SUBJECT REVIEW REPORT

DEPARTMENT OF MATHEMATICS & COMPUTER SCIENCE

FACULTY OF NATURAL SCIENCES
THE OPEN UNIVERSITY OF SRI LANKA

23rd to 25th August 2006

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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 student learning experience and on student achievement. It is designed to evaluate the quality of both undergraduate and taught postgraduate programmes.

The main features of the subject review method are:

- Peer review by academic staff with significant experience as subject practitioners
- Completion of an analytical self-evaluation document covering programmes being reviewed
- Provision of documents such as: examples of student work, student handbooks, statistics covering student progress and achievement, external examiners' reports, minutes of subject committees
- Observation of teaching
- Discussions with subject staff to discuss statements made in the self-evaluation and supporting documents provided by staff delivering the subject
- Discussions with support and administrative staff concerning university quality assurance and resources matters. Discussions with students to obtain their views
- Observation on the quality of the learning experience in their programme of study

The aims and learning outcomes contained in the self-evaluation report provide an important reference point for subject review. Reviewers evaluate the quality of education in the subject(s) under review according to the aims and learning outcomes aspired to by the subject team. They do not use any externally set standards against which the programmes are judged. Thus the university mission, the staff and student profile and the nature of the programmes are all evaluated according to the aims and learning outcomes set by departments or schools themselves and allows the subject review process to take account of diversity of institutions and students.

2. BRIEF HISTORY OF THE UNIVERSITY

The Open University of Sri Lanka (OUSL) was set up for the purpose of providing higher educational facilities to persons above 18 years of age with relevant basic qualifications. Established under the Universities Act No. 16 of 1978, incorporating with its system the External Services Agency (ESA) and the Sri Lanka Institute of Distance Education (SEIDE) the OUSL commenced its operation in 1980. The present activities of OUSL are

based on the provisions of the above Act and Open University of Sri Lanka Ordinance No.1 of 1990, as amended by the Ordinance No.12 of 1996.

Currently OUSL operates through 28 Regional Educational Service Centres. The network consists of 4 regional centeres in Colombo, Kandy, Matara and Jaffna and 17 study centres and 7 smaller teaching centres. Within this department of review there are well over thousand students. The Central Campus and the Colombo Regional of OUSL are situated in Nawala.

Within the department of review each year there are around 300 to 525 students according to the information given by the department.

Academic Year	No. of New Students	No. Registered for level 03 Mathematics & Computer Science Courses
2000/2001	800	311
2001/2002	781	423
2002/2003	1002	491
2003/2004	806	524

OUSL has the same legal and academic status as any other national university in Sri Lanka. It is the only recognized university in Sri Lanka where students are able to pursue further education by distance education techniques in keeping with the philosophy of Open and Distance Learning.

The academic entities of the University are grouped into four faculties: Natural Sciences, Engineering Technology, Humanities & Social Sciences, and Education.

The department under review, Department of Mathematics & Computer Science is coming under Faculty of Natural Sciences. There are five other departments belonging to this faculty. They are Departments of Botany, Chemistry, Health Sciences, Physics, and Zoology.

Vision of the University

The OUSL vision is to be the leader in distance education in South Asia within the first decade of the 21st century and be a premier centre of learning, renowned for excellence.

The OUSL strategic direction will be clearly focused on the adult leaner that is aspiring to upgrade the knowledge and skills necessary to be a productive citizen of the society. The OUSL's position and posture are to assist the employed adult through the distance learning process, to acquire the requisite knowledge and skills in his chosen field of strides that will enable him to fit into the prescribed role.

By the turn of the century, the pattern of education amongst the young men and women will differ in that the person having first found employment in a chosen career will then seek education to ensure his or her upward career growth. This trend has already been set

in the field of study, such as accounting, architecture, computing and management just to name a few. Thus learning will be employment focused and be interdependent.

Correspondence methods will be wholly inadequate to provide the sort of learning required. With the application of information technology in the work place and at home (more so at home) and TV/VCR becoming regular fixture at home, learning while working may take to the electronic media.

The OUSL will position itself to meet this market need and be the market leader over the next decade. In its determination to lead it will search for strategic options of national and regional level networking arrangements.

