SUBJECT REVIEW REPORT

DEPARTMENT OF PHYSICS

FACULTY OF SCIENCE
UNIVERSITY OF RUHUNA

10th to 12th March 2010

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1. SUBJECT REVIEW PROCESS

The main principles of subject review process

Accountability of universities for quality and standards is one of the key factors in promoting and safeguarding public confidence in Sri Lankan higher education system. As higher education is a public good, universities must conscientiously exercise their responsibility for quality and standards. The subject review is one of the components of the external quality assurance programme carried out in Sri Lankan universities. It evaluates the quality of education within a specific discipline. It is focused on evaluating the student learning experience, student achievement and the teaching learning process at the subject level.

Major features of the subject review process include the critical analysis of the Self Evaluation Report (SER) prepared by the academic department concerned, peer observation of teaching, observation of documents, observation of the facilities available, and gathering information on activities towards quality assurance through conducting discussions with as many stakeholders as possible.

Subject reviews evaluate how the teaching-learning process helps in the achievement of intended learning outcomes.

Peer observation carried out during the review process includes observing teaching both in the theory and laboratory classes, and if possible in the field classes. The documents that are observed include, examples of student work, student handbooks, student handouts, lesson guides, statistics on student achievements and progress, samples of answer scripts, external examiners' reports, peer evaluation reports, student evaluation reports, minutes of Departmental committees, and etc. The stakeholders with whom the discussions are carried out include the Head of the Department (HOD), members of the academic and non-academic staff, undergraduate students, postgraduate students, alumni, academic administrators, and student counsellors.

The subject review is carried out to evaluate the success of the processes employed to achieve the aims and intended learning outcomes stipulated in the SER.

Aspects of the subject review

In the subject review process, the following eight aspects are evaluated.

- Curriculum design, content and review
- Teaching, learning and assessment methods
- Quality of students including student progress and achievements
- Extent and use of student feedback, qualitative and quantitative
- Postgraduate studies
- Peer observation
- Skills development
- Academic guidance and counselling

The Review Process

The Review Team consisted of,

- Prof. Sudath R. D. Kalingamudali, HOD/Department of Physics (DP), University of Kelaniya, (Team Chair),
- Prof. Sumedha Jayanetti, Former HOD/DP, University of Colombo,
- Prof. Ranjith Premalal De Silva, Former HOD/Department of Agricultural Engineering, University of Peradeniya, and
- Dr. (Mrs) Chula P. Abeyratne, HOD/DP, University of Sri Jayewardenepura

The SER prepared by the DP was provided to the Review Team on 26 February 2010 by the Quality Assurance and Accreditation Council of the University Grants Commission. The Review Team carried out the review process on 10, 11, and 12 March 2010.

On the morning of 10 March 2010, the Review Team met the Vice-Chancellor together with the Dean/Faculty of Science and Head/DP. The Vice-Chancellor at this meeting briefed the reviewers on the present situation at the University.

The Review Team then finalized the agenda for the review process with the HOD. The Agenda for the review visit is given in Annex 1. After finalizing the agenda, the Review Team met the HOD and other members of the academic staff. The HOD gave a presentation on the contents of the SER which was followed by a discussion.

The Review Team during the course of the visit had discussions with the people listed in Annex 2.

Several documents were also perused. These included the Faculty handbooks, handouts given to students, minutes of the Departmental meetings, answer scripts, question papers, student feedback forms, peer observation reports etc.

The Review Team also examined the facilities available for teaching and learning, and the list of facilities observed is given in Annex 3.

On 12 March 2010, the Review Team gave a feedback of the findings to HOD and other members of the academic staff.

Publication of the review report

The Review Team will prepare a report incorporating the findings after the review visit. In the report, the strengths and good practices will be highlighted and the weaknesses will also be stated together with possible recommendations. Each aspect will be given a judgement of good, satisfactory or unsatisfactory. The draft report will be sent to the DP and the feedback will be obtained. If there is disagreement with any judgement, it would be resolved by the Quality Assurance and Accreditation Council (QAAC) through discussion. The judgement will be submitted to the Standing Committee on Quality Assurance of the UGC for approval. After its approval, the report will be published in the QAAC website, ***www.qaacouncil.lk***. The DP has to improve the quality of the aspects that receive a judgement of unsatisfactory within 6 months of approving the judgements by the Standing Committee on Quality Assurance of the UGC.

The primary source for the information given in this report were from the self-evaluation report prepared by the DP, supporting documents provided by the DP including the curriculum, detailed syllabi, teaching materials, student work records, question papers, marking schemes, answer scripts, marks, student feedbacks and peer observations. The team had useful discussions with the Vice Chancellor, Dean of the faculty and the Head/DP & senior and junior academic staff members, Faculty Co-ordinator of the English Language Teaching Unit, Director/ICT centre, Chief Student Counsellor & student counsellors, non-academic staff members and students from the first, second, third and fourth years. The team also visited Computer labs & pools, equipment rooms, laboratories including dark rooms, storage rooms, lecture theatres and rooms at department level, Main Library, Mechanical workshop, Physical Training Centre, staff rooms and the University Gymnasium.

