SUBJECT REVIEW REPORT

DEPARTMENT OF
CHEMICAL AND PROCESS ENGINEERING

FACULTY OF ENGINEERING
UNIVERSITY OF PERADENIYA

4th to 6th April 2011

Review Team :

Prof. (Ms.) Padma Amarasinghe, University of Moratuwa
Dr. Shantha amarasinghe, University of Moratuwa
Mr. E. A. S. Edirisinghe, Ceylon Petroleum Corporation
Dr. W. K. Wimalsiri, University of Moratuwa

CONTENTS

1. SUBJECT REVIEW PROCESS

Subject review process of the UGC involves evaluating the quality of education within a specific subject or discipline, focusing on the student learning experience and on student achievement. The subject review process evaluates the quality of both undergraduate and taught postgraduate programs. It is understood that the final responsibility for quality and standards remains within the institution itself, since it alone has the powers to control and to change existing practices.

Subject review process at the Department of Chemical and Process Engineering (DCPE) of the University of Peradeniya, Sri Lanka was conducted following the guidelines provided in the Quality Assurance Handbook for Sri Lankan Universities, published by the CVCD and University Grants Commission in July 2002. The quality of education was reviewed according to the aims and learning outcomes given in the self-evaluation report.
The following eight aspects of education were reviewed at the Departmental level:

- Curriculum design, content and review;
- Teaching, learning and assessment methods;
- Quality of students including student progress and achievements;
- Extent and use of student feedback (both qualitative and quantitative);
- Postgraduate studies;
- Peer observations;
- Skills development;
- Academic guidance and counseling.

The review team visited the department for three days, namely 4th, 5th and 6th April 2011. The agenda of the three-day visit is given in Annexure 1. The information related to the above eight aspects were collected by having discussions with the Dean, Head of the Department, members of the academic and non-academic staff, a group of undergraduate students and post graduate students (see Annexure 2 for persons met during the visit), by peer observation of the teaching process (lectures, laboratory work and project work; see Annexure 3), by observing the facilities at the DCPE and other relevant departments and divisions (see Annexure 4) and by examining the documents provided by the Department (see Annexure 5). Each of the eight aspects was judged as good/satisfactory/unsatisfactory, noting the strengths, good practices and weaknesses in each. Considering the judgment of the eight aspects, an overall judgment is reported at the end of this report selecting one of the three options; confidence/limited confidence/no confidence; in the academic program.

2. BRIEF HISTORY OF THE UNIVERSITY, FACULTY AND THE DEPARTMENT

University of Peradeniya

The University of Ceylon, the first university in the country, was established in Colombo on July 1, 1942 under the Ceylon University Ordinance (No. 20 of 1942) as a unitary, residential and autonomous corporation. It is shifted to the present site of great natural beauty at Peradeniya, just 8 km from the city of Kandy and 100 km from Colombo, on October 6, 1952. The University of Peradeniya (henceforth referred to as the University) is the heir to the University of Ceylon and is the largest university in the country with its eight faculties (Agriculture, Allied Health Sciences, Arts, Dental Sciences, Engineering, Medicine, Science and Veterinary Medicine & Animal Science) and two postgraduate institutes (Agriculture and

Science). About 2,600 undergraduates enter the University annually, to make up an undergraduate student population of 8,900 and the total number of postgraduate students registered is about 1,700. Out of the total undergraduate student population, about 5,700 are provided accommodation on and around campus.

Faculty of Engineering

Faculty of Engineering at the University of Peradeniya was established in Colombo on July 1, 1950. At its inception, the Faculty had three departments of study: Civil Engineering, Electrical Engineering and Mechanical Engineering. The Faculty moved to the current location at Peradeniya in 1964. Steady expansion and diversification of the Faculty have taken place since the move to Peradeniya and there are now eight departments of study: Chemical & Process Engineering, Civil Engineering, Computer Engineering, Electrical & Electronic Engineering, Engineering Management, Engineering Mathematics, Mechanical Engineering and Production Engineering.

The Faculty offers a full-time undergraduate course leading to the degree of Bachelor of the Science of Engineering (BSc Eng). This degree programme is of four years duration, the first year being common to all students and the last three years devoted to specialization in either chemical & process, civil, computer, electrical & electronic, mechanical or production engineering. Laboratory experiments, design projects, field work, open-ended projects and research projects form an essential part of the undergraduate programme. The assessment of a course unit comprises continuous assessments (quizzes, assignments, case studies, lab work, designs, projects, computer simulations), mid-semester and end-of-semester examinations.

In order to expose the students to engineering practice, they are placed at the real industrial environment for industrial training for a minimum period of 24 weeks before they enter their final year of study. The industrial training programme has been drawn up in collaboration with the National Apprenticeship & Industrial Training Authority (NAITA).

The Faculty provides an academic environment of the highest quality and has maintained a gratifying record of teaching, research and public service, the traditional functions of institutions of higher education. Research done in the Faculty has been published at home and abroad, while its consultancy and laboratory services have been provided over the years to private and public sector establishments in the country.

Department of Chemical and Process Engineering

Department of Chemical Engineering at the Faculty was established in 1981 and it catered for a Chemical Engineering degree programme with a mechanical engineering bias. Over the years, the said degree programme was systematically upgraded to a have a process engineering bias and therefore the name of the department was appropriately changed to Department of Chemical and Process Engineering (henceforth referred to as the Department) in 2005. The Department now caters for the BSc Eng degree programme with specialization in the field of Chemical and Process Engineering (henceforth referred to as C&P Eng). This programme imparts in its graduates the knowledge, understanding, skills and attributes required for the safe, sustainable and economical design, modification, operation, control and management of small-scale and large-scale physical, chemical and bio processing plants, the products from which are as wide ranging as refined fuels, chemicals, processed food, composite materials, electronics and pharmaceuticals. The graduates of the department are

also conversant in the knowledge and skills required for working with refrigeration and air conditioning technology, combustion and emissions technology, sustainable energy technology and environmental pollution control technology.

