

# Engineering Team Project (ETP) as an Inter-Disciplinary Subject for Undergraduate Students.

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**Abstract:** A course called Engineering Team Project (ETP) is offered to 3<sup>rd</sup> year engineering students at Universiti Teknologi Petronas (UTP). It is run in one semester (i.e 14 weeks), 2 credit hours per week. The course is conducted in the preparation for the students before they are dispatched to the industrial attachment training in year four. The subject is designed to ensure that students acquire the relevant knowledge in conducting research and development project work. Students are divided into groups consists of four or five members of various discipline which are Mechanical, Electrical & Electronic, Chemical and Civil Engineering. Appointing a selected group of lectures as supervisors carefully, ensures the smooth running of the course. This group which consists of lecturers with multi-disciplinary background are lead by one main supervisor. Their responsibilities among other things are to provide input and guidance to the students with their respective expertise in order to meet the objective of the chosen project title. In assisting the student to observe certain industrial processes or project activities, a few factory visits have been arranged. Each group of student is required to assemble with the supervisor once a week in the form of weekly progress meeting to discuss and resolve the current problem encountered and also to plan the next week activity. The weekly meeting minute is submitted to the Programme Committee as an effective means of monitoring devices. First Progress Report, Second Progress Report, Seminar Presentation and Poster Exhibition are accessed to grade the students. A number of benefits to our student are beginning to emerge since the commencement of this course at UTP. Students are more ready to go for their respective Industrial Attachment Training in year four and aware of what to expect in the training. This enables to break the stereo type thinking that one engineering discipline student is only inter-act with similar background person in his future career. It provides an excellent opportunity for students to experience the spirit of team works. Other benefits and break through advantages are also discussed and presented in this report.

**Keywords:** Engineering Team Project (ETP), multidisciplinary, supervisor, Industrial Internship Training.

## 1. Introduction

Engineers fresh from the university face new challenges when they start their careers. More often and not they are expected to provide solutions to the real technical problem by working together with other engineers of different disciplines from their own. This paper serves to share the Engineering Team Project (ETP) approach conducted at Universiti Teknologi Petronas (UTP) to prepare our fresh graduates to become effective in contribution as a team member. It is also demonstrate how this course has evolved to meet its objectives.

It has been said that teamwork skills can be learned. For instance, in the development of a new product, it is typical for a multidisciplinary team to be established. It take time and effort to build an effective team, however once in place, it is possible to perform as many possible of the product or system development tasks [1]. In the contact of our students, some of them may get the opportunity to learn and experience it at a young age through serious involment in teamsports such as soccer, basketball and rugby. Others may not be that fortunate if they do not participate in team sports. Some of them prefer more individual sport. Therefore, to give students the opportunity working in a team, UTP has decided to provide this ETP course as a more organised approach to cater for all engineering students. Hopefully, this first hand experience and action oriented learning enable UTP graduates to

develop higher level of problem solving skill. They also learn to adapt quickly to changing requirements and perform their functions in the team effectively.

## **2. ETP Course Structure**

This course is offered to Third Year Engineering students [2].. The subject is designed to ensure that students will acquire the knowledge in conducting research and development project work. This include conducting literature search, preparing project proposal, simulation, modelling, evaluation for the best option and designing engineering system. Students are divided into groups that consists of four or five members of various disciplines that is Mechanical, Electrical & Electronics, Chemical and Civil Engineering. Two or three groups will be assigned to one main supervisor. The main supervisor is further assisted by a group of supervisors which of course come from various field of specialisation as well. Hence, these supervisor are responsible in providing advice and guidance to their respected groups.

The final result of the project should be exhibited in the form of drawing of a conceptual design for a system using industrial or commercially available equipment to solve a specific problem or serve a specific purpose. The conceptual design should integrate the elements or components of Electrical, Electronic, Mechanical, Chemical and Civil Engineering in the system. The approach to solutions and methodology such as selection of the materials, problem analysis should be based on fundamental engineering calculation.

The course schedules are to include such as a series of lectures during the first two week of the semester. The list of topics will be handed to the group on the third week of the semester. The group will have to choose the topic according to their preferences. Students are given one week to conduct literature search and prepare the project proposal under the heading of Executive Summary of Project Proposal. The proposal will be discuss with the respective supervisors to determine the scope, problems and the practicality of the proposed design system. If the proposed proposals do not meet the guideline/criteria such as unclear statement of problem, weak objective, wrong methodology and wrong project planning, students may be requested to redefine or review or modify the work. Good proposal will proceed with their project.