2. BRIEF HISTORY OF THE UNIVERSITY, FACULTY AND DEPARTMENT

The Faculty & its Departments

The University of Ruhuna was established in September 1978 as Ruhuna University College with four faculties, namely, Agriculture, Arts, Medicine and Science. This was upgraded to a fully fledged university in February 1984. Presently, the university comprises of seven faculties;

a) Fisheries and Marine Science & Technology (located in Wellamadama),
b) Humanities and Social Sciences (formerly called Arts) (located in Wellamadama),
c) Management & Finance (located in Wellamadama),
d) Science (located in Wellamadama),
e) Engineering (located in Galle),
f) Medicine (located in Galle), and
g) Agriculture (located in Kamburupitiya).

The Faculty of Science of University of Ruhuna was established in 1978 with five departments; Botany, Chemistry, Mathematics, Physics, and Zoology and was housed in the Technical College premises at Meddawatta, Matara. The Faculty moved to its current location at Wellamadama, in 1985. The Faculty of Science, at present, consists of six departments with the addition of Department of Computer Science in 1997. Also, there is a Computer Unit, which provides services to the faculty and to the University in general. Department of Fisheries Science was established under the Faculty of Science in 1988 and it was upgraded to a faculty in 2004.

The faculty offers primarily undergraduate courses *viz*. the Bachelor of Science (B.Sc.) (General) Degree of three-year duration and B.Sc. (Special) Degree of four-year duration. The undergraduate programme comprises of a large number of course units (core units and optional units) offered by individual departments. In addition, the faculty offers postgraduate degree programmes leading to M.Sc., M.Phil. and Ph.D. At present, the faculty is equipped to cater to 130 students in Biological Sciences and 210 students in Physical Sciences for every academic year. However, during the last few years the faculty stretched to its maximum limits to recruit double batches at several occasions in order to reduce the backlog of students who were waiting to enter to the university.

The students who enrolled for the Physical Sciences stream have several options in their choice of courses. Each student must choose Mathematics as one of the subjects and two

other subjects among Applied Mathematics/Industrial Mathematics, Chemistry, Computer Science, and Physics. Students in the Biological Sciences stream offered the three subjects Chemistry, Botany and Zoology. However, since 2006, Biological Sciences students are given the option of choosing Physics as one of the subjects replacing Zoology, if they prefer. Biological and Physical Sciences students, who do not offer Computer Science as a subject, are offered one to two year Computer Literacy courses for additional computer knowledge. The faculty changed its original system of three terms a year to the system of two-semesters a year during year 2002 with the introduction of the course unit system. The students are offered core theory/practical course units (compulsory course units) during their first four to five semesters. Students have the freedom to choose optional courses, including courses such as Management and Physical Education, depending on their interest to fulfil credit requirements. Pass in English Level I and Level II examinations are compulsory for the B.Sc. (General) Degree programme, and Level III examination is also a must for the B.Sc. (Special) Degree programme. English is offered to all students throughout their undergraduate career.

An Overview - Department of Physics

Similar to the other departments in the Faculty of Science, the DP offers course units covering basic and applied fields of Physics for undergraduates registered for B.Sc. (General) and B.Sc. (Special) Degree programmes.

The selection of students for the undergraduate courses is done by the University Grant Commission (UGC) of Sri Lanka, based on the performance of students in the G.C.E. (A/L). A student must earn required qualifications at one sitting for the examination within three attempts. No selection procedure is in effect for the enrolment of students for the subject of Physics in the B.Sc. (General) Degree programme, and therefore any student selected to the Faculty of Science is eligible to choose Physics.

The DP is equipped to offer the subject of Physics to 180 students in each of the three levels I, II and III. However, this number is never achieved due to the restriction on the upper limit of the student number set by the Department of Mathematics as 210 in the Physical Sciences stream. Since Mathematics is a compulsory subject for all students in the Physical Sciences stream, only about 100 students choose Physics as one of the other two subjects for their undergraduate degree programme. The student enrolment for the Physics for the academic years 2006/2007, 2007/2008 and 2008/2009 from Physical Sciences stream are 89, 74, and 85 respectively, and same for the Biological Sciences stream are 25, 24, and 25 respectively.

Students are selected for the B.Sc. (Special) Degree programme after completion of Level II examinations. The B.Sc. (Special) Degree programme is four years and only those students who excel in their Level I and Level II examinations are selected for the programme with an interview among the suitable applicants. The DP is capable of enrolling about 6-8 students for the programme, however, on average, only about four to six students are being selected from the interview every year. A small percentage of selected students leave at the beginning, mainly citing the difficulty to follow the programme due to their weakness in English language. It is interesting to note that proportionately more and more female students are opting to follow the B.Sc. (Special) Degree programme in Physics. The number of student continued in the B.Sc. (Special) Degree programme in Physics for the academic years 2006/2007, 2007/2008 and 2008/2009 are 4 for each year.

The permanent cadre of the academic staff in the DP is 12, and currently has 9 academic staff members with four senior members specialised in different areas of Physics with foreign

training in the relevant fields. The Professor (Chair), three Senior Lecturers, five Lecturers (Probationary), four Temporary Assistant Lecturers, eight Demonstrators, five Technical Officers, and five Laboratory Attendants are presently working in the DP.

Technical staff in the department has gained reasonable IT knowledge through workshops conducted by the Department of Computer Science. They are encouraged to participate in local as well as overseas training programmes. The senior staff technical officer has obtained overseas training on several occasions and is quite capable of repairing even sophisticated equipment.