The course units offered in the department are designed to prepare its graduates to gainfully employed at petroleum refineries, chemical manufacturing facilities, pharmaceutical industry, food processing industry, biotechnology industry, process-software development businesses, quality control and management authorities, industrial pollution control and environmental pollution abatement organizations, sustainable development initiatives and strategies development cells and composite material using industries such as aerospace, automotive, biomedical, electronic, environmental and space industry. The graduates who perform well are also qualified to follow postgraduate studies in numerous fields related to chemical engineering such as process and product development, environmental engineering, energy and nuclear engineering, biotechnology, biomedical engineering, advanced and composite materials, and nanotechnology in any leading university in the world.

The Department provides course units such as Chemical Engineering Fundamentals, Separation Process Principles, Reaction Engineering, Process Equipment Design, Energy Systems Design, Industrial Safety and Health, Advanced Fluid Mechanics, Industrial Fluid Mechanics, Industrial Process Technology, Biological Process Engineering, Instrumentation and Measurement, Industrial Pollution Control System Design, Energy Technology for the Process Industry, Petroleum Engineering, Food Process Engineering and Environmental Management Systems. The Department also provides research and design projects supervision in course units such as Basics in Process Engineering Design Project, Advanced Process Engineering Design Project, Independent Study, Process Engineering Project and Process Engineering Research Project. Course units of a broader interest involving Thermodynamics, Heat Transfer, Mechanics of Fluids, Materials Science, Strength of Materials, Mechanics of Machines and Electrical Power are provided with the support of other departments.

3. AIMS AND LEARNING OUTCOMES

3.1 Aims

The aim of the Department is to provide a competitive teaching environment and to produce graduates with international recognition for their knowledge, understanding, skills and attributes required by the process engineering and related industries.

3.2 Learning Outcomes

On successful completion of our programme student should have:

- comprehensive knowledge and understanding of the scientific principles and theories that underpin chemical and process engineering,
- wide knowledge and comprehensive understanding of design principles, processes and techniques: knowledge, understanding, skills and attributes required for the safe, sustainable and economical design, modification, operation, control and management of small-scale and large-scale physical, chemical and bio processing plants,
- capability of creatively applying their understanding of principles, analytical and mathematical modelling techniques to solve problems arising in their career path,

- competency in communicating their ideas clearly and concisely in all forms, and
- Proficiency in engaging in lifelong learning which will be essential for progressing in their career.

4. FINDINGS OF THE REVIEW TEAM

The following eight aspects of education reviewed at the Departmental level are described in sub sections 4.1 to 4.8.

- Curriculum design, content and review;
- Teaching, learning and assessment methods;
- Quality of students including student progress and achievements;
- Extent and use of student feedback (both qualitative and quantitative);
- Postgraduate studies;
- Peer observations;
- Skills development;
- Academic guidance and counseling.

4.1. Curriculum Design, Content and Review

Department of Chemical Engineering at the Faculty of engineering was established in 1981. The degree programme offered at the Department then was mechanical engineering biased having only a few chemical engineering core courses. In late 1980s, the chemical engineering students were taught "Chemical Engineering Science" in their third year of study and "Theory of Process Equipment Design and Operation" and "Energy & Chemical Reaction Engineering" in their final year of study along with the availability of the optional courses in Biological Process Engineering, Environmental Engineering and Industrial Safety in an otherwise mechanical engineering dominant curriculum. Later, "Theory of Process Equipment Design and Operation" was replaced with "Process Engineering".

In 1990s, the Department introduced the environmental engineering component into the core curriculum at the undergraduate level. In 2000s the curriculum for the course unit system was introduced in line with the introduction of course unit system in the faculty. The curriculum for course unit system is mainly divided into two parts: the curriculum for General Course and the curriculum for the Final Course. The General Course is designed to expose the students basically to all fields of engineering, ranging from Engineering Drawing (QE105) to Workshop Technology (QE107) and Engineering Measurements (QE112). The students should earn 36 credits in general course to follow the final course. The Final Course comprises the second, third and fourth years of study at the Faculty and is made up of six semesters and 24 weeks of Industrial Training. Undergraduates follow their respective specializations in engineering during this period, and the specialization programme consists of course units grouped into five categories, namely, core course units, projects, technical electives, general electives and industrial training. Industrial Training (TR400 worth 6 course credits) is a compulsory course for all engineering specializations at the faculty. Depending on the minimum credit requirement in the final course, students can be graduated in two categories; BSc Eng degree (minimum of 96 final course credits) or a BSc Eng degree with Class honours (minimum of 108 final course credits). The credit difference in the two categories is only 12 credits and the review team noted that the second option is the most preferable and the always practiced option at the DCPE.

With the introduction of the course unit system, DCPE had the opportunity to introduce more subjects specialized in chemical and process engineering. Additional courses such as petroleum engineering were also introduced at later stages as minor revisions to the curriculum. During the discussion with the senior staff members of DCPE, the review team specifically noted their preference on developing graduates who can work both in chemical and mechanical related industries. The same objective was highlighted by the other faculty members who offer courses to the DCPE and the training engineer. The curriculum also reflects the same philosophy in its development. As such the review team is in the opinion that the design and content of the curriculum is ***good*** to achieve that objective. However, it could be noted that the aim and the learning outcomes do not adequately emphasize this objective which is specific to the Chemical and Process Engineering programme at University of Peradeniya.

There is an excellent interaction within the faculty, and other departments are willingly offer courses to the DCPE. This can be identified as a good practice. The emphasis on both chemical and mechanical design is remarkable. This can be further strengthened by introducing pressure vessel design. The effort made on introducing computer simulation and modelling is commendable. This can further be improved by introducing simulation packages such as ASPEN PLUS, HYSYS, LabVIEW etc.

Both the academic staff and the students of DCPE showed their interest in introducing more chemical and process engineering specialization to the degree programme. However, the review team identified the following as the major limitations for achieving this goal.

