SENIOR DESIGN PROJECT

Standard Operating Procedure (SOP)

CONTENTS

1. SUBJECT

Standard Operating Procedure (SOP) for the allocation, assessment and final evaluation of Senior Design Projects (SDP).

2. PURPOSE AND OBJECTIVE

The purpose of this SOP is to standardize the process of allocation, assessment and final evaluation of SDP. It is designed to manage and to define the roles and responsibilities of the SDP Committee members, SDP Supervisor and Students. This SOP also defines the necessary monitoring and controls of the SDP processes and the effective and efficient communication with the stakeholder, involved in the process.

3. RESPONSIBILITIES

3.1 SENIOR DESIGN PROJECT COMMITTEE

The Senior Design Project Committee shall be comprised of minimum:

- HoD or Dean (or both)
- At least 1 PhD Faculty
- Project Supervisor
- SDP Coordinator

3.2 ROLE OF SUPERVISOR

- Coordinate with SDP Coordinator to arrange mid-term and final evaluation
- Guide students to conduct experiments/project and write-up
- Suggest improvements and corrections (if any) throughout the SDP timeline.
- Ensure timely completion of the project as per SDP timeline

3.3 SDP GROUP/ STUDENTS

3.3.1 ELIGIBILITY

- Cleared courses up to 6th Semester

3.3.2 GROUP FORMULATION

- Maximum number of group members are 3
- Member formulation shall be described on SDP Consent Form (Annex A)

4. SDP PROCESS

The processes of Senior Design Project (SDP) are preparation, progress assessment and final evaluation.

4.1 Senior Design Project – 0 (SDP-0)

Students are allowed to work on and present a project synopsis under Senior Design Project – 0 (SDP-0 once they have cleared all the courses mentioned in the eligibility section-1. Throughout the sixth semester, students will come up with a problem statement and proposed solution by the end of the semester. It is expected that students cover up to 25% of the PLOs (Refer to Figure 1).

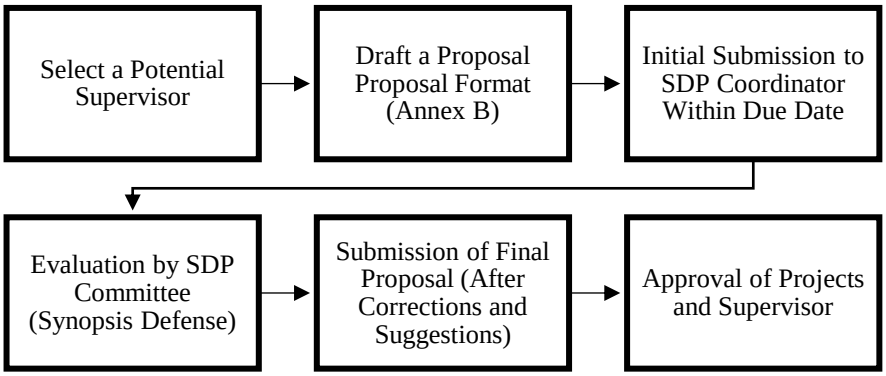

Figure 1: Senior Design Project – 0 (SDP-0) submission process

4.2 Senior Design Project – 1 (SDP-1)

Students will commence their project according to the timeline proposed/approved in SDP-0. Students are expected to conduct a thorough literature review and complete up to 50-60% of their work (refer to Figure 2).

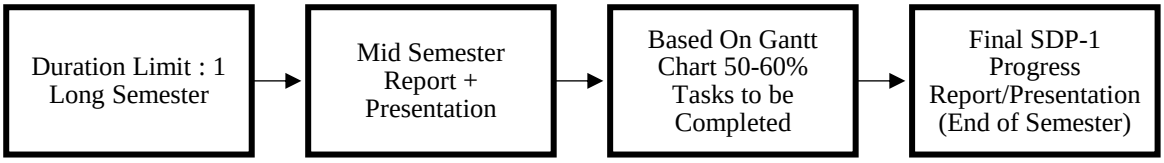

Figure 2: Senior Design Project – 1 (SDP-1) process flow

4.3 Senior Design Project – 2 (SDP-2)

Student will complete the remainder of their project (Figure 3).

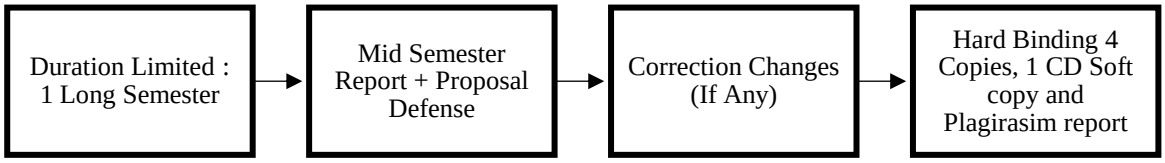

Figure 3: Senior Design Project – 3 (SDP-1) process flow

Record weekly progress report of the group and highlight behavior of each individual in the group (Annex D)

5. OBE – DISTRIBUTION TEMPLATE

The distribution of Senior Design Project PLOs is shown in Table:

