National University of Sciences & Technology (NUST),
School of Mechanical & Manufacturing Engineering (SMME),
Department of Mechanical Engineering.

Standard Operating Procedure (SOP) for the Preparation and Submission of Final Year Projects (FYP)

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1. Purpose

The purpose of this document is to provide a uniform system of guidelines to students and supervising faculty to realize their Bachelors of Engineering (BE) Final Year Projects (FYP). The aim of the FYP is to give each student the opportunity to experience the engineering design process in the context of a topic related to the Mechanical Engineering curriculum while working in a less structured environment. The projects can be undertaken individually or in small teams. In the latter case the student must still fulfill the requirements described below. The Academic Supervisor is a faculty member of SMME.

2. Objectives of FYP

1. To apply knowledge learned in other courses.
2. To enhance the thought and planning process.
3. To expose students to team design and implementation.
4. To improve the written and oral communication skills of the students.

3. Learning Outcomes

On successful completion of this module students will (will be able to):

S.No.	Learning Outcome	PLO	Assessment Method[1]
1.	Demonstrate the ability to develop solutions to engineering problems of significant complexity.	PLO3	Overall project performance.
2.	Develop and present a project plan, modularize project into work packages and modify project plan on a continuous basis.	PLO11	Interim presentation Overall project performance.
3.	Work as an individual, with support from a supervisor, formulating solutions to day-to-day problems by integrating knowledge and experience gained on the course and outside the course.	PLO9	Overall project performance.
4.	Demonstrate the ability to produce a formal engineering report, substantive in nature, with proper and complete structure, layout, grammar, spelling, cross-referencing of figures, tables and text, and referencing of previous work.	PLO10	FYP Report.
5.	Provide a clear motivation and set of objectives for the project, a critical review of previous work in the field, and a theoretical foundation and coherent justification for the approach taken in the project.	PLO4	Interim presentation FYP report.

[1] See article five for details of grading criteria

6.	Describe experimental apparatus and/or models, and analysis procedures in a clear, complete and unambiguous manner making best use of latest information technology.	PLO5	Interim presentation FYP report
7.	Present results clearly making best use of latest information technology; critically analyze results, draw objective and reasonable conclusions, and suggest avenues for future work.	PLO2	Interim presentation FYP report
8.	Demonstrate an in-depth understanding of a particular engineering subject area, through presentation of material in presentations, reports and response to questions in presentations.	PLO10	Interim presentation Final presentation Overall project performance
9.	Produce a perceptible project outcome, which demonstrates a significant level of difficulty and effort on the part of the student(s), consisting of at least one of the following: a. experimental results b. theoretical results c. numerical results d. detailed design of a prototype e. physical prototype f. experimental rig	PLO1	Interim presentation Final presentation Overall project performance
10.	Present clearly (using latest information technology) and critically evaluate different design concepts, and justify final choice through engineering analysis and/or prototype development.	PLO3	Interim presentation FYP report

4. Standard Operating Procedure

4.1 Project teams

All final year projects must be performed as teams consisting of two to three members. In exceptional cases individual projects or teams with more than three members might be allowed subject to approval by FYP Coordinator and HoD Mechanical.

The size and composition of the team should properly match the nature and complexity of the project. Each project is advised by one faculty member from the relevant discipline. The teams must be formed in accordance with the project timeline provided.

4.2 Project topics

Project suggestions must meet the following criteria in order to be accepted as an FYP:

1. Each project must be sufficiently complex, yet achievable within the allocated time and resources, with the understanding that a worthwhile product or a functioning prototype will result from the project.

2. Project suggestions may come from a number of different sources such as students, faculty members or industry.
3. All project proposals must be discussed with the prospective team advisor. The final decision, to accept a project proposal or not, will be made by the advisor.

All groups/individuals working on FYPs are required to submit their project proposal forms (attached as Annex I) and Statement of Requirement (SOR, attached as Annex II) to the UG Coordinator after approval of the respective project supervisor and the HoD. The purpose of the SOR is to record details of all resources that the group will require in the course of their final year for their FYP work.

4.3 Project documents

Midterm progress

Each group is required to prepare a progress report and deliver a presentation to the examination committee towards the end of the seventh semester.

Project Poster

Each group is required to make a poster of their project and submit it to the UG Coordinator, the SOP of which is given in document ME FYP/02.

FYP Report

Four hardbound copies of the FYP report (Template given in document ME FYP/03) are to be submitted. A project CD is also required which must contain the following items:

a) FYP report
b) Software developed (if any, along with the code)
c) Final defense Presentation
d) All other material consulted/utilized
e) Project submission certification (Form Annex VIII)

4.4 Project time line

Adherence to the following timeline is strongly recommended. Failure to do so will result in loss of points. Project supervisor is to be regularly consulted on all matters regarding the FYP on a regular basis; records of the meetings must be maintained on prescribed form (Annex III).

During the seventh semester all planning, research, and preliminary design work is completed. The eighth semester is when the project takes form - students construct prototypes, do testing, refine their designs, and present the final product.

Semester VII:

a) Weeks 1-2: Topic selection, team formation, submission of topic and SOR.
b) Week 3: Finalization of Teams and first meeting with faculty advisor. Obtain project reference number.
c) Week 4-8: Literature Review and problem formulation.

d) Week 9: Mid-semester presentation to supervisor.
e) Weeks 10-14: Preliminary design work.
f) Week 15: Begin ordering parts/components.
g) Week 16: Preliminary design work continues.
h) Week 17: Prepare for final presentation and report.
i) Week 18: Progress report/presentation and team evaluations due.