- DCPE has a severe shortage of academic staff and they were unable to recruit qualified staff to the available vacancies for a long period. Further, it is difficult for them to appoint suitable visiting staff due to being located at a place away from major industrial zones.
- Presently the DCPE offers only 40% of the course credits to their own students. As a result naturally DCPE has less flexibility within the faculty for changing their curriculum.

A major revision to the curriculum was not done for last 10 years and this can be identified as a weakness. However, presently a major curriculum revision is in progress. The following recommendations can be made on revising the curriculum.

- Attention must be given on strengthening the core chemical subject areas such as Transport phenomena, Process control, Pressure vessel design, Energy efficiency & conservation etc.
- Consider in introducing minor specialization areas of chemical and process engineering such as food process engineering, biochemical engineering, polymer engineering, etc. However, special attention must be given to availability of staff and laboratory facilities when introducing new subjects.
- Get the feedback from industry, students and the specialists in the field of chemical and process engineering. This can be done through formal discussions, workshops etc.
- Most importantly, the DCPE must be given the flexibility and the freedom to change its own curriculum to be in line with the changes in both global and local context of chemical and process engineering.

International accreditation of undergraduate courses in Sri Lankan universities is underway. The curriculum revision to meet the requirements of the accreditation body through which the DCPE plans to seek accreditation is important.

Considering all the above the review team judged this aspect as GOOD.

4.2 Teaching, Learning and Assessment Methods

The main components of teaching and learning activities are Lectures and Tutorials, Design Projects, Assignments, Open-Ended Research Projects, Independent Study, Laboratory Practical Classes, Industrial Training and Industrial Visits. A course module having both lectures and continuous assessment are generally assessed by the following methods.

25% of the final marks – continuous assessment
25% of the final marks – mid semester exam
50% of the final marks – semester end examination

The lectures are conducted by the senior staff members using all the modern facilities. 80% attendance for lectures is a must to follow rule for the students. The students are closely monitored and guided during the practical sessions. They have to write reports during the laboratory sessions and every attempt was made to limit the number of students to maximum of 5 in a practical group. Machine drawing and machine design are essential parts of the curriculum and adequate facilities and staff are available for giving individual attention to the students.

DCPE offers only 40% of the credit requirement and the maximum number of students in a batch is 25. The actual number of students in the past few years was even less and presently the total number of students in all 3 batches are slightly above 40. This gave an excellent opportunity for DCPE to develop an interactive learning program for their students.
The project based courses offered by DCPE are

- CP307 Process Engineering Project (2 credits)
- CP407 Independent Study (3 credits),
- CP404 Basics in Process Engineering Design Project (2 credits)
- CP405 Advanced Process Engineering Design Project (2 credits),
- CP507 Process Engineering Research Project (3 credits)

Some of the ongoing projects were presented to the review team by the students and several discussion sessions were conducted with the staff and students. The review team was impressed with the strategies followed by the DCPE staff to continuously monitor their students and the opportunities given for the students to interact effectively with the staff and to independently develop their confidence and the capabilities in a self learning environment. However, similar strategies may not be possible to adopt with the increase in student numbers and hence DCPE must consider new strategies which will enable them to maintain current status. Some of the other concerns that need further attention are given below.

- Special attention must be given to balance the work load for students. The reviewers noted the difficulties sometimes faced by the students due to overlapping of continuous assessments, project based courses and mid semester examinations.

- Since several different types of project base courses are offered, it is important to clearly define the project boundaries and the staff must give special attention on selecting the projects to meet specific learning outcomes relevant to each course module.
- The time spent by the students on project based courses is significantly high but it is not adequately reflected in the credit rating.

The students were satisfied with the feedback given to them by the DCPE staff on continuous assessment and the mid semester examinations. They were comfortable on discussing with the staff of DCPE than the other departments on issues related to re-correction of examination papers. The students prefer to register for more optional courses offered by DCPE. However at present the department is unable to offer more than one optional subject per semester due to lack of staff.

The effect of shortage in staff may be highlighted with the proposed change in curriculum and the enrolment of all 25 students in future. Therefore it is strongly recommended to take necessary action to recruit the staff for available cadre vacancies. As a short term measure, steps must be taken to attract visiting staff specialized in the field of chemical and process engineering. DCPE must consider further increasing the number of students enrolling for CPE program. This will enable to further increase in staff cadre which in turn will give more flexibility to DCPE for introducing new course modules to chemical and process engineering specialization.

DCPE has a dedicated team of academic support staff and non academic staff. In the recent past, new laboratories were developed with the introduction of new course modules. However, DCPE has only one lab attendant to look after all the laboratories. The non academic staff was not satisfied with the training opportunities given to them. Review team emphasize that availability of a well trained staff is essential for the development and the sustainability of the program.

On the basis of its observations, the review team considers that overall teaching, learning, and assessment aspects are GOOD.

4.3 Quality of Students, Including Student Progress and Achievements

The students to the Department are taken from the Engineering students who enter the Faculty. Good quality students with high potential and having highest marks in the mathematics stream of the GCE (Advanced Level) examination are selected for the engineering programmes. They are taken into the C&P Eng specialization after their General Course. Students are selected to the departments based on their performance (GPA) in the General Course and their preference of following a particular field of study. In recent past, Chemical and Process Engineering Program has been the least demanded among the six engineering programmes offered by the faculty of engineering. In addition to the prevailing job market in the country, the following reasons may also have given an adverse effect on the choice of students.

- Presently the DCPE does not have a proper building
- Shortage of staff

In year 2005, none of the students were enrolled to the CPE program. For some reason faculty, has allowed several departments to increase their intake without increasing the overall intake to the faculty. This problem has been rectified by now and last intake to the

DCPE program was 22. Several students whom could be able to apply for most demanded programs, made their first choice as CPE program. This new development is an obvious strength to the DCPE. During the discussion with the review team, the dean faculty of engineering specifically mentioned about the importance of completing the new building for DCPE without further delaying. The new building will certainly enhance the image of the department.