The facilities available include 2 large lecture theatres (with about 150 & 300 seating capacity each), 4 large laboratories (one lab each for Level I, II, III, and IV), an Electronics laboratory, a research laboratory, a well equipped workshop, a laboratory to carry out fourth year projects, 2 computer labs, 8 dark rooms, a small and large storage rooms, 5 tutorial rooms, separate rooms for permanent academic staff members, an office room, a meeting room, a tearoom, and 6 rooms for Temporary staff members. The labs, lecture theatres, some of the tutorial rooms, and lecturer's rooms are equipped with internet facilities. All lecture theatres and tutorial rooms are ready with black/white boards. Overhead projector/multimedia facility is provided to deliver lectures/presentations as needed.

Since 2009, the department caters to Para-medical students from the Faculty of Medicine who follow Medical Laboratory Science Degree programme by offering a Foundation Course in Physics, which includes theory (30hrs) and practical (30hrs) components using the facilities of the DP.

B.Sc. (General) Degree Programme

There are several subject streams that a student can follow with Physics as one of the subjects under the B.Sc. (General) degree programme.

a) Chemistry/Mathematics/Physics
b) Applied Mathematics/Mathematics/Physics
c) Industrial Mathematics/Mathematics/Physics
d) Computer Science/Mathematics/Physics
e) Botany/Chemistry/Physics (introduced in 2006)

Mathematics is compulsory for all Physical Sciences students and Chemistry is compulsory for all Biological Sciences students. In the B.Sc. (General) degree timetables each student who chooses Physics has four hours per week for theory lectures/tutorial classes, and three hours per week for laboratory classes. Physics core course units offered are the same for all students who follow Physics as a subject, regardless of their subject streams. In addition to core course units, the DP offers optional course units to both Physical and Biological sciences students.

B.Sc. (Special) Degree Programme

At the inception of the Faculty of Science in 1978, it was affiliated to the University of Kelaniya and the students were sent to the University of Kelaniya for the B.Sc. (Special) Degree programme after completion of the three-year B.Sc. (General) degree programme at the University of Ruhuna. After the university became an independent university in 1984, the department had introduced the B.Sc. (Special) Degree programme in 1985, but was not successful after 1987 due to lack of senior staff members. In 1993 the programme was re-

initiated and it continued without interruption. So far more than 50 students have been graduated from the University of Ruhuna with a B.Sc. (Special) Degree in Physics.

The B.Sc. (Special) Degree programme runs through two years. Theory and practical courses, seminar, research project (report and presentation), industrial training, etc. are included in the programme. Students in Part I of the B.Sc. (Special) Degree (third year in their degree programme) have 6-9 hours of practical and 8-10 hours of theory classes per week. Laboratory classes are offered only in the first three semesters of the B.Sc. (Special) Degree programme. In addition, students must complete 10 credit hours of optional course units by the end of their Part I. Some of the optional course units they follow during their second year of the degree programme (before they join the special programme) can be counted towards the 10 credits with the approval of the DP.

Students in the Part II of the B.Sc. (Special) Degree programme have to complete seminar presentations during the first semester. Their project work needs to be initiated at the beginning of semester I and should be completed by the end of the year. After the year-end examinations, they are sent for one month industrial training.

3. AIMS AND LEARNING OUTCOMES

The DP offers a variety of course units, which enable the students to get a better understanding and to develop the necessary skills in the subject area of Physics to achieve the vision and mission of the University of Ruhuna, which states as follows.

Vision: To be an internationally respected, outstanding academic centre, committed to rigorous scholarship, academic freedom, sound moral values and social responsibility.

Mission: To produce internationally accredited, outstanding graduates who are innovative, analytical and adaptable with a life long love for learning; and to contribute to the advancement of knowledge and enrichment of educational, cultural, economic and natural environments of people and the region we serve.

3.1 Aims

Aims - B.Sc. (General) Degree Programme

- Providing a sound understanding of fundamental concepts in Physics
- Building confidence in using Physics concepts in practical applications
- To endow with hands on experience in practical skills through laboratory experiments and proper handling of instruments and equipments
- To have ability to think critically, have capacity to apply knowledge and skills to novel situations and have confidence in communication skills

Aims - B.Sc. (Special) Degree Programme

- Providing a solid theoretical base
- Enhance problem solving ability through independent projects and research work
- Inculcate enthusiasm in students for pursuing higher studies in Physics and in related fields
- To have ability to think critically, have capacity to apply knowledge and skills to novel situations and have confidence in communication skills

3.2. Learning Outcomes

On the completion of the programmes offered through the DP, the students are expected to have;

- a sound knowledge in fundamental principles of physics and ability to use them in problem solving.
- gained an understanding to use such knowledge in research, in industry and in related fields.
- developed confidence in scientific method and use that in investigations and analysis and to draw proper conclusions and justification of results.
- gained skills in safe and proper handling of instruments.
- developed student's creativity, thinking ability and decision making capacity.
- learnt the need of transferring the gained knowledge to the society at large.

4. FINDINGS OF THE REVIEW TEAM

4.1. Curriculum Design, Content and Review

Since 2002, the Faculty of Science has been following a two-semester course unit system. The students are required to take core course units under each major subject area and optional course units offered through departments and the faculty to fulfil the requirements for the completion of the B.Sc. (General) and B.Sc. (Special) Degree programmes. DP conducts courses for the above degree programmes for the students in both Biological and Physical Sciences streams.

Physics component of the B.Sc. (General) Degree programme comprises eight core course units amounting to 30 credits and eight optional course units amounting to 16 credits that spread over three years. The same for the B.Sc. (Special) Degree programme comprises an additional eighteen core course units amounting to 68 credits. The list of course units is given in Annex 4.

