SUBJECT REVIEW REPORT

DEPARTMENT OF ENGINEERING MATHEMATICS

FACULTY OF ENGINEERING
UNIVERSITY OF PERADENIYA

21st to 23rd January 2009

Review Team :

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CONTENTS

1. SUBJECT REVIEW PROCESS

Subject review evaluates the quality of education within a specific subject or discipline. It is focused on the quality of the students' learning and on student achievement. It is designed primarily to evaluate the quality of undergraduate programmes, but considers that postgraduate programmes also required for achieving good overall quality in a study programme. The review process has been conducted according to the guidelines given by in the Quality Assurance Handbook for Sri Lankan Universities, published by the CVCD and University Grants Commission in July 2002. According to those guidelines, the quality of education, as per a specific subject, has been reviewed under the following eight aspects.

1. Curriculum Design, Contents and Review
2. Teaching, Learning and Assessments methods
3. Quality of students, Including Student Progress and Achievements
4. Extent and use of student Feedback
5. Postgraduate Studies
6. Peer Observation
7. Skills Development
8. Academic Guidance and Counselling

This document presents the results of the subject review process conducted for the Department of Engineering Mathematics, University of Peradeniya. The subject review team has conducted the evaluation based on the Self-Evaluation report submitted by the Department. As per the guidelines, the Self-Evaluation report has been structured with 12 sections, namely, Introduction; Overview; Resources; Curriculum design, content and review; Teaching, learning and assessments; Quality of students; Student feedback; Postgraduate studies; Peer observation; Skill development; Academic guidance and counselling; and Conclusions.

The review team visited the Department of Engineering Mathematics, University of Peradeniya from 21st- 23rd January 2009. The Agenda for the visit is attached (Annexure)
The following activities were carried out to evaluate the Dept. of Engineering Mathematics

- Meetings with the Vice-Chancellor, Dean, Head of Department and representative of University Quality Assurance Cell.
- Presentation of the Self-Evaluation report by the Head of Department followed by a discussion with staff members
- Separate meetings with department Academic staff, Temporary academic staff, non-academic staff, students offering optional courses in mathematics, E07 batch of students, postgraduate students, and student counsellors
- Observing a presentation by a former student to assess presentation skills
- Observing physical facilities: staff rooms, department library, consultation room, department computer lab, Faculty computer centre, Faculty Library, Lecture theatres and Tutorial rooms
- Observing conduct of lectures for three batches (QE 104, QE 313, EM 502)
- Observing conduct of tutorials for three groups offering QE 104
- Reviewing the documentary evidence provided to support Self-evaluation report

The process has assessed each of the eight aspects as being either good (A), satisfactory (B) or unsatisfactory (C).

2. BRIEF HISTORY OF THE UNIVERSITY AND THE DEPARTMENT

The roots of the history of the University of Peradeniya go back to the end of the 19th century. Although there was a well developed system of primary and secondary education at that time in Sri Lanka, there were hardly any opportunities available for the study of Arts and Sciences beyond the secondary school level. Since the 1860s onwards Sri Lanka witnessed the emergence of several new institutions of tertiary education such as the Ceylon Medical College (1869), Vidyodaya (1870) and Vidyalankara (1875) Pirivenas, the Law College (1874) and the Technical College (1893). But there were no facilities to obtain degrees. In 1921, The Ceylon University College was founded to prepare students for the University of London's external degree examinations in Arts and Science. In the late 1930s, the courses at the Ceylon Technical College were only up to the University of London's Intermediate Examination in Engineering. In 1942, the State Council under the Ceylon University Ordinance No.20 established the first university, the University of Ceylon, by amalgamating the Ceylon University College and the Ceylon Medical College. At that time, the University had 55 academic staff members and 904 students in four Faculties.