Almost all the students who enter the CPE program complete their degrees and more than 80% of them complete the degree within four years. None of the past graduates reported to have unemployed. University career guidance unit organize several activities aiming at human resource development. Faculty of Engineering also has a separate career guidance unit which also organizes activities specific to engineering profession. English Language Teaching Unit supports the students to effectively write their CV's. Most importantly students of DCPE discuss their problems directly with the DCPE staff and seek advice and support in career related issues.

Majority of the students who enroll to the DCPE program had their first preference to follow some other engineering discipline. Achieving good progress in such a group is always a challenging task. The review team is in the opinion that the department was successful in every aspect regarding the student progress and achievement. The performance records of students provided by the SAR Engineering clearly indicated the gradual increase in their progress during the course of study. The records maintained by the English Language Teaching Unit (Annexure 6) indicate the significant improvement in the performance of the students compared to the time of their entry to the university.

The training division of the faculty takes necessary steps to provide the required industrial training to the students. Students are given the opportunity to get their industrial training at two different places for a period of 12 weeks each, after 4^{th} and 6^{th} Semesters. Training inspection is usually done by NAITA. The training division and the senior staff members from the DCPE also visit the training places. However, this is not a regular practice and it is recommended to encourage the staff members to visit training places by providing transport facilities arranged by the training division. The majority of students were well satisfied with the training received by them. However, few difficulties faced by some of the students are listed below. These issues can be sorted by arranging training inspections done by the departmental staff.

- Training placements at non-relevant places
- Training palace was not formally communicated prior to the beginning of training period
- Training place was unaware of the type of training to be given to the students

The students were in the opinion that CPE program has been well designed to develop their progress and achievements. They were very satisfied with the learning outcomes of the project based courses and truly believe that those projects help them to develop their technical, analytical and soft skills. The review team could also observe the confidence in students gained through project based activities. Lack of computer facilities within the department can be identified as a weakness. The design of CPE program demands extensive use of computers by the students which cannot be met by central computer facilities only. Hence the gradual development of computer facilities including setting up of Wi-Fi zones is recommended.

Considering all the above the review team judged this aspect as SATISFACTORY.

4.4 The Extent and Use of Student Feedback

Engineering Faculty has a policy on obtaining feedback from students. Two forms are used by the faculty for this purpose; Teacher evaluation form and Course evaluation form (Annexure 7). Every lecturer at the last lecture of his/her lecture series distributes the course/teacher evaluation sheets to the class. Students fill them within the class itself, one student collect them and return to the respective lecturer. They were asked not to write their names or any identification number.

On inquiry from students, it could be seen that they were unaware of the mechanism of how there feedback was used in improving the quality of lectures. The review team noted that obtaining of student feedback is not a regular practice for some of the courses offered in CPE program. There was no formal quantitative analysis done on the feedback but lecturers individually use them qualitatively.

DCPE does not maintain a record of meetings with students. However, students have the opportunity to convey their feedback on CPE subjects and the CPE program in general to the DCPE staff through informal meetings and discussions. Students are satisfied with the actions taken by the DCPE staff to accommodate their feedback which were mostly conveyed through informal discussions.

Considering all the above the review team judged this aspect as *SATISFACTORY*.

4.5 Postgraduate Studies

The Department conducts postgraduate research leading to M.Phil and PhD Degrees and taught postgraduate course in Environmental Pollution Control Engineering leading to PG diploma or masters degree. The review team is satisfied with the postgraduate studies at DCPE despite the lack of staff, funding and facilities. At present 14 postgraduate students are attached to the DCPE (Annexure 8). The SER submitted by the DCPE shows that the department has carried out research in a wide range of expertise fields, including environment, energy and separation processes. The discussions with the academic staff and the post graduate students reviewed that the students require long time for completion of the research component of the taught course and therefore DCPE has no plans to commence a new batch for the Masters course in Environmental Pollution Control Engineering immediate future. However, the review team is of the view that the DCPE should commence the program again as a post graduate course in the department has multiple benefits.

Considering the above, the review team judges this aspect as GOOD.

4.6 Peer Observations

The objectives of peer observation in an undergraduate program are to monitor the quality of teaching, share good practices and enhance quality of teaching.

The DCPE has peer observation practice either by observing a teaching class or by discussions with few students in the selected class. The observer fills a form and informs the observee the suitable modifications. The team observes that the peer observation procedure can be further improved and make more effective by extending peer observation scheme for

laboratory classes, course notes, question papers. Further the peer observation form used at present can be modified and upgraded.

Although improvements require to be made in this area, the review team judged this aspect as SATISFACTORY.

4.7 Skills Development

Several steps have been taken to develop students' English language, computer knowledge, presentation skills, report writing skills and team work, both at the faculty level and Department level.

Faculty offers an intensive course to uplift the language, analytical and computer application skills of fresh entrants during orientation program. The statistics provided by the English Language Teaching Unit (ELTU) show considerable improvement in performance English at the semester 1 examination when compared with the placement tests at the entrance (Annex 6).

The skill development activities are embedded to many course moduli. Chemical and Process Engineering curriculum has been designed to provide students and opportunity to work in teams, improve presentation and report writing skills and computer based skills.
Teaching and Learning Strategies used at the DCPE aiming skill development are;

1. Lectures in which the students are given selected sections to prepare and teach to his/her peers facilitated by the lecturer-in-change.
2. Assignments for which known solutions exist.
3. Open-ended assignments/projects without known or not so well-defined solutions.
4. Laboratory-based sessions which allow a group of students to carry out experimental work.
5. Laboratory experiments designed and carried out by students to arrive at required information or testing of ideas
6. Practical sessions on computing classes where students use software and numerical tools to analyse engineering problems or as design tools
7. Design projects which provide an opportunity to undertake design case studies
8. Open-ended research projects, Literature survey and Project work
9. Seminars and Workshops, industrial visits
10. In-plant training at chemical and allied industry.
11. self-assessments records for project based modulus

The review team is pleased with the steps that have been taken for student skill development and improving their employability and the DCPE staff are encouraged to maintain the same level of skill development in future.

Considering the above, the review team judges this aspect as GOOD.