In the global scene distance education will play the 'lead role' in learning and the OUSL will restructure itself not merely to be the leader in distance education but also to achieve credence as centre of learning. To achieve this task the OUSL will evaluate its traditional faculty demarcated organizational boundaries in relation to matrix organizational structures.

It will also look at overarching institutional arrangements with other educational and research institutional as a means of synergistic networking.

Mission of the University

The OUSL is dedicated to increasing access to and success in adult learning at university level and to enhance equality of educational opportunities primarily for Sri Lankan citizens.

The OUSL is committed to excellence in teaching, research and scholarship and being of service to the generic public.

The OUSL 'core- activity' is to assist the adult citizens of Sri Lanka to acquire a university level education. The adult learner may be described as a person who having progressed into some livelihood is now seeking to advance himself academically.

The OUSL will aim to provide increasing access to the adult learner firstly by open entry to a programme of studies. This means that, assuming that the person has a general education background; the adult learner will be assisted by means of a systematic learning process, to acquire whatever qualification the person is seeking. Secondly by not requiring by the person to attend classes or follow a strict time-table as in the conventional university situation, the person could while carrying on with his livelihood, follow a programme of studies at the OUSL.

The OUSL mission of ensuring 'success' in adult learning at the university level will be through the provision of high quality, user friendly lesson material. The OUSL is committed to making available lesson material that provides comprehensive knowledge acceptable at the university level, while eliminating outside intervention in order to comprehend that text.

In order to enhance equality of educational opportunities, the OUSL is committed to provide guidance and counseling. The OUSL will facilitate easy access to such guidance and counseling by providing adequate and well equipped 'counseling and guidance entrees, at suitable locations.

The OUSL is thus committed to provide a highly differentiated market needs focused product- service.

Programme Details

The Department of Mathematics & Computer Science offers courses for the following programmes.

- Foundation courses in Mathematics (Levels 1 & 2):
- B.Sc. Degree Programme: (Levels 3, 4 & 5)
- Advanced Certificate in Laboratory Technology (ACLT)
- B.Sc. (Nursing) Degree Programme
- M.A. in Teacher Education Programme:
- Agricultural Engineering:

Under the Foundation course the department offers 4 courses of 0.5 credits each.

Students following B.Sc. Degree Programme are required to choose 3 disciplines in first year (level 3). However in the subsequent years they have the option of reducing this number to 2 or 1 discipline. The department contributes to this programme with 3 disciplines namely Pure Mathematics (PMU), Applied Mathematics (AMU) and Computer Science (CSU).

Students enrolled in the B.Ed programme, which is jointly offered with the Faculty of Education, can also take courses available for the B.Sc. programme.

For Advanced Certificate in Laboratory Technology (ACLT) programme and the department offers one course of 1/6 credits and a part of 1/2 credits course. For B.Sc. (Nursing) Degree Programme the department offers one course of 1/6 credit. For M.A. in Teacher Education Programme the department offers six courses totaling 9/6 credits. For Agricultural Engineering programme the department contributes one course of 1/6 credit.

Note: The academic content of a course in the Open University is measured with the unit called “credit”. An average student taking 01 credit worth of courses is expected to spend around 450 hours of study time.

3. AIMS & LEARNING OUTCOMES

(*This section is a reproduction from the Self-Evaluation Report*)

3.1 AIMS

The aims of the Mathematics & Comp Science Department are

3.1.1 to provide an opportunity for all students, regardless of academic background, gender, or ethnicity, to study Mathematics/Computer Science at any level, from Foundation to Post-Graduate, in an accessible and supportive environment, using distance-learning methodology.

3.1.2 to help students to upgrade their knowledge and skills, in the context of strong science programmes, so as to enhance their employability and career development.

3.1.3 to encourage students to develop skills and attributes that will enable them to engage in life-long learning, and that will also meet the needs of present or prospective employees and contribute to national development.

3.1.4 to create an environment within the Department, in which members of the staff, both academic and support, can work together harmoniously to further both the Department's educational objectives and also the professional development of individuals.

3.1.5 to work towards upgrading the Department's facilities, so as to enable both staff and students to engage in better teaching and learning, better research, and better scholarship.

