO 9, series of 2008. They were however reworded following Bloom's taxonomy considering the appropriate higher order skills as shown in Table 2-2.

**Table 2-2 Mapping of Student Outcomes from PTC-ACBET-EAC With the Program Outcomes of SLU**

| Student Outcomes from PTC-ACBET-EAC | Program Outcomes |
|---|---|
| a) ability to apply knowledge of mathematics and science to solve engineering problems | PO1: **apply** a wide range of skills in mathematics, physical sciences, engineering sciences to the practice of Engineering; |
| b) ability to design and conduct experiments, as well as to analyze and interpret data | PO2: **design** and conduct experiments as well as to analyze and interpret data; |
| c) ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards | PO3: **design** a system, component, or process to meet desired needs within realistic constrains such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability in accordance with standards; |
| d) ability to function on multidisciplinary teams | PO4: **work** effectively as a member and leader in multi-disciplinary and multi-cultural teams; |
| e) ability to identify, formulate, and solve engineering problems | PO5: **formulate and solve** Engineering problems; |
| f) understanding of professional and ethical responsibility | PO6: act in accordance to professional, social and ethical responsibility |
| h) broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context | PO7: **apply** an in-depth understanding of the impact of engineering solutions in a global, economic, environmental and societal context; |
| g) ability to communicate effectively | PO8: **communicate** effectively in written and oral forms using both English and Filipino as well as in graphical forms; |
| i) recognition of the need for, and an ability to engage in life-long learning | PO9: **practice** life-long learning and exhibit the willingness and capability to be current and relevant with the developments in the field of Engineering; |
| j) knowledge of contemporary issues | PO10: **apply** current trends and developments in the field of Engineering; |

| Student Outcomes from PTC-ACBET-EAC | Program Outcomes |
|---|---|
| k) ability to use techniques, skills, and modern engineering tools necessary for engineering practice | PO11: **use** appropriate techniques, skills and modern engineering tools for Engineering practice; |
| l) knowledge and understanding of engineering and management principles as a member and leader in a team, to manage projects and in multidisciplinary environments | PO12: **demonstrate** a keen awareness of contemporary issues and their impact on the practice of Engineering profession; |
| | PO13: **participate** in the generation of new knowledge and developmental projects; |
| | PO14: **preserve and promote** "*Filipino historical and cultural heritage*" by showing a deep and principled understanding of how Engineering is related to a larger historical, social, cultural, and political processes; |
| | PO15: **practice** Christian values in their personal and professional endeavors as Louisians in the service of the CICM mission. |

The development process of the SEA OBE system started in January, 2013 in response to the CHED CMOs 37 and 46, series of 2012. The department heads for each program were tasked to accomplish document OBE-MF-01 for submission to the CHED Technical Panel for Engineering and Technology (TPET). At this point, documents and references were sought as bases for developing a comprehensive OBE system with the initial task of completing the documentary requirements to accomplish OBE-MF-01. Primary references were the Criteria for Accrediting Engineering Programs from ABET-EAC, the CHED Handbook on Typology, Outcomes Based Education and Institutional Sustainability Assessment, and PTC-CASEE documents among others. As a result, the initial POs adopted by the program were primarily based on the A to L program outcomes adopted by ABET and CHED.

During the transition period of the shift of the start of the academic year from June to August in 2014, the SLU administration scheduled a series of seminar workshops as a means of capacity building for its faculty and staff towards the institutional shift to the OBE system of education. This provided the right venue to review the constructive alignment of the university's mission-vision, the school's program educational objectives, program outcomes, course learning outcomes, topic learning outcomes, and teaching-learning systems. It was at this time that three additional POs were considered for inclusion in the existing A to L POs adopted by SEA. Eventually, the

POs were relabeled using numbers instead of the traditional letters. POa to POl were assigned PO1 to PO12 with three additional POs from PO13 to PO15. PO13 which pertains to develop the students' ability to participate in the generation of new knowledge and developmental projects was added to address the research dimension of university education as suggested by CHED in the Pos common to a horizontal type as defined in CMO 46. PO14 pertaining to the students' ability to preserve and promote "*Filipino historical and cultural heritage*" by showing a deep and principled understanding of how Engineering is related to a larger historical, social, cultural, and political processes was added based on the mandated list of POs from CHED in CMO 46. Finally PO15 was added as an institutional PO addressing the CICM Mission of the university as it develops the students' ability to practice Christian values in their personal and professional endeavors as Louisians in the service of the CICM mission.