4.8 Academic Guidance and Counseling

The faculty has arrangements to provide academic guidance and counselling for undergraduate students from the entry to the end of the program. The Faculty assigns an academic staff member for a group of about five to six students as the advisor when the students enter the Faculty. The advisors maintain a close liaison with the students allocated

and advice them in module selection and related issues. The advisor endorses on the student's registration form for course units.

The advisor assigned when a student enters the faculty will act as his/her advisor during the first two semesters. From the third semester onwards each Department of Study assigns an advisor for a group of students specialising in the programme offered by the Department concerned.

Industrial training is conducted through the industrial training division. The review team believe involvement of DCPE academic staff in selecting and allocating training places can be advantageous for students.

The Vice chancellor appoints eight academic staff members in the Engineering Faculty as student counsellors and the students are able to consult them for professional guidance on their personal problems. The University provides opportunities for student counsellor to train in the field of counselling so that the students receive professional counselling when they need it. The student counsellors meet regularly at the Faculty level as well as university level to discuss issues related to student welfare.

Counselling services are also available at the University level provided by the medical officers of the University Health Centre. Counselling is offered to students facing variety of problems that may be personal, social or academic in nature with the assurance of complete confidentiality.

Several academic staff members at DCPE are experienced student counselors and team observed a close a relationship between students and staff. This can be partially due to small student numbers at present and continuation of the good relation even with increased student numbers is important.

Considering the above, the review team judges this aspect as GOOD.

5. CONCLUSIONS

The team wishes to summarize the observations on the eight aspects under review as follows.

1. Curriculum Design, Content and Review

Strengths/Good Practices:

- Department of Chemical Engineering at the Faculty of engineering, University of Peradeniya has reviewed the undergraduate curriculum at several stages over last few years by introducing more chemical engineering biased course modules and environmental engineering component to meet the current demand in the country.
- The present curriculum produces graduates who can work both in chemical and mechanical related industries.
- DCPE has an excellent interaction with the other departments in the faculty who are willingly to offer courses to the CPE students.

Weaknesses:

- DCPE offers only 40% of the course credits to CPE graduates. Introduction of more core chemical and process engineering modules and minor specialization areas of chemical and process engineering will enable the fulfillment of aims and learning outcomes of the department.
- The department has severe shortage of qualified staff which has hindered the uplifting of the course curriculum towards CPE specialization.

2. Teaching Learning and Assessment Methods

Strengths/Good Practices:

- Various modes of teaching and learning are practiced. Student capabilities are improved in many aspects such as problem solving, self learning, and team work. 80% attendance for lectures is compulsory to sit for the end of semester examination. Close monitoring of students during practical classes and project work is commendable.
- Students are assessed by continuous assessment, mid semester examinations and end of semester examinations for course modules. Projects and training are assessed by repots, viva voice examination and presentations. Hence, student talents and skills in various aspects are improved and tested.
- Students are given the opportunities to interact effectively with the staff and to independently develop their confidence and the capabilities in a self learning environment.

Weaknesses:

- Teaching and learning strategies currently practiced may not be possible to adopt with the increase in student numbers especially with the shortage of staff.

3. Quality of Students Including Student Progress and Achievements

Strengths/Good Practices:

- Good quality students with high performance at the G.C.E. (A.L.) examination enter the engineering faculty of UOP.
- Almost all the students who enter the CPE program complete their degrees and the graduates are 100% employed,

Weaknesses:

- The students entering the engineering faculty follow a general course in the first year. They are selected to the departments based on their GPA and preferences. Among the several engineering programs offered CPE has been the least demanded. The following reasons may have given an adverse effect on the choice of students.
    - Presently the DCPE does not have a proper building
    - Shortage of staff

  However, the review team noticed that this situation is now improving gradually.

4. Extent and Use of Student Feedback

Strengths/Good Practices:

- Engineering Faculty has a policy on obtaining feedback from students. Two forms are used by the faculty for this purpose; Teacher evaluation form and Course evaluation form.

- In addition Student feedback is obtained through informal discussions.

Weaknesses:
- There was no formal quantitative analysis done on the feedback but lecturers individually use them qualitatively.
- DCPE does not maintain a record of meetings with students.
- Present and past student's feedback should be obtained in curriculum revisions.

5. Postgraduate Studies

Strengths/Good Practices:
- Despite the staff shortage the department conducts postgraduate research leading to M.Phil. and PhD Degrees and taught postgraduate course in Environmental Pollution Control Engineering leading to PG diploma or masters degree.

Weaknesses:
- The students require long time for completion of the research component of the taught Masters program partially due to lack of facilities and delay in funding approval.

6. Peer Observations

Strengths/Good Practices:
- The DCPE has peer observation practice either by observing a teaching class or by discussions with few students in the selected class.

Weaknesses:
- Peer observation forms need to be improved
- Peer observation is not a regular practice for some of the course modules offered by the CPE programme.

7. Skills Development

Strengths/Good Practices:
- Several steps have been taken to develop students' English language, computer knowledge, presentation skills, report writing skills and team work, both at the faculty level and Department level.
- DCPE has given special attention to include skill development activities in most of the courses offered by the DCPE.

Weaknesses:
- Some skill development methods currently practiced may not be possible to adopt with the increase in student numbers especially with the shortage of staff.

8. Academic Guidance and Counseling

Strengths/Good Practices:
- The academic advisors are formally appointed and they maintain a close liaison with the students allocated and advice them in module selection and related issues. The advisor endorses on the student's registration form for course units.

- In addition to the academic guidance students can consult student counsellors for professional guidance on their personal problems. Several academic staff members at DCPE are experienced student counsellors and the review team observed a close a relationship between students and staff.
- Professional counsellors are appointed by the university and students sometimes feel free to discuss their personal problems with these professional counsellors

Weaknesses:

- Not all the students use the counseling facilities available within the university

The Review Team's judgment of the eight aspects studied during the review visit is summarized below.