3.2 LEARNING OUTCOMES

Upon successful completion of Mathematics courses at the **Foundation Level**, a student should have

3.2.1 gained a knowledge of the subject material equivalent to that of a student with a G.C.E. (Advanced Level) pass in Mathematics.

3.2.2 acquired a thorough knowledge of Mathematics sufficient to move on to degree level courses in Mathematics/Computer Science.

Upon successful completion of Mathematics/Computer Science courses at **Level 3 of the B.Sc. Degree Programme,** a student should have

3.2.3 acquired an understanding of the basic knowledge of the respective discipline.

3.2.4 become familiar with the computing environment to proceed to higher levels.(in the case of Computer Science)

3.2.5 developed independent, self-directed learning skills.

Upon successful completion of given Mathematics/Computer Science courses at Levels **4 and 5 of the B.Sc. Degree Programme,** a student should have gained adequate knowledge and skills to

3.2.6 move on to higher studies.

3.2.7 lead a career in teaching or in industry that require mathematical/computational skills.

Upon successful completion of a research project in Mathematics/Computer Science at **Level 5**, a student should have developed

3.2.8 the ability to work independently, critically synthesize information, and develop additional laboratory skills if relevant.

3.2.9 presentation, communication and organizational skills.

3.2.10 skills required to undertake research.

4. FINDINGS OF THE REVIEW TEAM

The Review team visited the Department of Mathematics and Computer Science of the Open University of Sri Lanka on three days from 23 to 25 August 2006. The agenda for the visit is attached herewith (Annex 1). In this section we will summarize our findings in each of the eight aspects highlighted by the Committee on Quality Assurance as the most important areas for review at the subject level. Also we will give a judgment on each aspect based on the self-evaluation report and the evidence we gathered during our visit.

This includes

- discussions with the Dean, Head of the Department, members of the academic and non-academic staff, and a group of undergraduate students
- peer observation of teaching and tutorial work (Annex 2)
- observation of the facilities in the Department/Faculty
- examining the student work (Annex 3) and other documents provided by the Department

We wish to make a special note on the cooperation of the entire staff including the Head of Department during this visit and their preparation for the Review visit was commendable.

4.1 Curriculum Design, Content and Review

As stated under the aims of the department we found evidence that it provides an opportunity for all students, regardless of academic background to pursue the subjects up to degree level. Curriculum, Resource Material, Delivery and Examination of Foundation Level courses suggest that certainly upon successful completion of them students would gain knowledge of the subject material equivalent to that of a student with a G.C.E. (Advanced Level).

Allowing students to offer level 3 courses in their preferred language is a good practice. Also the requirement that all students need to pass both English course LSE 1303 and LSE 2303 and pass both LSE 1303 and LSE 2303 in order to graduate is a value addition for the degree.

Even though the students have complete freedom to explore their interests at Level 5 (and 6) structurally there is no flexibility in choosing courses due to limited number of available courses.

The Faculty has recognized and has been granting (case by case basis) exemptions to students with suitable qualifications. Reviewers found this very appropriate and timely practice.

It was noted that informal curriculum review occurs though formal review is carried out approximately once in 10 years. One of the reasons for the lacking regular revisions is the lack of staff.

Course materials available at Open University under the subjects reviewed are excellent. This claim is well supported by the evidence that a large number of resource materials sold to non Open University students.

This aspect makes a significant contribution to the attainment of the stated aims by the Department. **Judgment – Good**

4.2. Teaching, Learning and Assessment Methods

The teaching process consists of two components: development of course material and course delivery. For some courses, course material includes supplementary practical guides and audio/visual material. In addition, the learning process is supported by additional material, including study questions and information sheets.

Course delivery begins with the distribution of printed course material to the students. The printed material is the basis of the self-learning process. There is a printing unit at OUSL from which every department gets the required materials printed for. Course material distribution is also done by a distribution center. Both of these facilities enhance the teaching and learning activities. Students are expected to read and assimilate the material on their own, at their own pace while adhering to the time frame for assessments

fixed by the department. According to some students the timely distribution of course material has been a problem and needs to be improved.

No formal lectures are held but the department provides a number of very effective day schools and tutor clinics for those who need assistance. The day schools and tutor clinics are optional. The only compulsory activities, for which the student needs to be physically present at one of the centres, are examinations and practical classes/workshops where applicable. There are a number of video recorded lectures on some of the topics in mathematics for students to use for self-learning activities. The use of media unit by the academic staff to create such material should be encouraged.