B.Sc. (General) Degree Curriculum

The theory core course units offered at the first year of the B.Sc. (General) Degree curriculum have been designed to provide students the basic understanding on the fundamental concepts of Physics in Classical Mechanics I, Wave Motion and Acoustics, Electricity and Magnetism, and, Geometrical and Physical Optics. During these courses, students will develop their skills in relevant applications with the ability of solving problems and to follow the other Physics course units offered thereafter. The laboratory course unit offered at first year have been designed to develop systematic foundation of experimental work to gain necessary skills in understanding the working and the capabilities of the apparatus, handling scientific instruments, the inherent limitations of measurements, the manipulation of experimental techniques, use of computer for experiments, experience in data analysis and technical report writing.

The two theory core course units offered at the year 2, each of 4 credits, have been designed to provide an understanding of the basic concepts in Thermal Physics & Classical Mechanics II, Electricity and Magnetism II, Atomic and Nuclear Physics & Special Theory of Relativity. The laboratory course unit at the year 2 has been designed to provide students the skills of handling scientific instruments and performing experiments.

In this level it is necessary for students to write comprehensive lab reports for each lab-experiment, and it provides them with experience in data analysis and technical report writing.

In addition, two optional course units both theory and practical are offered at the year 2, each of 2 credits, in Electronics to provide opportunity for the students in understanding the basic concepts of Analogue and Digital Electronics and their applications. However, these to courses are compulsory for those students who wish to follow the B.Sc. (Special) Degree in Physics.

The core theory course module offered at the year 3 of Semester I provide detailed understanding on fundamental concepts of Quantum Mechanics, Statistical Physics and Solid State Physics. In addition, the laboratory course unit will further improve their analytical skills and report writing ability.

In the Semester II of the year 3, in addition to traditional Physics course units, DP offers 6 optional course units in Astronomy and Cosmology, Computer Simulation of Physics I, Computer Simulation of Physics II, Special Topics in Physics, Physics for Bioscience Students, and Microcontroller Applications. These units provide important links between several aspects of the related fields of Physics.

Considering the curriculum of the B.Sc. (General) Degree programme, reviewers are of the opinion that the Physics course units offered by the DP have been designed in order to provide a good conceptual understanding of fundamental principles, together with associated theories, in core and applied areas of Physics. The inclusion of courses in applied areas should be appreciated. The laboratory experiments are designed to provide students the skills of handling scientific instruments and performing experiments in mechanics, properties of matter, electricity, optics, electronics, data acquisition systems and some computer assisted Physics experiments. The necessary knowledge in Mathematics to understand the subject matter in Physics is gained from the compulsory Mathematics courses offered by the Department of Mathematics. According to the Aims, Objectives and the Learning outcomes spelt out by the DP in chapter 1 of the SER, at the end of the B.Sc. (General) Degree programme students should be able to handle equipment they encounter in research or industrial environment.

The Review Team also noted that the Electronics Laboratory Manual has been prepared by the Senior Staff Technical Officer. Review Team finds this as a good trend and is appreciative of the Technical Officer´s contribution. However, the Review Team observed that some of the experiments had been copied directly from a foreign manual. Thus, it is advisable to prepare Laboratory Manuals under the guidance and supervision of senior academic staff members who would have avoided such situations.

In general, the Review Team is of the opinion that the design and the content of the Physics curriculum offered for the B.Sc. (General) Degree by the DP are adequate to achieve its outcomes. However, the reviewers observed that the Electronics course units have been made optional. However, as the background knowledge in Electronic is essential when carrying out certain research projects or laboratory experiments with modern instruments, the Review Team recommends that the Electronics (theory) course unit be revised to a minimum of 4 credit course unit and make both Electronics (theory and practical) course units core course units.

B.Sc. (Special) Degree Curriculum

B.Sc. (Special) Degree curriculum comprises all B.Sc. (General) Degree course units and eighteen more core course units amounting to 68 credits offered at Level 4, comprises with eleven theory, five practical, a research project, and an industrial training unit.

The theory course units of Level 4 have been designed to provide students an advanced knowledge on the fields of study such as Mathematical Methods for Physics, Classical Mechanics & Special Relativity, Quantum Mechanics, Electromagnetic Theory and Electricity, Nuclear and Particle Physics, Statistical Mechanics, Solid State Physics, Electronics II, Astronomy and Cosmology, Miscellaneous Topics I, and Miscellaneous Topics II.

Five level 4 laboratory course units offered to the students of the B.Sc. (Special) Degree programme have been designed to provide hands on experience in advanced experimental techniques through laboratory work on several areas.

During the fourth year, one year research project is assigned to an each student and it is carried out under the supervision of a senior member of the academic staff. At the end of the year, students must be submitted a comprehensive research reports which will be evaluated through presentations.

In addition, the course unit on Learning Skills provides an industrial practical training which will be followed by a seminar.

In general, the Review Team is of the opinion that the design and the content of the Physics curriculum offered by the DP for B.Sc. (Special) Degree programme are creditable to achieve its intended outcomes.

Curriculum Review

In order to keep the degree programmes up to date curriculum additions in the DP are made regularly. According to the information in the SER, the DP has last revised the B.Sc. (General) Degree curriculum in 2002 with the introduction of the modularised course unit system. However, Review Team noted that, from time to time, several core and optional course units were introduced to both B.Sc. (General) and B.Sc. (Special) Degree curriculums. A major revision of the credit values was done during 2009, and from 2009/2010 academic year, the practical credit values are redefined to be 1 credit for each 30 - 45 hrs (which was 2 credits for 45hrs).