The debate on whether the location of the university should be Kandy or Colombo took a considerable length of time and the decision was also delayed by World War II. In 1945, the University Council resolved to establish a Faculty of Engineering in Peradeniya by 1948. However, due to various reasons including the second world war, the opening of the University at Peradeniya was delayed. The date of transfer of Faculties from Colombo was postponed from 1948 to 1950, and then to 1952. On the 6th of October 1952, the University of Ceylon was officially declared open at Peradeniya. With this event, the Faculties of Arts and Oriental Studies, and the Departments of Law, Agriculture and Veterinary Science started functioning at Peradeniya, while the Faculties of Science, Medicine and Engineering continued to be in Colombo pending the completion of the 2nd and 3rd phases of the building programme at Peradeniya. With those phases of development completed, the rest of the faculties were established. The Faculty of Engineering was transferred to Peradeniya in October 1964.

Today, the University of Peradeniya is the largest residential University of Sri Lanka, located on an area of 700 ha of land with a picturesque landscape, and consists of seven Faculties, namely the Faculties of Agriculture, Arts, Dental Science, Engineering, Medicine, Science and Veterinary Medicine & Animal Science. The present student strength of the University of Peradeniya is around 10,000. The Faculty of Engineering has about 1,500 undergraduates. The Department of Engineering Mathematics (DEM) is one of the eight departments in the faculty and was established in 1965.

3. AIMS AND LEARNING OUTCOMES

3.1 Aims

The subject area of Engineering Mathematics plays an important role in amalgamating various other disciplines together in their study and practice. This also provides the necessary intellectual challenge, skills and attitudes to serve mankind while offering limitless opportunities to use mathematics beyond using it merely as a tool. In order to keep the vision and mission intact, the Department aims to achieve:

1. High quality postgraduate degree programs which train the students towards interdisciplinary professions and research.
2. A learning and teaching environment which facilitates intellectual development.
3. A strong research environment.

4. A congenial professional environment for the staff to work in.
5. A positive mind set to facilitate continuous career development of the staff.
6. An open minded and friendly environment in the department for the students to bring out and develop the best of their inner potential and aspirations.
7. A professional and efficient administrative and managerial structure for the effective implementation of the education programs.

3.2 Learning Outcomes

In developing the engineering mathematics curriculum, the department has used the SIFI (European Society for Engineering Education) document titled A core curriculum in Mathematics for the European Engineer, as one of the main guidelines. They have also studied the mathematics curricula of a number of leading engineering faculties in the world. Since the teaching endeavor of the Department of Engineering Mathematics does not currently lead to a stand alone undergraduate degree, pragmatic issues arise while setting yardsticks to measure the level of achievement of desired learning outcomes at the successful completion of the engineering degree program. It is also important to recognize that the expected outcome is measured not only from the total degree program, but also through the mathematics education program conducted by the Department. The Engineering Mathematics program attempts to develop the following intended skills:

Cognitive Capabilities and Skills

These are the capabilities and skills related to the cognitive domain of engineering mathematics. The cognitive domain deals with knowledge and understanding, and the intellectual process.

(a) Knowledge and Understanding – Demonstrate the knowledge and understanding of the fundamental and essential facts, concepts, principles and theories in mathematics.
(b) Application of Methods and Tools - Deploy appropriate mathematical methods and tools to seek solutions and to carry out investigation and analysis.
(c) Logical Thinking and Presentation – Be able to use the above knowledge and understanding to seek solutions and carry out investigation and analysis, in a logical and systematic manner, and communicate the results effectively, both orally and in writing.
(d) Interpretation of Research - Interpret results and research data, and make decisions, for simple investigative research.

Practical Skills

Practical skills are skills related to applying the theories to practice. This can also include psychomotor skills. However, for mathematics education, the following computer related skills have been identified as the practical skills.

(a) Computational Skills – Be able to use software tools to solve, analyze and investigate mathematical problems and to analyze data and make decisions.
(b) Programming skills – Be able to develop computer programs to solve, analyse and investigate mathematical problems and data.
(c) Modeling Real Life Problems - Be able to use the knowledge and understanding, and the methods and tools, to construct mathematical models and analyze real life problems and phenomena.

Transferable Skills

These are the general skills that are developed through the mathematics program but can be applied in many other contexts.

(a) Communication skills – Make an oral presentation or write a report to a range of target groups on technical problems and their solutions.
(b) Independent studies – Solve, analyze and investigate a problem without formal teaching.

(c) Team work – Be able to work effectively as a member of a team which expects his/her contribution.