A member of the academic staff of the Department of Mathematics and Computer Science manages each course with the assistance of an Educational Assistant or a Temporary Demonstrator. They are responsible for ensuring that day schools and practical classes are conducted as scheduled, continuous assessment tests and final examinations are set, administered, and graded, and students are communicated with. Reviewers are very impressed with the systematic and efficient way the department administers this aspect.

The assessments of courses are done at three stages. First stage of assessment is an Open Book Test (OBT), which is done after the students engage in about 4 to 5 weeks of study. Second stage of assessment is a Closed Book Test (CBT), which is held after the students engage in studies for about 8 to 10 weeks. Based on the marks of these tests an eligibility mark is computed according to a pre-announced formula. The students who become eligible get the opportunity to face the third stage of assessment is at the end of the semester. This is done through a final examination, which again is of the closed book type. Once eligible, students have 5 years in which to complete the course by sitting (re-sitting if necessary) the final examination and passing the course. Reviewers found that not all eligible students sit for the final examination.

Even though students do not get back their graded OBT and CBT answer scripts department provides them with detailed marking schemes which include solutions as well. All final examination question papers are moderated by external academics. However no second marking mechanism is in place.

Students have the option of choosing projects in Mathematics or in Computer Science. Final year computer Science projects are assessed using a report and a viva. It was noted that mathematics final projects is also available as an option, however there are no takers at present.

There are around 30 students at a time at the level 5 and none at level 6. There is a low demand for Level 6 course modules. The potential reason may be due to insufficient course modules offered, the longer duration need to graduate. As strength there were several interdisciplinary course modules. It was also noted that plans are underway to move into e-learning with the DEMP Project initiative at OUSL. It was commendable

that the department offers a practical course on Digital Computer Fundamentals CSU 2178.

This aspect makes a significant contribution to the attainment of the stated aims by the Department. **Judgment - Good**

4.3 Quality of Students, including Student Progress and Achievements

OUSL vision is to focus on the adult leaner that is aspiring to upgrade the knowledge and skills necessary to be a productive citizen of the society. It is an open-admission, distance-learning institution, catering to the needs of a wide range of students, from ones who have just completed their schooling to retirees, all ages over 18, all ethnic groups, employed or unemployed. Reviewers observed that most students belonging to the category of unemployed school leavers after GCE (A/L) who study on a more less full-time basis.

The intake for Computer Science is limited to around 200 per year. The selection to follow Computer Science is based on a transparent selection test at the entry level.

Reviewers noted that the prospective students are introduced to the OU system at orientation sessions conducted prior to registration. Also each student is assigned a personal counselor for further continuous assistance. One month after registration, all students are given an add-drop period to make changes to the list of courses for which they are registered, without academic or financial penalty. Then for a further period, they are permitted to drop courses without academic penalty. In making decisions to alter courses, students have the facility of consulting their personal counselors or other faculty members for advice. Students who do not want to take any courses are given the option of keeping the studentship for the current academic year by paying only the studentship fee.

Management Information System of the university, which keeps the records of the academic performance of students, is of highest order. Even though the self-evaluation report says that Paper records are also kept we noticed that the department does not keep the final marks sheets.

Even though the progress of students in each course is monitored there is no formal mechanism in place to do the same for overall progress at any given time.

It is understandable that no time limit can be placed on how long a genuine student can take to complete a programme in this set up. Also the system allows that students can retain eligibility for five years. There was evidence to suggest that these factors have negative effect and many students take an unduly long period of time to complete their degrees.

The department admits that the overall completion rate in the Degree Programme is low and it does not have a mechanism for collecting data on students who fail to complete the programme. .

We found evidence to support the claim that students getting classes are capable of independent learning and have been successful at getting jobs. However no proper study has been carried out to see the achievements of average graduates.

The aims set by the department under this aspect are substantially met. **Judgment - Good**

4.4. Extent and Use of Student Feedback, Qualitative and Quantitative

As stated in the self-evaluation report the only formal mechanism for receiving feedback from students in the B.Sc. degree programme is the presence of two student representatives on the Faculty Board. The students we met were of the opinion that their voice was not heard in the Faculty Board.