In addition to offering course units in Physics as main subjects, the DP provides course units of more applied areas such as Electronics, Physics for Bioscience Students and Renewable Energy course units which are open to all the students of the Faculty of Science.

Purchasing of new equipment and regular introduction of new experiments are in practice in the DP. The DP has already introduced the use of computers in laboratory experiments. Computer aided experiments provide the opportunity to investigate the behaviour of physical quantities under test in more liberal manner when compared to conventional experiments.

In general, Review Team is of the opinion that it is the high time to revise the B.Sc. (General) Degree curriculum with the necessary feedback from all stakeholders including potential

employers, experts in the field, alumni, and students to improve the quality and relevance of undergraduates.

4.2. Teaching, Learning and Assessment Methods

Review Team observed that the learning environment provided for students studying Physics in the DP was good. Spacious lecture theatres/rooms, laboratories, the standard apparatus available for laboratory studies and the quieter surroundings provide a fitting environment for undergraduate studies.

DP imparts the knowledge in Physics to the undergraduates through lectures and laboratory work. Review Team observed teaching by several academic staff members for both B.Sc. (General) and B.Sc. (Special) Degree undergraduates of different levels that included lectures and laboratory work. Lectures were conducted mainly using black/white boards and overhead projectors while making the students interactive. Team found that the teaching loads had been shared on a fair basis by the academic staff, the four senior staff members and the currently serving three younger lecturers who are simultaneously pursuing their postgraduate studies. Majority of the lectures of the senior students were found to be conducted by the limited number of senior academic staff of the department. Review Team found the peer review process that is employed to monitor the teaching of staff commendable and as a good practice.

Laboratory classes, consist of a number of good experiments in Physics designed for students of all levels. The performance of students is being assessed by demonstrators and younger lecturers under the guidance of a senior academic staff member. Review Team however noticed that the extent and the level of experiments in Electronics were somewhat less in comparison to conventional Physics experiments. This was also found to be an area that the students expressed concern during their discussion with the Review Team.

Examinations in the DP are conducted based on the semester system and the evaluations are made using the GPA mechanism, accepted in the national universities. Performance of students in their theory course units are evaluated mainly through end-of-semester examinations. Laboratory performance of students is assessed on both continuous basis and through an end-of-semester laboratory test. Moderation of question papers and evaluation of answers scripts of end-of-semester examinations are done by external moderators/second examiners. The results are issued to students by the fourth or fifth week of the following semester. After the results are issued, students are given two weeks to apply for verification of results of the course units, if they disagree of the results they obtained. A verification fee of Rs 500·00 per course unit is charged and this will be reimbursed if the result is changed. There are Senate approved guidelines for the verification of grades and marks. More than 80% of students who enter the Faculty and follow Physics course units were found to have made a good progress through their undergraduate programme by going through the teaching, learning and assessment methods employed by the DP.

4.3 Quality of Students including Student Progress and Achievements

B.Sc. (General) Degree Programme

Students are selected to the Faculty of Science of the University of Ruhuna on the basis of their achievements at the G.C.E. (A/L) Examination through the University Grants Commission. Due to the high demand and the attraction for professionally oriented degree

programmes such as Engineering and Medicine, usually students who secure relatively low Z-scores at the G.C.E. (A/L) Examination will be selected for Applied Sciences and Science Faculties of the Sri Lankan Universities. Quality of students entering the University of Ruhuna is distributed over a wide range as indicated in the SER by the range of Z- scores centred in the range 0.98-1.24.

Several meetings were conducted both with the students and their leaders offering Physics as a subject by the Review Team. In these meetings they have indicated their satisfaction with the programmes conducted by the DP. Also, they appreciated the support and the relationship provided by the staff of the DP. It was observed that many of the students possess good interpersonal and leadership skills.

Their Physics knowledge seems to have improved at the end of their 3-year B.Sc. (General) Degree programme with a pass rate of about 85% (excluding incompletes which could be repeated at a later examination) (Data available for the 2003/2004 group).

A survey conducted by the DP has not received a response from most of the students. Considering the small number of responses received indicates an employment rate of about 75% which is a fairly favourable number in comparison with the initial standards.

B.Sc. (Special) Degree Programme

Almost all of the students who followed the special degree programme have successfully completed the programme and found employment or pursued higher studies.

Most of the students in the present batches of special degree programme were not aware of the job opportunities available for them. It would be advisable to inform them about career opportunities before they enrol for the programme which would inspire them positively to engage in their leaning activities.

On the average there is an improvement in the quality of students before entering and after completing both the B.Sc. (General) and B.Sc. (Special) Degree programmes.

4.4. Extent and use of Student Feedback

The DP provided evidence to suggest that the DP has considered student feedback as an important component in its activities. The proper record keeping for students' feedback dates back to 2004 or even before. The Professor of Physics has set an example of formal record keeping of the student feedback.

There is evidence to show that course evaluation from student feedback for lectures and practical sessions has been done separately. It was found that the department had arranged lecturers to collect the formal feedback forms from students at the end of the course. Furthermore, there was evidence to suggest informal collection of student feedback during the course as well. Documentary evidence of student feedback history for all senior members of the DP is available.