Attitudes

(a) Open mindedness to apply capabilities and skills that have been developed beyond the boundaries of specialization, and contribute to interdisciplinary activities.

4. FINDINGS OF THE REVIEW TEAM

4.1. Curriculum Design, Content and Review

At the Faculty of Engineering, the module based semester system was introduced in 2000. The mathematics curriculum was drawn up at that time following the guidelines published by the European Society for Engineering Education in a document titled "A Core Curriculum in Mathematics for the European Engineers". While developing the curriculum, each department in the Faculty was consulted in order to get their views, suggestions, and requirements. The mathematics curricula of leading engineering faculties in the world were also comprehensively studied.

The courses offered were categorized into three main groups: Core, Elective and Optional Subjects. The Review Team observed that the contents of the core courses offered during the first four semesters covered very well most of the fundamentals and essentials needed by students of any engineering discipline. Elective and optional courses were aimed at developing students' skills in computation, analysis, research, communication, and teamwork. Elective courses were designed to cater to the needs of individual Departments and were prescribed as core mathematics subjects for their students. A wide spectrum of optional courses was mentioned in the SER. However, the review team observed that the number of students who opt for these courses are remarkably low. At a meeting with the members of the academic staff, some lecturers attributed this low demand to the faculty regulations on credit requirements.

The DEM also addresses modern trends in the field of engineering mathematics by developing the computational and programming skills of students through integration of mathematical software into the curriculum and giving reasonable amount of time for practical lab sessions at optional level.

4.2. Teaching, Learning and Assessment Methods.

The main mode of delivery is through class room lecturing and tutorial classes. The review team observed about four teaching sessions. The lectures for the core courses were conducted in well furnished auditoriums. The higher level courses and tutorial classes were conducted in somewhat smaller lecture rooms. The lecture environment was very conducive to learning without requiring lights, fans and audio systems. The auditoriums had multimedia facilities, but due to the nature of the subject, the black or white boards were used as the main medium of course delivery. Lectures were well presented and encouraging. The Review Team witnessed good interaction of teachers with students during lectures. Some staff members have developed multimedia based teaching materials and demonstration software to go along with white/black board teaching. In some courses, lecture handouts were distributed and they appeared well prepared. At the meeting with the undergraduate students, students expressed their overall satisfaction with the delivery of lectures, course materials distributed and the use of multimedia facilities. They also had special commendations about the conduct of tutorial classes. Instructors mark and return their tutorial assignments with comments, which students found very useful and encouraging.

The courses such as numerical methods (EM 314), Optimization (EM 502), Industrial Statistics (EM 309), and design and analysis of experiments (EM 513) consist of extensive and significant component in computing. The Department has a small Computer Laboratory. It is used for conducting computer lab sessions for optional courses where the class size is small. For courses with larger class size, the computer facilities are provided at the Faculty Computing Centre.

The Department adopts a variety of assessment methods. The main components of the assessment procedure are the mid- and end-semester examinations. Each question paper is moderated by a peer lecturer appointed by the Faculty board. The Mid-Semester examination is generally a one-hour written examination. Students have the chance of appealing on their results.

As part of the Continuous Assessment Component, lecturers adopt several other methods.
(a) Tutorials: Generally, 10% of the Final Marks are allocated for submission of tutorials and attendance in tutorial classes.
(b) Projects and/or presentations
(c) Computing Labs

4.3 Quality of Students including Student Progress and Achievements

The review team obtained information regarding this aspect from the self evaluation report, and also from meeting current students and graduates. It should be noted that Engineering Mathematics is a service department in the faculty of Engineering. As such, evaluation of progress is not that easy as in a department offering a well defined study program.

4.4. Extent and use of Student Feedback

The subject review team observed that a student's feedback system has been practiced since 2001. Feedback was obtained through the following questionnaires:

- Teacher evaluation.
- Course evaluation.

The method adopted was to distribute the questionnaires among students at the end of semester, after which the lecturer will obtain feedback on his /her teaching. Finally the Department will summarize it in a formal way. Based on the above comments received from the students, steps were taken to improve the quality of material and teaching style of the course if and when it was necessary.