Students agree with the department statement that due to the friendly approach of academic staff members, through student-staff interactions they obtain feedback, both positive and negative, on an informal basis.

Reviewers are of the view that formation of subject committees involving students and relevant teachers could alleviate this situation.

The Faculty has not taken any steps yet to get a feedback on course modules or the whole programme. Existence of such process would help the university to judge if the aims of the Department are met.

Judgment – Satisfactory

4.5 Postgraduate Studies

The opportunities for postgraduate studies at the Department of Mathematics and Computer Science are praiseworthy in Sri Lankan standards. In all currently there are six students involved in postgraduate studies. However the reviewers are concerned that the supervisor of most of these students is no longer attached to the Open University. Senior academics at the department should start supervising postgraduate students to make opportunities for talented students and junior staff members.

This aspect presently makes a substantial contribution to the attainment of the stated objectives. **Judgment – Good**

4.6. Peer Observation

As stated in the self-evaluation report no formal mechanism exists for peer observations on teaching. However we noticed some very good practices of the department in

connection with this aspect; Regular dialog and close interaction of two academic staff members (one senior and one junior) in each course module, frequent departmental meetings with active participation of all members.

This aspect makes an acceptable contribution to the attainment of stated objectives. But significant improvement could be made. **Judgment – Satisfactory**

4.7. Skills Development

The department claims its curriculum (and science curriculum in general) is knowledge-based rather than skill-based and the only skills, the development of which is incorporated into the curriculum, are discipline–related skills.

Even though the Laboratory skills are taught because of the constraints in distance education and lack of resources there is a doubt if the expected outcomes are achieved.

However the review panel observed that students take part in workshops on areas such as CV writing, improving interview skills, developing presentation skills as a part of a course unit. It is commendable that a series of seminars are conducted to the level 5 students on technical report writing. The project proposal is assessed via an interview. The projects are continuously monitored. The panel observed the attendance sheets of the students who took part in the seminars. Two sample documents on “Oral Presentations and Report Writing Guidelines” and “Project Report on a Self Study” were made available. There was evidence of a workshop conducted on “Data Analysis using SPSS”.

This aspect makes significant contribution to the attainment of the stated learning outcomes. **Judgment – Good**

4.8. Academic Guidance and Counselling

The department is very proud on their contribution to this aspect. All academic staff members are involved in counseling students. The faculty student counselors are available to assist students with non-academic matters.

Every prospective new student is assigned a "personal tutor” to act as an academic counselor. The personal tutor is responsible for making sure the student clearly understand the system, academic procedures, and requirements of the Open University, and for guiding the student in his/her choice of courses at the beginning of the academic year. Some students were unhappy the way personal tours are assigned, as they do not necessarily belong to the student’s subject areas. These students were of the opinion that they get only clerical help in such situation.

A formal student orientation programme is carried out only at the start of level 3. According to students they are very keen to have similar programmes even at levels 4 and 5. They also lamented the lack of support in some subject areas at Regional Centres. The

department is of the view that only a limited number of students take even the available opportunities.

40 students are allocated for each permanent academic staff member. There is one senior student counselor at OUSL and two student counselors per faculty. Written guidelines are provided to counselors. Student counselors meet once for a two months.

This aspect makes significant contribution to the attainment of the stated learning outcomes. However there is scope for improvement. **Judgment – Good**

5. CONCLUSIONS

Based on the observations made and evidence gathered during the Review team visit, the eight aspects were judged as follows:

Aspect Reviewed	Judgment Given
1. Curriculum Design, Content and Review	**Good**
2. Teaching, Learning and Assessment Methods	**Good**
3. Quality of Students, including Student Progress and Achievements	**Good**
4. Extent and Use of Student Feedback	**Satisfactory**
5. Postgraduate Studies	**Good**
6. Peer Observation	**Satisfactory**
7. Skills Development	**Good**
8. Academic Guidance and Counseling	**Good**

6. RECOMMENDATIONS

Based on the findings indicated above the review team wishes to make the following specific recommendations:

- A student feedback mechanism is recommend for capturing student concerns and suggestions.
- A formal second marking of process could be established.
- Students could be consulted prior to the annual purchase of library books.