## C. Performance Indicators for Each of the Program Outcomes

There are two performance indicators for each of the POs as shown in Table 2-3.

**Table 2-3 Program Outcomes with the corresponding Performance Indicators**

| PROGRAM OUTCOMES | PERFORMANCE INDICATORS |
|---|---|
| PO1: Apply a wide range of skills in mathematics, physical sciences, and engineering sciences to the practice of engineering. | a. Demonstrate a thorough understanding of a wide range of theorems and principles of mathematics, physical sciences, and engineering sciences. |
| | b. Apply relevant theorems and principles of mathematics, physical sciences, and engineering sciences to the practice of engineering. |
| PO2: Design and conduct experiments as well as analyze and interpret data. | a. Perform scientific experiments in the field of engineering and obtain accurate and precise data and results |
| | b. Design experiments to test relevant parameters of engineering systems and establish significant conclusions based on the evaluation of collected data and results. |
| PO3: Design a system, component, or process to meet desired | a. Define the requirements and constraints associated with engineering |

| PROGRAM OUTCOMES | PERFORMANCE INDICATORS |
|---|---|
| needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability in accordance with standards. | systems, components, and processes based on established standards. |
| | b. Design engineering systems, components, or processes based on established standards. |
| PO4: Work effectively as a member and leader in multi-disciplinary and multi-cultural teams. | a. Demonstrate a well-developed set of interpersonal and social skills in dealing with group members to effectively establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty |
| | b. Work effectively with individuals from a wide range of educational, cultural, and technical backgrounds. |
| PO5: Formulate, and solve engineering problems. | a. Demonstrate the capability to formulate engineering problems that are properly governed by fundamental theorems and principles of engineering |
| | b. Apply the fundamental theorems and principles to properly identify and effectively solve engineering problems. |
| PO6: Act in accordance to professional, social, and ethical responsibility. | a. Demonstrate a keen moral and ethical sense in all inter-personal, social, and professional relations and dealings |
| | b. Practice professional attitudes and values in all academic, co-curricular, and extra-curricular activities in the university and the society at large |
| PO7: Apply an in-depth understanding of the impact of engineering solutions in a global, economic, environmental and societal context. | a. Apply the fundamental theorems and principles of engineering to address global, economic, environmental, and societal problems and issues. |
| | b. Develop engineering systems to address and alleviate global, economic, environmental and societal problem. |
| PO8: Communicate effectively in written and oral forms using | a. Demonstrate the ability to communicate in written form with |

| PROGRAM OUTCOMES | PERFORMANCE INDICATORS |
|---|---|
| English and Filipino as well as graphical forms. | sufficient substance and in the correct form. |
| | b. Demonstrate the ability to communicate orally with sufficient substance, correct form, and articulate delivery. |
| PO9: Practice life-long learning and exhibit the willingness and capability to be current and relevant with the developments in the field of engineering. | a. Attend educational trips, OJTs, seminars, and trainings to maximize learning and expertise in the field of engineering. |
| | b. Compose and submit relevant reports that accurately depict the learning experiences in educational trips, OJTs, seminars, and trainings in the field of engineering. |
| PO10: Apply current trends and developments in the field of engineering. | a. Discuss how current trends affect engineering policies and guidelines. |
| | b. Design and develop systems responsive to the effects of current trends affecting engineering. |
| PO11: Use appropriate techniques, skills and modern engineering tools for engineering practice. | a. Demonstrate a fully developed set of skills in the use of engineering laboratory equipment and/or computer-based simulation and computational software in the testing and analysis of engineering systems and processes. |
| | b. Apply skills in the use of engineering laboratory equipment and/or computer-based simulation and computational software in the design of real world engineering systems. |
| PO12: Demonstrate a keen awareness of contemporary issues and their impact on the practice of the engineering profession. | a. Demonstrate a thorough understanding of contemporary issues, policies, and guidelines in the field of engineering. |
| | b. Discuss how contemporary issues, policies, and guidelines affect the engineering practice. |