The review team observed documentation on feedbacks received from the student group meetings. The adopted procedure was to meet a group of students to discuss the module with the Head of the Department and another two lecturers who are not related to the particular module.

Other than the above methods, the lecturers also obtain feedback from informal discussions and tutorial sessions. This method has improved the good relations between staff and students.

4.5. Postgraduate Studies

The review team obtained information regarding this aspect from the self evaluation report, and also from meeting postgraduate students and staff. Although Engineering Mathematics is a service department in the faculty of Engineering, it has not confined its role merely to a teaching one; instead it has probably spearheaded the research efforts in the faculty, particularly through good collaborations with other departments.

4.6. Peer Observation

The process of peer observation requires that faculty peers review a lecturer's performance through class-room observation, examination of instructional material and course design. Observation of classroom behavior is intended for reviewing the teaching process and its possible relationship to learning. The focus is a verbal and nonverbal behavior of both the lecturer and the student in the classroom. Effective peer observation requires training in observation and analytical skills. Less subjective peer observation requires time for multiple reviews.

The review team observed that peer observation has been practiced for a long time in the Department in an informal manner. Formal adoption has started recently.

4.7. Skills Development

In the self-evaluation report, skill development has been presented in relation to the learning outcomes. Maintaining the mapping between learning outcomes and the skill development is a positive aspect of ensuring the quality in general.

As per the learning outcomes, skill development has been classified into three categories, namely, cognitive skills, practical skills and transferable skills.

4.8. Academic Guidance and Counseling

Every academic staff member in the department is an academic advisor, who is assigned with 4 to 5 students from the first year. This has been a common practice in the university system.

Based on the observations made during the visit by the review team the eight aspects were judged as follows:

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

5. CONCLUSIONS

1. Curriculum Design, Content and Review

Strengths/Good Practices

1. Curriculum is based on international standards and guidelines.
2. Even though no major curriculum revision was undertaken, contents were reviewed and updated regularly based on student feedback.
3. The DEM is in the process of carrying out a deliberation on their mathematics curriculum and is awaiting a faculty level initiative on a major curriculum revision.
4. The program of remedial teaching introduced by the DEM with the aim of bridging the gap between the contents of school and university mathematics is a commendable practice.

Weaknesses

1. No major curriculum revision has taken place since 2001.
2. The numbers of students offering optional courses were remarkably low. The review team feels that the offering of optional courses needs to be synchronous with respective departmental needs.
3. The SER of the DEM mentions "Although a lot of effort has been made in planning and developing the curriculum, with a vision of not only to convey the content but also to develop various types and levels of competency that would benefit the students in the Engineering Degree program, the department has found it difficult to implement it due to the lack of sufficient time in core level". The review team too noted with concern that the lecture time allocated to core level courses QE 103, QE 104, EM 201 and EM 202 are grossly inadequate. Even though these courses carry three credits, the number of lecture hours per week is two. This is distinctly low compared with the other two engineering faculties in the country.

Based on the above observations, the Review Team judged the "Curriculum Design, Content and Review aspect as GOOD.

2. Teaching, Learning and Assessment Methods

Strengths/Good Practices

4.2.1 Qualified, experienced and friendly teaching staff.
4.2.2 Handouts are well prepared and are updated regularly with the use of ICT
4.2.3 An extensive tutorial program for all subjects at core level. Comments by instructors on the marked tutorials were encouraging.
4.2.4 Staff at all levels have been very dedicated and committed.
4.2.5 Staff-student relationships are very cordial. Holding a mid-semester staff-student discussion on every course is a good practice.

Based on the above observations, the Review Team judged the "Teaching, Learning and Assessment" aspect as GOOD.

3. Quality of Students, including Student Progress and Achievement

Strengths/Good Practices

1. Students entering the University for BSc Engineering Degree program are of generally high calibre. The SER shows that 87% of the students entering the Faculty of Engineering have obtained high grades for mathematics.