Aspect Reviewed	Judgment Given
Curriculum Design, Content and Review	Good
Teaching, Learning and Assessment Methods	Good
Quality of Students including Student Progress and Achievements	Satisfactory
Extent and Use of Student Feedback, Qualitative and Quantitative	Satisfactory
Postgraduate Studies	Good
Peer Observation	Satisfactory
Skills Development	Good
Academic Guidance and Counseling	Good

6. RECOMMENDATIONS

Based on the findings indicated above, the Review Team found that in most aspects the programme is conducted at the DCPE are commendable. While sharing the lack of funds and other problems inherent to all the Sri Lankan universities, the high moral and positive attitude of the staff should be commended.

The Review Team also wishes to make the following specific recommendations.

- To introduce of more CPE core courses such as Transport phenomena, Process control, Pressure vessel design, Energy efficiency & conservation and minor specialization areas of chemical and process engineering such as food process engineering, biochemical engineering, polymer engineering.
- To consider the requirements for accreditation of the course during curriculum revisions.
- To recruit more academic staff enabling the DCPE to introduce more CPE courses and to handle increasing student numbers.
- To provide funds necessary to complete the DCPE building so that the identity of the CPE is enhanced and thereby enable attraction of good students and staff.

- To improve relations with the industry and related organizations and further strengthen the industrial training programme.
- To recommence the M.Sc. taught course in Environmental Engineering despite the difficulties due to staff shortage.
- To reappoint the external examiners to review examination papers and project reports.
- To formalize the departmental meetings, feedback and peer observations

7. ANNEXES

Annex 1. AGENDA OF THE 3 DAY VISIT

Day 01 - 04/04/2011 (Monday)

Time	Activity
8.00 - 8.30	Private Meeting of Review Panel with QAA Council Representative
8.35 - 8.50	Meeting with Dean
9.00 - 9.20	Meeting with VC
9.20 - 9.50	Observing University facilities (Main Library, IT Centre, Gymnasium, Swimming Pool, Play grounds, etc.)
10.10 - 10.35	Discuss Agenda for the Visit (Working Tea)
10.40 – 12.00	Department Presentation on the Self-Evaluation Report and Discussion
12.00 – 13.15	Lunch at Circuit Bungalow
13.30 –13.45	Observing Departmental Facilities - Pilot Plant Laboratory
13.45-14.00	Observing Departmental Facilities - Biochemical Laboratory
14.00-14.15	Observing Departmental Facilities – Analytical Laboratory
14.20 -14.35	Observing other facilities - Engineering Library
14.40-14.55	Observing other facilities -Thermodynamics Laboratory
15.00-15.15	Observing other facilities - Materials and Metallurgy Laboratory
15.20-15.35	Observing other facilities - Electrical and Electronic Laboratory
15.40 – 16.25	Meeting with Department Staff (Working Tea)
16.30 – 17.30	Brief Meeting of Reviewers

Day 2 - 05/04/11 (Tuesday)

Time	Activity
8.30-9.00	Meeting with the Director/ITCGU on Industrial Training
9.00 - 9.30	Meeting with the Director/ Physical Education Unit
9.30 - 10.10	Meeting with Technical Staff and other non Academic (Working Tea)
10.10-10.30	Observe Teaching - Design class conducted by a staff member from a different department
10.35-11.00	Observe - Students conducting Research Projects in Laboratories
11.05-11.20	Observe Teaching
11.20-12.30	Observing Departmental Document and meeting with the Senior Academic Staff
12.30 –13.45	Lunch
13.45 - 14.00	Meeting with the Staff ITCGU on Carrier Guidance
14.00-14.15	Meeting with the ELTU Staff
14.15 –15.00	Meeting with PG students (Working Tea)
15.00-15.45	Meeting of Reviewers
15.45 – 16.30	Students Presentation
16.30 – 17.30	Meeting with Undergraduate students

Day 03 – 06/04/2011 (Wednesday)

Time	Activity
9.00 - 9.20	Observe Teaching – Computer Aided Design
9.25 - 9.35	Observe Teaching – Practical classes
9.40-10.20	Meeting of Reviewers (Working Tea)
10.25-10.45	Observe Teaching - Computer Simulation of problems using math lab
10.45 – 11.15	Academic guidance and Counseling-Core aspects meeting
11.15 – 12.15	Reviews Private Discussion
12.15 – 13.00	Meeting With Head and Staff for Reporting of Reviewers
13.00 - 14.00	Lunch
14.00 – 17.00	Report Writing / Working Tea

Annex 2. LIST OF ACADEMIC AND NON-ACADEMIC STAFF MEMBERS MET DURING THE VISIT

University and Faculty

1. Prof S.B.S. Abayakoon, Vice Chancellor –University of Peradeniya
2. Prof. S.B. Weerakoon, Dean-Faculty of Engineering – University of Peradeniya

Department of Chemical and Process Engineering

1. Dr. C.S Kalpage , Head-Dept. of Chemical and Process Engineering
2. Prof. R Shanthini , Professor
3. Dr. DGGP Karunaratne, Senior Lecturer
4. Ms. SMWTPK Ariyaratne, Eng. Teaching assistant
5. Ms. AM Wasantha Menike, Eng. Teaching assistant
6. Non academic staff members
7. Group of undergraduate students (≅30)
8. Group of post graduate students (≅ 12)

Other Supporting Departments

1. Mr. Udula Kotakadeniya –Thermodynamics Laboratory
2. Ms Bakmeedeniya -–Thermodynamics Laboratory
3. Mr. J.M.G Indunil – Materials Science and microscopy laboratory
4. Dr. A. Atputharajah- Head/Electrical Engineering
5. Prof. M.A.R.M. Fernanado- Department of Electrical Engineering
6. Mr. W.R.M.U Wickramasinghe, Director Training Division
7. Ms. I.W Kularathne, Senior Eng. Teaching assistant, Department of Mechanical Engineering
8. Mr. S.B. Wijekoon, career guidance unit
9. Ms U. Karunarathne, Coordinator, ELTU
10. Ms Asanka De Silva, Instructor, IT