Semester VIII:

a) Week 1: Order remaining parts/components.
b) Weeks 2-7: Fabrication of prototype/Execution of project.
c) Weeks 8-12: Testing/Validation.
d) Weeks 13-14: Design refinement/redesign.
e) Week 15: Prototype/testing results due.
f) Week 16: Prepare for Open House and project defense.
g) Week 17-18: Open House, Final report, project defense and project submission. Final team evaluations due.

5. Evaluation Criteria

The assessment of each student will be carried out as follows. The students will be graded by an examination committee consisting of three to five members of whom the supervisor must be a part. The highest scoring project will receive the best project award.

Criteria	Weightage	Assessment Method
Project proposal	5 %	Rubric - Appendix I & II
Semester – VII Presentation	10 %	Rubric - Appendix IV
Semester – VII Report	15 %	Rubric - Appendix V
Semester – VIII Final Presentation/Defense	20 %	Rubric - Appendix IV
Semester – VIII Final Report	20 %	Rubric – Appendix V
Semester – VIII Outcome Evaluation	30 %	Rubric – Appendix VI

APPENDIX I: FYP Proposal

FYP Team

	Name	Reg. No.	Phone Number
1.			
2.			
3.			
4.			
5.			

Project Title

Abstract

Members of Guidance and Examination committee

( ) ( )

Project Supervisor:

( ) **Date:**

Head of Department:

(Dr Shahid Ikramullah Butt) **Date:**

APPENDIX II: FYP Statement of Requirement (SoR)

FYP Team

	Name	Reg. No.	Phone Number
1.			
2.			
3.			
4.			
5.			

Project Title

Elaborate against each of the following resources that you require:

Hardware:	
Software:	
Lab facility inside the department:	
Lab facility outside the department:	
Training:	
Literature:	

Project Supervisor: _____

(**)** **Date:**

APPENDIX III: FYP meetings with project supervisor

FYP Team

	Name	Reg. No.	Phone Number
1.			
2.			
3.			
4.			
5.			

Project Title

	Date	Attended by	Progress	Remarks	Signature
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

APPENDIX IV: FYP Evaluation of Presentation (SMME)

(Separate Form be used by each Evaluator)

FYP Team

	Name	**Reg. No.**
1.		
2.		
3.		
4.		
5.		

Project S No: ---------- **Name of Evaluator** ----------

Marks to be awarded out of 10 for each attribute according to following guidelines:

10: Exception *(must be used rarely)* 9: Excellent; 8: Very good; 7: Above average;
6: High average / Fair; 5: Average; 4: Below average; 3: Poor; Below 3: Fail

	Description	**Student 1**	**Student 2**	**Student 3**	**Student 4**	**Student 5**
1	Clarity *(Project introduction, problem statement)*					
2	Soundness *(Technical explanation, relevance of theory, supportive arguments)*					
3	Continuity and Rationale *(Ideas, presentation sequence)*					
4	Presentation skills *(Oratory skills, relevance of supportive graphs, plots, animations etc.)*					
5	Slides Organization *(Font type, size, background, quality of graphs, plots etc.)*					
6	Conclusions / Results / Achievements / Recommendations					
7	Questions and Answers					
Total						

APPENDIX V: FYP Report Assessment (SMME)

(Separate Form be used by each Evaluator)

FYP Team

	Name	**Reg. No.**
1.		
2.		
3.		
4.		
5.		

Project S No: ---------- **Name of Evaluator** ----------

Marks to be awarded out of 10 for each attribute according to following guidelines:

10: Exception *(must be used rarely)* 9: Excellent; 8: Very good; 7: Above average;
6: High average / Fair; 5: Average; 4: Below average; 3: Poor; Below 3: Fail

S No	**Element**	**Score**
1	Background Search / Literature Review	
2	Concept Development	
3	Project Management / Testing Plan	
4	Mathematical Modelling / Calculations	
5	Use of Modern Engineering Software / Tools	
6	Sketches / Pictures	
7	Reference to Standards / Design Documents	
8	Report Outline / Grammar / Vocabulary	
9	Report Presentation / Formatting	
10	Future Work / Linkage With Social, Environmental or Economic Issues	
Total (out of 50 marks)		

APPENDIX VI: FYP Outcome Evaluation (SMME)

(Separate Form be used by each Evaluator)

FYP Team

	Name	**Reg. No.**
1.		
2.		
3.		
4.		
5.		

Project S No: ---------- **Name of Evaluator** ----------

Marks to be awarded out of 10 for each attribute according to following guidelines:

10: Exception *(must be used rarely)* 9: Excellent; 8: Very good; 7: Above average;
6: High average / Fair; 5: Average; 4: Below average; 3: Poor; Below 3: Fail

S No	**Element**	**Score**
1	Quality of Work *(Engineering approach, Functioning of hardware or software)*	
2	Soundness of Approach and Analysis *(Could a better approach be used? Has project objective fully achieved?)*	
3	Depth of Understanding / Demonstration	
4	Novelty *(Whether new, continuation project or proof of concept etc.)*	
5	Industrial Research Importance	
6	Project Poster and Management at Open House	
7	Team work	
Total		

APPENDIX VII: FYP Project Submission (SMME)

FYP Team

	Name	Reg. No.
1.		
2.		
3.		
4.		
5.		

Project Title

_____

_____

_____

Project S No: _____

It is certified that the following items in respect of the above project have been handed over to SMME as per the following details:

	Item	Qty	Name & Designation of Recipient	Signature of Recipient
1	Project Report			
2	Project CD			
3	Any software developed			
4	Project Hardware (if any)			
5				
6				
7				
8				
9				
10				

Project Supervisor: _____

(**)** **Date:**