2. There is also a wide spread in quality of English knowledge among the students. This has an adverse effect on the academic program of the Faculty. However, this seems to be having a very marginal effect on the performance in mathematics at the university level.
3. The average distribution of grades for the core courses (12 credits) that are followed by all the students shows a high end performance for mathematics. The average GPA for mathematics scores is higher than the overall average GPA obtained by students. Although the optional courses are taken only by a small percentage of students, as shown in Appendix 4 of the SER, the performance is high end distributed.
4. The student attitude towards mathematics and in fact the Department itself is very positive. They see very clearly the importance of the role that mathematics plays in engineering.
5. There is also an agreement among the students who have pursued graduate studies abroad that the engineering mathematics education (albeit under the old curriculum) has made a significant contribution to their graduate studies and research.

Weaknesses

1. The z-score of students entering the Faculty spans a wide spectrum (0.7933-2.594) and the intake from Colombo, Kalutara, Galle and Matara districts is limited.
2. Despite the fact that there is a lot of enthusiasm about mathematics, students have not been encouraged to participate in either national or international mathematics competitions.
3. As there has been some reduction in the content and in the training in mathematics under the new curriculum (and also in the A level curriculum) there is a concern among many academics in the Faculty as to whether graduates (under new curriculum) would have the same strong mathematical foundation as before to pursue graduate studies.
4. Recommendations/Suggestions
5. A faculty wide study should be undertaken to attract more students from the districts of Colombo, Kalutara, Galle and Matara.
6. Students should be encouraged to participate in mathematics competitions; also to form a student society for mathematics if there isn't one already; and to energize it if it exists.
7. A study should be undertaken to ascertain how the performance and progress with mathematics education has contributed to the students' performance in the other subjects they follow in the Faculty, and in their overall performance.

Based on the above, the Review Team judged the "Quality of Students, including student progress and achievements" aspect as GOOD.

4. Extent and Use of Student Feedback

Strengths/Good Practices

1. Students revealed that their feedback is promptly considered and entertained.
2. Comments received have been used by the staff to enhance the quality of teaching materials and mode of lectures.
3. Giving feedback both formally and informally is encouraged by the lecturers.
4. Students commended the cordial and friendly atmosphere of staff/students relationships.

Based on the above, the Review Team judged the "Extent and use of Student Feedback" aspect as "Good".

5. Postgraduate Studies

Strengths/Good Practices

1. The Department of Engineering Mathematics is one of the first Departments to start a postgraduate program in the Faculty of Engineering in 1994. The Postgraduate Diploma in Engineering Mathematics program was commenced to fill a vacuum that existed in the Faculty in providing postgraduate education and research opportunities. This was a special type of Postgraduate Diploma course where there was a 75% research component. In addition, the Department also offers a Postgraduate Diploma in Engineering Mathematics with 100% research component.

2. A Postgraduate Diploma and MSc (and MScEng) in Systems Engineering programs have been approved by the Faculty board in 2003. This program was not implemented at that time due to the lack of staff in the Department. As the staff situation has now improved, the department is planning to implement the program as soon as possible.

3. The Department staff has been active in research and also in supervising research based Postgraduate Diplomas, MPhil and PhD degrees. The diversity of the staff members in the context of research enables them to supervise thesis while collaborating with the other departments of the Faculty, other faculties of the University, other universities and institutes of the country and universities overseas. A number of students have registered or have completed Postgraduate diplomas and degrees under the supervision of the staff .

4. The temporary staff joining the department are encouraged to undertake a research project with a staff member in the Department. If they show initial success, they will be asked to register for a Postgraduate Diploma or a Research Degree. Staff are given relatively low workloads and considerable freedom to enable the pursuit of research. Even though some such staff may not have first classes or second uppers for their first degrees, most of them have been very successful in research, not only in completing their diplomas or degrees but also securing positions overseas to gain further research degrees. This mobility is a great credit to the Department. The Postgraduate diploma by research (1.5 years) is a good innovation that contributes to this mobility.

5. The Department staff have an impressive list of research publications. They have also won research grants and prestigious awards. Some of them have jointly supervised doctorates awarded to their former students by overseas institutions.

6. Overall the Department has been successful in creating quite a good research culture.

Based on the above, the Review Team judged the "Postgraduate Studies" aspect as GOOD.