## **3. Responsibilities of ETP Committee and Supervisors**

The committee consists of all Program Heads (i.e. Mechanical, Electrical & Electronic, Chemical Civil Engineering). They are responsible in establishing criteria for project proposal and progress report. Evaluating the executive summary of the project proposal to ensure no overlapping in the approach and solution methodology, student oral presentation and moderation the final results are also fall under the committee responsibility. On top of that they are also expected to advise the supervisors on the project assessment or any other problems encountered during the project work.

The responsibilities of supervisors can be summarised as follow.

- ?? Helping the ETP Committee to evaluate the executive summary of project proposal.
- ?? Advising students on the preparation of their design projects.
- ?? Monitoring student' s progress through their weekly progress report.
- ?? Measuring of progress against Gantt Chart.
- ?? Assessing progress reports, final report and seminar.

## **4. Method of student evaluation**

The overall assessments of the course are divided into several sections as describe on the following statements.

The First Progress Report, which is limited to two pages excluding Gantt Chart will be assessed. This report should contain problem definition, propose project planning, delegation of work, tools and software use and the development of a schematic flow process showing the involvement of all members in the group.

The Second Progress Report should contained information such as identifying details things need to be done, recognising potential problems, developing few alternative models, cost benefit analysis in designing decision

making, usage of data and engineering calculation and measuring the progress against the Gantt Chart. This report should be limited to three pages only.

The Final report will be assessed base on two parts. The first part is the overall content and the second one is the presentation of the report itself. In the overall content, the student is expected to report critical view of current problem and solution, decision making process, final design, suggestion for improvement and recommended future work. Whilst in the in the presentation of the report, it should cover scopes like executive summary, introduction and project objectives, literature review, problem statement, results, dicussion and conclusion, references and appendices.

The assessment is further given for oral and poster presentation at the end of the course. The assessment criteria on these matters are such as visual quality, clarity of presentation, logic, knowledge of the subject matters and the overall content of presentation.

The allocation of marks on all the assessments are shown in the Table 1 as below.

Table 1. ETP mark allocation

	Marks Allocated
1 <sup>st</sup> Progress Report	10%
2 <sup>nd</sup> Progress Report	10%
Final Project Report (100% completion)	40%
Seminar (Oral Presentation)	25%
Poster Exhibition	15%

## 5. Proposed project tasks.

The proposed project tasks can be selected from three methods. The standard manner is when the student select the topic which is listed by the ETP Committee. The second method is when the most enthusiastic propose their ideas to the committee or their immediate supervisors. Hence, they can proceed with the work after getting the approval from the committee. Finally, the last channel where the student could get the project title is from their respective supervisor proposal Below are some of the topics listed from the last exercise.

- ?? The design of cooling device on the parked automobile.
- ?? The design of light transit system in the UTP campus
- ?? The design of elevator system in the house.

## 6. Discussion and conclusion

From our observation on the last exercise of this course, we found out that the student managed to realise their clear role and expectation. Member must understand that the team process means accepting interdependence. Differing skill and background means that everyone in the team brings to it certain talents or skill and is expected to perform a specific job or role in order to meet the stated goal. Successful teams are characterised by an atmosphere of trust and open communication. Trust and openness occur in a team environment when members learn that they can speak freely, that their ideas and opinion will be valued and listened to with out ridicule, that other members of the team accept and support them, and that the team is a place where they can take risk and grow. All these attributes which was learned by the students during the course was very important in preparing themselves in the real working condition after graduating from UTP. We were also receiving a very good feedback from the industries commenting their satisfaction of having UTP student in the organisation. With this remark from the industries we know that we are achieving our objective in running this course of ETP in the UTP.

## 7. References

- [1]. J. A. Charles, F. A. A. Crane and J. A. G. Furness, "Motivation for selection," Chapter 2 in Selection and Use of Engineering Materials, 3<sup>rd</sup> Eds., Butterworth-Heinemann.,1997.
- {2} UTP ,Engineering Team Project Guideline for Supervisor, 1999/2000.