In addition to the feedback from the students, evaluations of the data on attendance and performance of the students at examinations have been conducted to examine the relationship between attendance and student performance. This is a good practice which other departments could adopt in student evaluations. It is clearly identified from student feedback

that Biological Sciences students need separate Physics courses. This repeated request from the students needs to be considered seriously. Also in Physics, Biological Sciences students expect more attention as per the information available in student feedback.

It is encouraging to see that formal student feedback has been analyzed and relevant graphs and figures have been drawn and discussed in the DP in a bid to improve the student performance. This is also a good practice which other departments could adopt easily.

4.5. Postgraduate Studies

The desire of the DP staff to get involved in postgraduate studies is clearly evident due to the fact that the Professor of Physics in the DP has undertaken the post of Director of Graduate Studies of the university.

Evidence was found that the staff of the DP is involved in offering postgraduate M.Sc. programme in Molecular Biology. Although the DP has not undertaken taught postgraduate courses, the staff has taken the responsibility of supervising research students. The DP has also shown a steady progress in acquiring funds and resources for postgraduate research in whatever the available capacity. It is noteworthy that the research training has been extended to the PhD level in the DP. Several successful foreign collaborations for postgraduate training have been achieved by the DP. The research publications and patented outputs produced from the department sets an example for others.

4.6 Peer Observation

A formal peer observation process has been in practice with an evaluation form, as a positive effort towards improving the quality of lectures, in the DP since 2006 because they firmly believe that peer observation could play a substantial role in enhancing the staff performance. As per the materials provided to the Review Team, all lecturers (both permanent and temporary) have been subjected to peer observation while teaching, by senior members of the DP.

It can be recommended that the peer observation reports and the student feedback reports of the same lecturer can be correlated for further improving teaching, learning and assessment of the lecturers concerned. The Review Team also noted that the department engages peers for moderation of question papers.

4.7. Skills Development

Efforts have been made to develop skills of students in various directions. These include optional course units such as *Health Related Physical Fitness* and *Physical Fitness and Health Management* offered to a limited number of students, *Management Accountancy, Geography, Natural Disaster Control* course units offered by the Faculty of Humanities, *Information Technology* course unit offered by the Department of Computer Science, and English Courses aimed at developing language skills. While these can all be considered as positive steps taken forward with the goal of enhancing the overall quality of students, the desired results are yet to be achieved and reach the students.

Discussions with students indicated a lack of confidence in communicating in English and several dropouts have been reported due to the inability to follow courses delivered in English. Since the programs aimed at skills development have been intensified recently an improvement of the situation can be expected to take place in a few years time.

Further to this, the non-functioning of the Physics Society seems to be a drawback in the development of certain skills related to Physics. The existence of active subject societies can introduce cooperation among students, ability to participate productively in group work and developing leadership qualities. An active subject society can facilitate interactions with societies in other universities which would provide opportunities for development beneficial to parties. Therefore, the Physics Society should be reactivated as part of the skills development activities.

While the efforts made for skills development are commendable, there is room for improvement until the students benefit from the efforts.

4.8 Academic Guidance and Counseling

Students are guided in general with regard to academic matters by the HOD and the academic staff of the DP. The Faculty Handbook available for the undergraduates provides with information on academic guidance and counselling. At classroom level, as an early step of academic guidance, it is a normal practice of the DP for the lecturer-in-charge of each course unit to recommend relevant literature (textbooks, laboratory manuals etc.) for students' benefit. DP also receives the benefit of other mechanisms used by the Faculty and the University to handle counselling of needy students.

During discussions with students, it was observed by the reviewers that the extent of feedback received by students in overall academic guidance was somewhat mediocre possibly due to the limited interaction of students with the teachers. It is the understanding of the reviewers that both the academic guidance and counselling can be improved further by introducing a properly planned mechanism that encourages students to meet relevant staff members regularly. Recently introduced mechanisms employed by the DP/Faculty to provide counselling for students are expected to yield better results in the future. However, having studied the nature of students during the interactions with them, reviewers felt that in order to provide better academic guidance and counselling, it was necessary that the DP take measures to make its members reach the students rather than having the students reach the members. As an example, student-staff interaction can be strengthened by forming a student body such as a subject based society where the staff members can play advisory and guiding roles on continuous basis.

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

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

5. CONCLUSIONS

The strengths/good practices and the weaknesses of each of the eight aspects considered in the subject review process are summarized as follows.

1. Curriculum Design, Content and Review

Strengths/Good Practices:

- Introduction of new course units in applied areas of Physics
- Availability of Physics courses for Biological Sciences students
- Availability of non-credit Mathematics course for Biological Sciences students who offered Physics as a subject
- Availability of Physics courses of a more applied and general nature
- Availability of English Language compulsory courses
- Conducting tutorials in small group classes
- Availability of some Applied Physics course units for all students in the Faculty of Science
- Availability of group projects for students who offered Electronics course units
- Availability of a one month Practical Training at industry and research institutes for B.Sc. (Special) Degree programme and providing an allowance of Rs 2,500·00

Weaknesses:

- Curriculum revisions are not carried out on a regular basis. Last revision was done in 2002
- Practical sessions has a mismatch with theory courses
- Absence of Industrial Training for B.Sc. (General) Degree programme
- Credit value of the Electronics course unit is inadequate
- Non-availability of courses such as Biophysics and Medical Physics specially for Biological Sciences students
- Offering Electronics as an optional course for students offering Physics as a subject

- Non-availability of B.Sc. (Special) Degree programme for Biological Sciences students