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6. Peer Observation

Strengths/Good Practices

1. Staff members have a positive attitude towards the concept and are familiar with goals, priorities, values and faculty problems.

2. Results of peer observation has been communicated to the respective lecturers.

3. Moderated question papers have also been a part of the peer review process.

4. Through the process of peer reviewing, lecturers get comments on coverage of syllabus, achieving of learning outcomes and the standard of the question papers.

Based on the above, the Review Team judged the "Peer Observation" aspect as GOOD.

7. Skills Development

Strengths/Good Practices

1. Students are exposed to well prepared lectures, tutorial classes and also informal meetings with staff when necessary.

2. Very high pass rate of Mathematics shows that students have gained the expected cognitive skills.

3. Meetings with students also revealed that many students are motivated to do their final year projects with a substantial component of mathematics and also pursue higher studies in Mathematics related areas in Engineering.

4. Development of Research Interpretation skills through an optional course has been implemented. The team also recommends that a formal and uniform mechanism to guide and evaluate research interpretation should be developed.

5. Steps have been taken to develop students' practical skills in three directions, namely, computational skills, use of mathematical software tools, and programming skills.

6. In line with the modern trends in mathematics education, this is highly commendable.

7. Under computational skill development, offering of a course on algorithms in the first year for all students is very relevant.

8. A number of mathematical software tools has been used for assignments and tutorials of many subjects.

9. Several courses based on Mathlab have been used to develop programming skills.

10. Communication skills, independent working ability and team work have been introduced to develop the transferable skills of students.

11. Communication skills have been introduced as an integral part of some courses (Mathematical Modeling, Optimization) as per final assignment.

12. Students have been encouraged to publish research papers based on these courses.

13. The concept of independent study has been introduced to address the issue of a declining trend in referring books and other literature by students. This is a positive aspect and amounts to preparing students for higher studies too.

14. Team work has been introduced to develop the skills in working together so as to achieve a common goal. However, the self-evaluation report points out that the success of this exercise is insignificant due to the nature of the curriculum.

Weaknesses

1. There is no uniform guideline for evaluation of interpretation in research. At present is it dependent on the individual lecturer.

Based on the above, the Review Team judged the "Skill Development" aspect as GOOD.

8. Academic Guidance and Counseling

Strengths/Good Practices

1. Staff members have maintained records of meeting with students.

2. Some staff members from the department work as the faculty appointed counselors. This has been a reason for students to interact more with the department.

3. Students have expressed their satisfaction about the academic guidance and counseling.

4. The Department has also been practicing informal means of advising and counseling. This was appreciated by the students very much.

5. One of the key strengths of the department is the very good student-staff relationships.

Based on the above, the Review Team judged the "Academic Guidance and Counseling" aspect as GOOD.

6. RECOMMENDATIONS/SUGESTIONS

1. A curriculum revision should be done in consultation with the relevant departments.
2. Consider increasing the time allocated to core level courses.
3. Teaching, learning and Assessments methods
4. In view of the present international trends in engineering education, the pace of integration of ICT and computational software should be further encouraged.
5. For the mid-semester examinations in Mathematics individual lecturers should have the freedom to choose from: Open book/closed book exam, written exam/MCQ
6. Introducing a question bank would be beneficial to students/lecturers
7. The Department's efforts towards the use of ICT for teaching and assessments are commendable. In view of the present international trends in engineering education, the pace of integration of ICT and computational software should be further encouraged.
8. The review team observed a kind of rigidity in the conduct of mid-semester examinations. In most cases the mid-semester examination was a closed-book, written examination and the answer scripts were not returned to the students. At a meeting with the Department academic staff it was pointed out that these practices are based on Faculty decisions. However, the Review Team is of the opinion that, in view of the distinctive nature of Mathematics, there must be a certain amount of flexibility with regard to the conduct of mid-semester examinations in Mathematics. Individual lecturers should have the freedom to choose from:

- Open book/closed book exam.
- Written exam/MCQ
- Answer scripts returned/ not returned

This flexibility could make mid-semester exam not just an assessment exercise, but also a teaching and learning tool.