| PROGRAM OUTCOMES | PERFORMANCE INDICATORS |
|---|---|
| PO13: Participate in the generation of new knowledge. | a. Conduct investigatory projects and researches in the field of engineering. |
| | b. Design and develop new systems or produce innovations on existing technologies. |
| PO14: Preserve and promote "Filipino historical and cultural heritage" by showing a deep and principled understanding of how engineering is related to a larger social, cultural, and political process | a. Demonstrate a keen knowledge of Filipino history and culture. |
| | b. Demonstrate concern for the preservation of Filipino and cultural heritage in the practice of the engineering profession. |
| PO15: Practice Christian values in their personal and professional endeavors as Louisians in the service of the CICM mission. | a. Practice Christian attitudes and values in all academic, co-curricular, and extra-curricular activities in the university and the society at large. |
| | b. Demonstrate a keen moral and ethical sense in all inter-personal, social, and professional relations and dealings. |

Performance indicators for each of the program outcomes are used to provide a more focused and specific assessment of the outcomes either by providing different levels of competence for the program outcomes (i.e. from ***demonstrate*** in the first performance indicator to ***apply*** in the second indicator) or demonstrating the same level of ability in different fields covered by the same program outcome (i.e. demonstrate the ability to communicate in ***written*** form . . . and demonstrate the ability to communicate ***orally*** . . .).

For each performance indicator at least one determinant course is assigned based on the course's capability to provide an assessment tool to properly measure the students' competence particular to the performance indicator. Performance targets are set for each assessment strategy based on realistic expectations based initially on the historical passing rates or the observed average performance of students in previous semesters. As soon as the determinant courses are selected and performance targets are set for all the POs in the program, an assessment period is set to measure student ability to meet the targets.

After the assessment period, the results are evaluated first based on the performance targets that were set. If the performance targets are not met, inquiries are conducted primarily with the faculty handling the course and the students who underwent the assessment as to the reasons behind the students' failure to achieve the targets. If performance targets are met, inquiries are

still conducted to take note of best practices especially in courses where performance targets are well exceeded.

Action plans are formulated after the evaluation period. If the performance targets are met, a review of the performance targets is conducted to determine if the target threshold could be increased. Whether performance targets are met or not, a review of the learning outcomes and teaching-learning and assessment strategies is conducted to improve students' ability to meet performance targets (in the case of failure to meet the targets), or consider improving learning and assessment strategies for a deeper or more comprehensive learning experience for the students ( in the case of targets being met or exceeded).

**Assessment Tools to Determine the Attainment of Program Outcomes**

A combination of direct and indirect methods of assessment is employed to gather quantitative and qualitative data to assess the attainment of the POs as cascaded in the Course Level outcomes and the Topic Level Outcomes. The process is done every semestral term.

**Direct Assessments**

Direct Assessments include quizzes, major exams for the prelim, midterm, and final periods, assignments, projects, and laboratory reports among others. The assessment tools were designed to gauge whether the particular PO indicator is demonstrated or practiced by the students.

**Indirect Assessment Methods**

Indirect Assessment refers to surveys conducted to determine the attainment of the POs. There are three indirect assessments used: The Student Exit Survey, the Employer Survey, and the Alumni Survey. The Assessment and Evaluation of the POs are discussed in detail in Criterion 9.

**E. Deployment Process of Program Outcomes**

After the formulation of the POs, meetings were conducted for information dissemination with the stakeholders. Alongside with the deployment of the PEOs, the POs were presented by the Dean in a meeting with the Department Heads who in turn cascaded the information to the faculty in the Department meetings. An SLU-SEA OBE primer was also developed and distributed to each student. The OBE Process including the POs are explained by the faculty to their students at the start of each semester. Likewise, the required assessments and targets are also presented during the first meeting of a semester in every class. The OBE process as well as the SLU-SEA OBE

primer which includes the POs were also presented to the members of the Industry Advisory Board in a meeting.

These POs are published in the SLU website (http:// www.slu.edu.ph), the 2016-2017 edition of the SLU-SEA Catalogue as well as the SLU-SEA OBE primer. These POs are also posted in the main hall way of the engineering building (4$^{th}$ floor Otto Hahn Building) and the SEA Dean's office.