Other Relevant Divisions at the University

1. Mr. A.T. Alwis- Actg Librarian
2. Mrs. S. Gunasekara, Senior Asst. Librarian
3. Mr. Krishnamoorthy, Library Assistant-Engineering Library.
4. Ms. A. Perera, Director/Physical Education and counselor
5. Group of student counselors

Annex 3. LECTURES AND LABORATORY CLASSES OBSERVED DURING REVIEW

- ME 209- Machine Design I – Drawing Class
- CP 307 – Process Engineering project
- CP 201- Mechanics of materials I- Lecture
- ME 207- Applied Thermodynamics I - Laboratory
- CE 207 - Material Science I- Laboratory
- CP 507 –Process Engineering Research project- student presentations
- CP 307- Process Engineering project- student presentations
- CP 304 – Process equipment design – Design class
- CP 303 - Reaction Engineering- Laboratory
- CP 303 - Reaction Engineering- Simulation

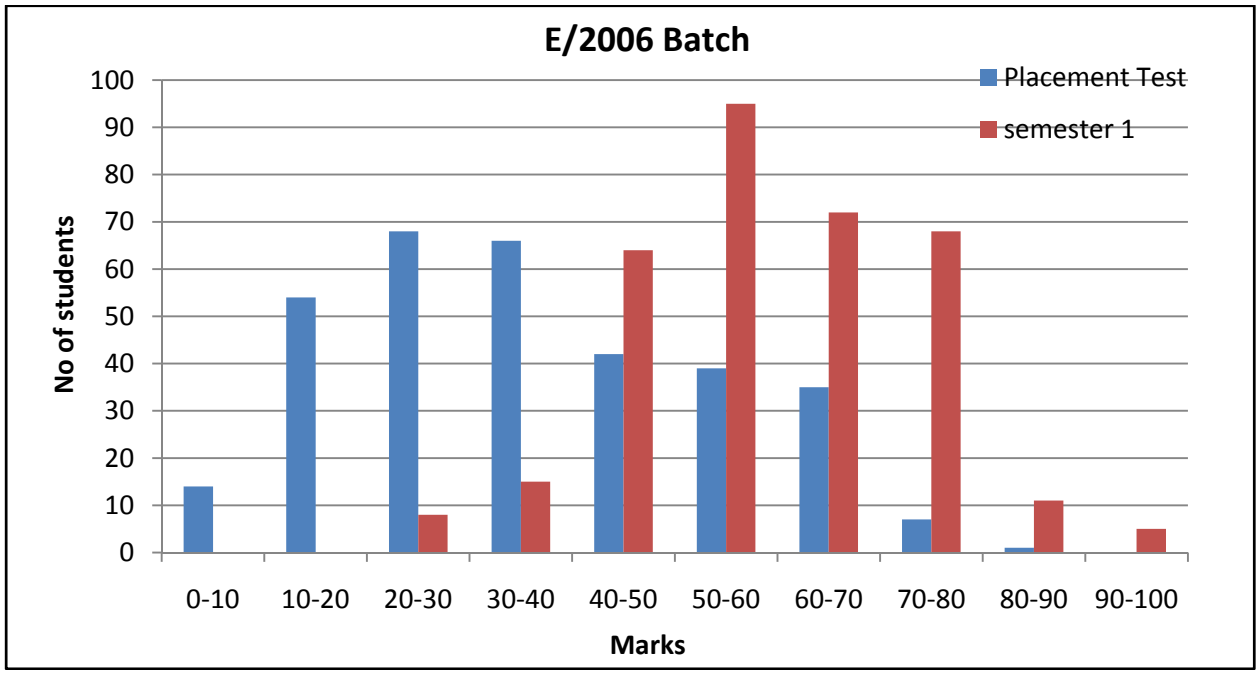
Annex 4. LIST OF FACILITIES OBSERVED

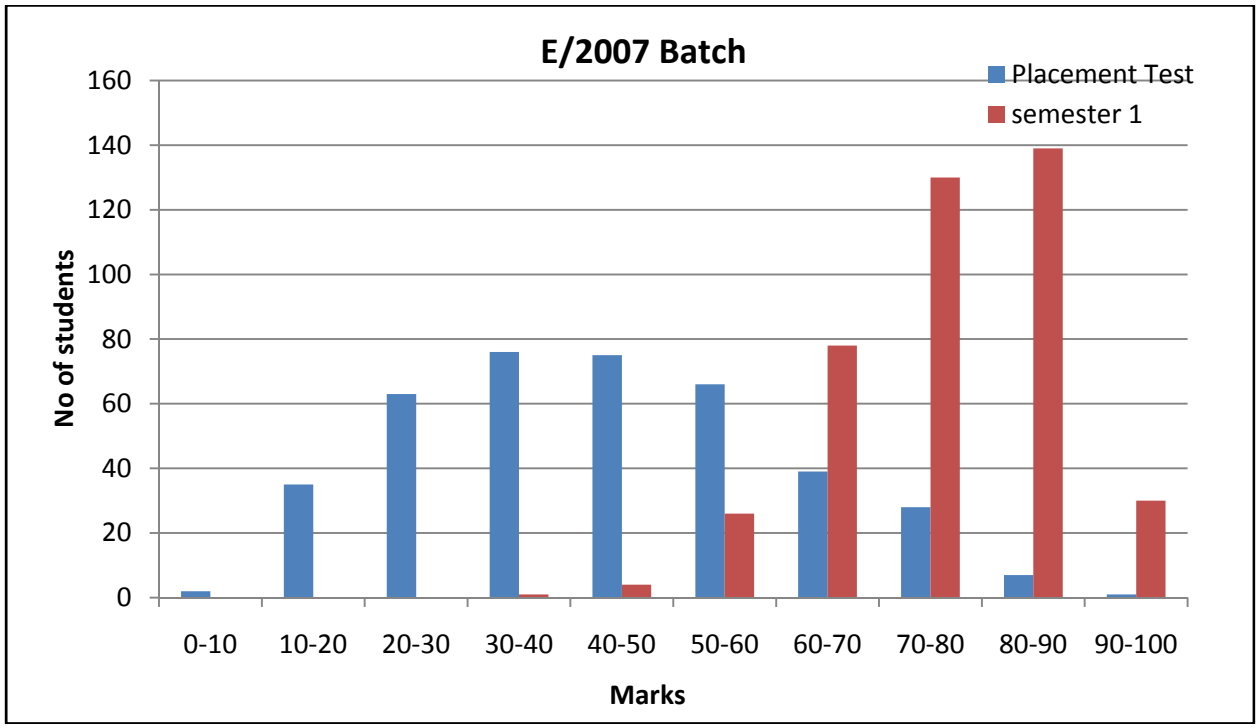
- Unit operations and Separation processes laboratory
- Chemical Reaction Engineering laboratory
- Biological Process Engineering laboratory
- Analytical Instrumentation Laboratory
- Lecture rooms
- Faculty seminar room
- Engineering workshops
- Faculty Computer center
- Main Library
- Engineering library
- Thermodynamics laboratory
- Material Science and Microscopy laboratory
- Electrical Engineering laboratory
- Health center
- Gymnasium, swimming pool and other recreation facilities
- Halls of residence