9. Introducing a question bank would be beneficial to students/lecturers
10. Faculty wide study should be undertaken to attract more students from the districts of Colombo, Kalutara, Galle and Matara.
11. Students should be encouraged to participate in mathematics competitions. Also to form a student society for mathematics if there isn't one already; and to energize it if it exists.
12. A study should be undertaken to ascertain how the performance and progress with mathematics education has contributed to the students' performance in the other subjects they follow in the Faculty, and in their overall performance.
13. Putting a section in the course handbook or on the web about what changes have been made in response to past student feedback can be considered.
14. Similarly a 'fast feedback' facility on the web is a possibility. The computer laboratory could have an instant button on its website.
15. Using short questionnaires in the middle of the semester/modules for immediate feedbacks during teaching time.
16. Building feedback in to assignments: Ask students what they thought of the assignment they have just completed as part of the assignment.
17. The approved Postgraduate Diploma and MSc (and MScEng) in Systems Engineering programs can now be implemented, given that the staff situation has now improved.
18. Obtain experts' advice on form and process development, and training on peer observation.
19. Inquire into peer observation activities of other Departments / Colleges and other campuses nationwide.
20. Develop departmental peer observation forms and processes for formative and summative observation.
21. Train faculty members prior to class room visits.
22. Peer review process should be documented.
23. Demonstration of the use of software tools for engineering applications should be added to the Remedial course.
24. Interpretation in research should be introduced through a Core course.
25. Formal guidelines to prepare oral presentations and report writing should be documented. This may also include the guidelines for interpretation in research, which was mentioned under cognitive skills development.
26. Based on the results of independent studies, students should be encouraged to produce some articles as department publications or even as refereed publications.
27. Some tutorials/assignments can be set out to promote team working. This can be practiced without any change in curriculum.
28. The Department may also introduce concepts such as mentoring to expose the students into relevant segments in society.
29. It is suggested that the department can attract more students to offer optional courses in mathematics through the academic advisory process.

7. ANNEXES

Annex 1. AGENDA FOR THE REVIEW VISIT

Day 1- Wednesday 21/01/2009		
Time	Activity	Venue
08.00-08.40	Private meeting of review panel with QAA council representatives	Dept. conference room (DEM CR)
09.00-10.00	Meeting with the Vice Chancellor/Dean/Head of the dept./Faculty QA representative	VC's office
10.20-11.00	Discuss the agenda for the visit	DEM CR
11.00-11.45	Department presentation on the self evaluation report	DEM CR
11.45-12.30	Discussion on Self evaluation report	DEM CR
12.30-13.30	Lunch	
13.30-14.00	Observing teaching-QE104	Room 9
14.00-14.30	Observing departmental facilities	
14.30-15.30	Observing library, Computer center, Tea	
15.30-16.30	Meeting with department academic staff	DEM CR
16.30-17.00	Brief meeting of reviewers	DEM CR
Day 2- Thursday 22/01/2009		
8.30-9.00	Meeting with students who offered optional courses	DEM CR
9.00-9.35	Meeting with department temporary academic staff	DEM CR
9.40-10.00	Observing teaching (Lecture-Discrete Mathematics EM313)	Room 10
10.00-10.30	Tea + Checking documents	Dept Library
10.30-11.00	Meeting with past PG students of the department	DEM CR
11.00-11.30	Meeting with student counselors-former and present	DEM CR
11.30-12.30	Presentation by former students	DEM CR
12.30-13.30	Lunch	
13.30-14.00	Meeting with department non-academic staff	DEM CR
14.00-15.30	Tea- checking documents + Reviewers private discussion	Dept Library
15.30-16.30	Meeting with students (E07 batch)	DEM CR
17.00-17.30	Observing teaching (Lecture- Optimization EM502)	Room 9
17.30-18.00	Meeting of reviewers	DEM CR
Day 3- 23/01/2009		
8.00-9.00	Observing teaching-Tutorial classes (Mathematics II-QE104)	Room 18
9.00-10.00	Reviewers private discussion	Dept Library
10.00-10.15	Tea	
10.15-11.15	Meeting with Head and staff for reporting	DEM-CR
11.15-12.30	Report writing	DEM CR
12.30-13.30	Lunch	