- A formal peer evaluation process may be established for improving the quality of teaching.
- Career guidance and counseling could be improved. An academic staff member from the same discipline could be allocated to the students of the department. At present academic members from other departments has also been allocated to the students of the Mathematics and Computer Science Department.
- New Audio Visual Material could be provided to the students.

7. ANNEXES

Annex 1 – Agenda of the Subject Review

23 August 2006 (Day 1)

0830 – 0900 – Private meeting of Review Panel with QAA council representatives
0900 – 0930 – Welcome meeting with the Dean and Head of Department
0930 – 1000 – Discuss the Agenda of the Review
1000 – 1030 – Tea Break
1030 – 1130 – Department Presentation on the Self Evaluation Report by HOD.
1130 – 1230 – Discussion with the Academic Staff Members
1230 – 1400 – Lunch
1400 – 1430 – Observe Practical Class 1
1430 – 1515 – Meeting with Postgraduate Students and Tea
1515 – 1545 – Observe Practical Class 2
1545 – 1615 – Observing the Computer Laboratory
1615 – 1645 – Brief Meeting of Reviewers

24 August 2006 (Day 2)
0900 – 0930 – Observe Day School 1
0930 – 1000 – Observe Day School 2
1000 – 1015 – Tea Break
1015 – 1045 – Observe Day School 3
1045 – 1230 – Observe Documents
1230 – 1330 – Lunch
1330 – 1445 – Meeting with Students
1445 – 1515 – Presentation by a Postgraduate Student
1515 – 1530 – Tea Break
1530 – 1600 – Observe Close Book Test (CBT)
1600 – 1630 – Reviewer's Meeting with HOD.

26 May 2006 (Day 3)
0900 – 0930 – Academic Guidance and Counseling Core Aspect Meeting
0930 – 1000 – Presentation by a Postgraduate Student
1000 – 1030 – Meeting with Nonacademic Staff and Tea
1030 – 1230 – Visit to Press/Distribution Centre/Media House/Library
1230 – 1330 – Meeting with HOD and Academic Staff for Reporting
1330 – 1400 – Lunch
1400 – Report Writing

Annex 2 – Observation of Day Schools

(1) AMU 1190 (English Medium)
(2) AMU 1190 (Sinhala Medium)
(3) CSU 3279

All three Reviewers were present in each observation and kept different notes.

The review panel observed 3 day schools sessions and one session had approximately 80 students while the other session had 12 students. The session with 80 students was on the compulsory IT unit, which was conducted, in English medium. As a good practice students were brought to the blackboard to workout the exercises. One of the areas for improvements as observed by the panel was the level of interaction at the CSE 3279. In the third day school session past papers were discussed on AMU1190 with approximately 130 students.

The review panel observed a computer practical assessment. Optional laboratory sessions are offered to the students and the students are expected to sit for a compulsory test

Annex 3 – Observation of Documents

Reviewers evaluated samples of student work covering the following Modules. This included Open Book Exam, Closed Book Exam and Final Exam related work.

(1) PSU 1182 – Bio Statistics
(2) AMU 3189 – Mathematical Modeling and Methods
(3) AMU 2181 – Mathematical Modeling I
(4) AMU 2182 – Statistics I
(5) AMU 2184 – Newtonian Mechanics
(6) PMU 2194 – Number Theory & Polynomials
(7) PMU 2192 – Linear Algebra

Further, the review panel scrutinized the following documents:

- Cooperate Plan
- Sub-committees
- Course Syllabi
- Minutes of the Departmental meetings
- Practical record books
- Research publications
- Foundation Level Question Papers I and II and Model Answers of MAF 1301/MAE 130 held in 2004/2005, 2003/2004. (No marking schemes were available for 1999/1998)
- Question papers marking scheme and question papers of MAF/MAE 2301 held in 2004/2005. (No marking schemes were available for 2003/2004)
- Question papers and model answers of MAF/MAE 1301 held in 2004/2005
- Question papers and model answers of MAF/MAE 2301 held in 2004/2005
- Question papers of MAF/MAE 2301 held in 2003/2004, 1999/2000
- 15 Computer Science Final Year Projects made available for inspection by the reviewers

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