Judgement: ***Good***

2. Teaching, Learning and Assessment Methods

Strengths/Good Practices:
- Availability a sound environment for teaching and learning
- Practice of Peer Observation process during teaching
- Use of standard good practices for teaching, moderation of question papers and marking answer scripts
- In the case of a student disagreeing on the results obtained, availability of verification of results of the course units

Weaknesses:
- Insufficient senior staff to conduct teaching at all levels
- Insufficient staff to conduct teaching in areas such as Electronics and Biophysics
- Relatively insufficient use of visual teaching aids to enhance the presentability of course materials

Judgement: ***Good***

3. Quality of Students, including Student Progress and Achievement

Strengths/Good Practices:
- Good passing rate in both theory and practical Physics course units
- Good passing rate in B.Sc. (Special) Degree programme in Physics
- Mechanisms are in place to provide students with an opportunity to develop various skills

Weaknesses:
- Poor attendance specially at third year lectures
- Lack of data on the B.Sc. (General) Degree graduate profile

Judgement: ***Good***

4. Extent and Use of Student Feedback

Strengths/Good Practices:
- Collecting and compiling students' feedbacks have started at least in 2004
- A formal, well organized student feedback process exists
- All the senior staff has been involved in student evaluations
- Evaluation of attendance vs. performance of students at examinations is very encouraging
- Process of developing graphs and figures from student comments for discussion among staff is very useful

Weaknesses:
- Individual lecturer has taken the responsibility of their own evaluations
- The Review Team did not find follow up actions taken for some issues raised in the students' feedback

- Students get higher weights for their GPA from the same lecturer

Judgement: ***Good***

5. Postgraduate Studies

Strengths/Good Practices:
- Professor of Physics has been involved in promoting postgraduate studies in the entire university as the Director Graduate Studies
- DP offers postgraduate research programmes even with its limited staff
- Publications in refereed international and local journals from the staff of the DP are good
- Several strong foreign research collaborations exist between DP and international institutes

Weaknesses:
- No ongoing M.Sc. or postgraduate diploma programmes within the DP

Judgement: ***Satisfactory***

6. Peer observation

Strengths/Good Practices:
- Availability of a formal mechanism for peer observation of teaching
- Practising peer observation for both permanent and temporary lecturers
- Moderation of question papers
- Common general matters are discussed at regular departmental meetings

Weaknesses
- Lack of proper analyses for further improving teaching, learning and assessment process
- Moderation of question papers is done mainly by the internal staff

Judgement: ***Good***

7. Skills Development

Strengths/Good Practices:
- Availability of a wide spectrum of academic and extracurricular services
- The B.Sc. (Special) Degree curriculum contains Industrial Training placements and Projects
- Availability of optional course units that develop students' inter-personal and transferable skills

Weaknesses:
- Limited opportunities for collaborations with industry within the region
- Unavailability of the Physics students' society
- Unavailability of different students' subject societies

- Lack of confidence in communicating in English

Judgement: ***Satisfactory***

5.8 Academic Guidance and Counselling

Strengths/Good Practices:
- Recent incorporation of new mechanisms to improve the counselling of students
- Availability of qualified senior academic staff to provide proper academic guidance
- Availability of the Faculty Day for students and staff to meet and work together as a full day programme which concludes with a get-together having music, dancing and dinner.

Weaknesses:
- Insufficient guidance of students academically
- Insufficient opportunities for student-staff interaction

Judgement: ***Satisfactory***

6. RECOMMENDATIONS

Based on the findings of the review process, the Review Team wishes that DP may consider the following recommendations in order to further improve the quality of their study programmes.

1. Curriculum revisions be carried out on a regular basis at least once in five years
2. Consider matching practical sessions with theory courses as much as possible
3. Introduce Industrial Training for B.Sc. (General) Degree programme
4. Introduce Biophysics and Medical Physics as optional courses specially for Biological Sciences students
5. Electronics course unit to be revised to a minimum of 4 credit course
6. Status of the Electronics course units should be changed to a core unit for all students offering Physics as a subject
7. Open up the B.Sc. (Special) Degree programme for Biological Sciences students
8. Recruitment of qualified staff to strengthen the teaching in important areas such as Electronics and Biophysics
9. Use of visual aids to enhance the demonstrative component of subject matter during lectures especially in applied physics areas
10. Encourage the current group of Probationary Lecturers to complete their postgraduate work in order to use their teaching potential to its maximum
11. Extension of mid-semester evaluation of students in all of their theory course units
12. Motivate students to improve their attendance at third year lectures
13. Consider introducing more in-class assessments specially in the second and third years as a part of the assessment methods in addition to end of semester examinations
14. Introduce presentations to the practical components
15. Quantitative student feedback data need to be analyzed by some one else and not by the lecturer concerned
16. Obtaining quantitative student feedback data need to be extended to tutorial and practical sessions as well
17. Introduce a follow up mechanism for the issues raised in the students' feedback
18. Findings from the student feedback may be discussed at staff meetings

19. Explore the potential of introducing postgraduate diploma and M.Sc. programmes
20. Peer observation data could be correlated with the student feedback responses for further improving teaching, learning and assessment of lecturers concerned
21. Obtaining peer observation to be extended to all temporary staff (tutors and demonstrators) on a regular basis
22. Include participation of external academics/experts in the moderation process
23. DP could support the formation of Physics students' society and other subject societies
24. Introduce some activities through Physics students' society to improve communication, and writing skills in English
25. Introduce presentation components to the practical units
26. Bridging the staff-student interaction gap by forming a student body such as a subject based society
27. Encouraging students to interact with staff individually or through student bodies
28. Encouraging students to seek academic guidance from academic staff

Acknowledgements

The Review Team appreciates the excellent working arrangement made by the DP during the review visit. The HOD, Professor of Physics and all other members in the DP provided the necessary support to perform our duty well. The documents were displayed and any additional document needed by the team members, was provided by the staff. The Review Team is grateful to all the categories of the staff in the DP and others for the support given during our review visit.