Annex5. LIST OF DOCUMENTS OBSERVED

- UOP Hand book -2010
- Curriculum and syllabi
- Course notes – subject modulus conducted by the DCPE
- Past question papers
- Publications by the staff DCPE
- Student project reports
  CP 407 – Independent study, CP 404 – Process Engineering Design project
- Students Results sheets and transcripts
- Laboratory instruction sheets
- Student course works and course work submission forms
- Peer observation forms
- Student feedback forms
- Academic calendar
- Time tables and lecture schedules

Annex 6. STATISTICS ON ENGLISH LANGUAGE PERFORMANCE





Annex 7. TEACHER EVALUATION FORM AND COURSE EVALUATION FORM

TEACHER EVALUATION FORM

Teacher Evaluation

Faculty of Engineering, University of Peradeniya

Name of the Teacher : .....

Code/ Title of the Course Unit : .....

Date : .....

Instruction: Please indicate your response on the following scale by circling one against each statement.

+2 Strongly agree
+1 Agree
0 Not sure
-1 Disagree
-2 Strongly disagree

a)	The teacher showed good knowledge of the subject matter	+2	+1	0	-1	-2
b)	The lectures were clear and interesting	+2	+1	0	1	-2
c)	The lectures were done at an acceptable speed	+2	+1	0	-1	-2
d)	The teacher emphasized important points	+2	+1	0	-1	-2
e)	The teacher was able to capture and hold the students' interest	+2	+1	0	-1	-2
f)	The teacher encouraged students to ask question	-2	+1	0	-1	-2
g)	The teacher was punctual	+2	+1	0	-1	-2
h)	The teacher is accessible and friendly	+2	+1	0	-1	-2
i)	Teaching Aids(chalk board, OHP , handouts, etc) ware used effectively during the lectures	+2	+1	0	-1	-2
j)	The number of tutorials given was sufficient	+2	+1	0	-1	-2
k)	The classes were conducted as indicated on the Timetable	+2	+1	0	-1	-2
l)	Considering all aspects, the lectures were good	+2	+1	0	-1	-2

Any other comments:

Course Evaluation Form

Course Evaluation

Faculty of Engineering, University of Peradeniya

Code/ Title of the Course Unit:..... Date: .....

Instruction: Please indicate your response on the following scale by circling one against ach statement:

+2 Strongly agree
+1 agree
0 Not sure
-1 Disagree
-2 Strongly disagree

a) The course helped to improve knowledge	+2	+1	0	-1	-2
b) The course content was interesting	+2	+1	0	-1	-2
c) The course material appears to have relevance to engineering Application	+2	+1	0	-1	-2
d) The workload of the course was reasonable.	+2	+1	0	-1	-2
e) Use of teaching aids such as OHP , Video Multimedia, etc. in Teaching this course was adequate.	+2	+1	0	-1	-2
f) Considering all aspects, the adequate.	+2	+1	0	-1	-2
What do you think of the following?					
g) The Course should include more advanced topics.	+2	+1	0	-1	-2
h) A. text book should be prescribed for this course.	+2	+1	0	-1	-2
i) If a text book is prescribed (costing, say Rs. 500/=), I would Purchase a copy.	+2	+1	0	-1	-2
j) Printed lecture notes should be provided for this course.	+2	+1	0	-1	-2
k) If Printed lecture notes are available for copying, I would be Willing to pay the cost.	+2	+1	0	-1	-2
Please respond based on your own habits.					
l) I attended lectures regularly.	+2	+1	0	-1	-2
m) I went through the course notes after each class.	+2	+1	0	-1	-2
n) I completed assignment in time.	+2	+1	0	-1	-2
o) I asked questions from the teacher in the class	+2	+1	0	-1	-2
p) I referred recommended text books regularly.	+2	+1	0	-1	-2

Any other comments: .....

.....

.....

Annex 8. LIST OF POSTGRADUATE STUDENTS DEPARTMENT OF CHEMICAL AND PROCESS ENGINEERING

01. Mr. I.A. Kannangara (PGDip)
02. Mrs. B.M.R.K. Rathnathilaka (PGDip)
03. Mr. S.D. Patapilige (MscEng)
04. Mr. G.N.Paranavithana (MscEng)
05. Mr. A.Nanayakkara (MscEng)
06. Mrs. S.K. Liyanagamage (MscEng)
07. Mr. M.A.S.Upul Kumara (MscEng)
08. Mrs. S.K.I. Wijewardena (MscEng)
09. Mrs. A. Markkandu (MscEng)
10. Ms. Priyanwada Wickramasinghe (PhD)
11. Ms. S.M.W.T.P.K.Ariyaratne (Mphil)
12. Ms. A.M.W.Menike (Mphil)
13. Mr. Nandana Edirisinghe (Mphil)
14. D.M.Sepalika (Mphil)