Table 1: Senior Design Project PLOs Distribution

PLOs		SDP I PRESENTATION	SDP II PRESENTATION	SDP II DEMONSTRATION	SDP II REPORT
PLO 1	Engineering Knowledge	**R1** Subject Knowledge	**R1** Subject Knowledge		
PLO 2	Problem Analysis	**R2** Problem Statement			**R1** Literature Review & Problem Statement
PLO 3	Design/Development of solutions	**R3** Project Design Program	**R2** Project Demonstration	**R1** Quality and Coding Standards	**R2** Methodology
PLO 4	Investigation	**R4** Analysis and Approach	**R3** Investigation		**R3** Result & Conclusion
PLO 5	Modern Tool Usage			**R2** Modern Tool Usage	**R4** Implementation & Testing
PLO 6	The Engineer and Society		**R4** Impact of engineering solutions in a global, economic, environmental and societal context.		
PLO 7	Environment and Sustainability		**R5** Project Impact		**R5** Project Sustainability Impacts
PLO 8	Ethics		**R6** Professional ethical values	**R3** Originality	**R6** Formatting Style and similarity index
PLO 9	Individuals and Team work	**R5** Team work	**R7** Team Work		

PLO 10	Communication	**R6** Presentation and Viva	**R8** Presentation and Viva	**R4** Ways of Demonstration	**R7** Language and Grammar, Formatting Style
PLO 11	Project Management	**R7** Project Schedule and Milestone		**R5** Completeness and Accuracy	**R8** Completeness and Accuracy
PLO 12	Lifelong Learning	**R8** Novelty and Creativity		**R6** Novelty and Creativity	

6. COMPLEX ENGINEERING PROBLEMS / ACTIVITIES

The core objective of Senior Design Project (SPD) is to expose the students to the problems which cannot be solved through the conventional techniques and surface knowledge. Hence according to the PEC OBE Accreditation Manual, following characteristics of Complex Engineering Problem (CEP) must be adopted in defining the Senior Design Project (SDP) and assessing it through the rubrics. Furthermore, the alignment of rubrics must be present with the Programme Learning Outcomes (PLOs) as defined in the SAR of the department and the Graduate Attributes (GAs) as defined in the PEC OBE-Accreditation Manual.

Following are the major CEP characteristics;

i. Range of conflicting requirements: technical, engineering or other issues.
ii. Depth of analysis required: have no obvious solution and require abstract thinking
iii. Depth of knowledge required: require research-based knowledge
iv. Familiarity of issues: involve infrequently encountered issues
v. Extent of applicable codes: standards and codes devised by the professional bodies
vi. Extent of stakeholder involvement and level of conflicting requirements
vii. Consequences: impact over the society
viii. Interdependence: problems due to dependability

Following are the Complex Activities;

Complex activities mean engineering activities or projects that have some or all of the following characteristics listed below:

i. Range of resources: involve the use of diverse resources (and for this purpose, resources include people, money, equipment, materials, information and technologies). EA1
ii. Level of interaction: require resolution of significant problems arising from interactions between wide ranging or conflicting technical, engineering or other issues. EA2
iii. Innovation: involve creative use of engineering principles and research-based knowledge in novel ways. EA3
iv. Consequences to society and the environment: have significant consequences in a range of

contexts, characterized by difficulty of prediction and mitigation. EA4

v. Familiarity: can extend beyond previous experiences by applying principles-based approaches. EA5

7. SUSTAINABLE DEVELOPMENT GOALS

SDG1: End poverty in all its forms everywhere.

SDG2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture.

SDG3: Ensure healthy lives and promote well-being for all at all ages.

SDG4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

SDG5: Achieve gender equality and empower all women and girls.

SDG6: Ensure availability and sustainable management of water and sanitation for all.

SDG7: Ensure access to affordable, reliable, sustainable and modern energy for all.

SDG8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

SDG9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

SDG10: Reduce inequality within and among countries

SDG11: Make cities and human settlements inclusive, safe, resilient and sustainable

SDG12: Ensure sustainable consumption and production patterns

SDG13: Take urgent action to combat climate change and its impacts

SDG14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

SDG15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

SDG16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

SDG17: Strengthen the means of implementation and revitalize the global partnership for sustainable development

8. ASSESSMENT

- Weekly Progress Report (Annex D)
- Mid-Semester Presentation & Evaluation (Progress)
- Final Presentation & Evaluation (Defense)
- Hard Copy of Report

9. REPORT FORMAT

Reports submitted for SDP-0, SDP-1 and SDP-2 shall follow the SDP approved format. (Annex B and Annex C)

10. ANNEX

- SDP Consent Form (Annex A)
- Proposal Submit Form (Annex B)
- Report Format (Annex C)
- Weekly Progress Report (Annex D)
- SDP Consent Form for Project Hardware Submission (Annex E)

11. APPENDIX

- Complex Engineering Problems
- UN Sustainable Development Goals (SDGs) Mapping
- National Academy of Engineering (NAE) Grand Challenges for Engineering