7. ANNEXURES

Annex 1: AGENDA OF THE REVIEW VISIT

Day 1: 10 March 2010

08.00 - 08.30 Private Meeting of Review Panel with QAA Council Representatives
08.30 - 09.00 Review Panel meeting(s) with the Vice Chancellor, Dean/Science, Head/DP
09.00 - 09.30 Discuss the Agenda for the Visit
09.30 - 10.30 Department Presentation on the Self Evaluation Report
10.30 - 11.30 Discussion (*working tea*)
11.30 - 12.00 Observing Teaching - Level II practical class
12.00 - 13.00 *Lunch*
13.00 - 14.00 Observing Departmental Facilities
14.00 - 15.00 Meeting with Undergraduate Students
15.00 - 16.00 Observing Other Facilities (Faculty Library, Computer Pool, Main Library, University Gymnasium & Physical Training Centre)
16.00 - 17.00 Meeting with Student Union members
17:00 - 17:30 Meeting with Demonstrators (*Working tea*)
17.30 - 18.00 Brief Meeting of Reviewers

Day 2: 11 March 2010

09.00 - 10.00 Observing Documents
10:00 - 10:15 Observing Teaching - Level I practical class
10.15 - 11.00 Meeting with Academic staff (*Working Tea*)
11.00 - 11.30 Observing Teaching - Level III Lecture
11.30 - 12.30 Meeting with Technical Staff and Other Non-Academic Staff
12:30 - 13:30 *Lunch*
13.30 - 14.00 Observing Teaching - Level II Lecture
14.00 - 14.30 Observing Teaching - Special Degree practical class
14.30 - 15.00 Meeting with Special Degree Students
15.00 - 15.30 Meeting with Postgraduate Students
15.30 - 16.00 *Tea*
16.00 - 16.30 Meeting with coordinators of other compulsory courses (IT/English)
16.30 - 17.00 Meeting of Reviewers

Day 3: 12 March 2010

09.00 - 09.45 Meeting with course coordinators of other optional courses (Physical Education/Management & Finance)
09.45 - 10.15 Reviewers Private Discussion
10.15 - 10.30 *Tea*
10.30 - 11.00 Observe Teaching - Special Degree lecture
11.00 - 11.30 Meeting with Student Counsellors/Academic Advisors
11.30 - 12.00 Meeting with Head and Staff for Reporting
12.00 - 13.00 *Lunch*
13.30 - 17.00 Report Writing

Annex 2. LIST OF PEOPLE MET BY THE REVIEW TEAM

Vice Chancellor
Dean of the faculty
Head/DP, senior and junior academic staff members
Librarian of the Main library
Director, ICT Centre
Coordinator of the English Language Teaching Unit
Chief Student Counsellor & Student Counsellors
Demonstrators
Postgraduate students
Non-academic staff members
Students from the first, second, third and fourth years

Annex 3. FACILITIES

Computer Pools
Dark Rooms
Equipment Rooms
Laboratories
Lecture Halls
Main Library
Mechanical Workshop
Physical Training Centre
Staff Rooms
University Gymnasium

Annex 4.LIST OF COURSE UNITS

Level	Semester	Course Code	Course Title	Status
Level 1	I	PHY1114	General Physics I	Core
		PHY1b24	Elementary Physics Practical I	
	II	PHY1214	General Physics II	
Level 2	I	PHY2114	General Physics III	Core
		PHY2b24	General Physics Practical I	
		PHY2122	Electronics	Optional
	II	PHY2214	Electricity and Magnetism II, Atomic and Nuclear Physics, Relativity	Core
		PHY2222	Electronics Practical	Optional
Level 3	I	PHY3114	Quantum Mechanics, Statistical Physics and Solid State Physics	Core
		PHY3122	General Physics Practical II	
	II	PHY3222	Electronics Practical (same as PHY2222)	Optional
		PHY3232	Astronomy and Cosmology	
		PHY3242	Computer Simulation of Physics I	
		PHY3252	Special Topics in Physics	
		PHY3262	Physics for Bioscience Students	
		PHY3272	Computer Simulation of Physics II	
		PHY3282	Microcontroller Applications	

Level 4	I & II	PHY4014	Mathematical methods for Physics	Core
		PHY4024	Classical Mechanics & Special Relativity	
		PHY4034	Quantum Mechanics	
		PHY4044	Electromagnetic Theory and Electricity	
		PHY4055	Special Physics Practical I	
		PHY4065	Special Physics Practical II	
		PHY4072	Special Physics Practical III	
		PHY4084	Nuclear and Particle Physics	
		PHY4094	Statistical Mechanics	
		PHY4104	Solid State Physics	
		PHY4112	Electronics II	
		PHY4124	Astronomy and Cosmology	
		PHY4132	Miscellaneous Topics I	
		PHY4144	Miscellaneous Topics II	
		PHY4152	Learning skills	
		PHY4166	Research Project	
		PHY4175	Special Physics Practical IV	
		PHY4183	Special Physics Practical V	