SUBJECT REVIEW REPORT

DEPARTMENT OF CHEMISTRY

FACULTY OF SCIENCE
UNIVERSITY OF RUHUNA

20th to 22nd April 2010

Review Team :

Prof. S. Mohandas/University of Jaffna
Prof. Ranjith Mahanama/University of Colombo
Prof. (Ms.) Janitha Liyanage/University of Kelaniya

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1. SUBJECT REVIEW PROCESS

A key factor required to promote and safeguard public confidence in Sri Lankan higher education is accountability for quality and standards. 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.

Key features of the subject review process include the critical analysis of the self evaluation report 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 etc. The stakeholders with whom the discussions are carried out include the Head of the department, members of the academic and non-academic staff, undergraduate students, postgraduate students, alumni, academic administrators, and student counselors.
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 self evaluation report.

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. S Mohanadas, Former Vice Chancellor, University of Jaffna, (Team Chair),
- Prof. K.R.Ranjith Mahanama, Head/Department of Chemistry, University of Colombo
- Prof. (Ms) Janitha Liyanage, Department of Chemistry, University of Kelaniya

The Self Evaluation Report prepared by the Department was provided to the review team on 23rd March, 2010 by the Quality Assurance and Accreditation Council of the University

Grants Commission. The review team carried out the review process from 20th to 22nd April, 2010.

On 20th morning, the review team met the QA Specialist and thereafter met the Acting Vice-Chancellor together with the Dean / Faculty of Sciences, Chairman / Internal QA Unit and Head / Department of Chemistry (DOC). The Acting 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 Head of the Department. The Agenda for the review visit is given in Annex 1. After finalizing the agenda, the review team met the Head of the Department together with other members of the academic staff. The Head of the Department gave a presentation on the contents of the Self Evaluation Report which was followed by a discussion.

The review team during the course of the visit had discussions with the members of the academic staff, technical officers & non-academic staff, student counselors, directors of career guidance centre & staff development centre and the present undergraduates following the B.Sc. programmes as well as past students and postgraduate students. The list of persons met is given in the 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 complete list of the documents examined is given in Annex 3.

The review team also examined the facilities available for teaching and learning. These included the lecture theatres, teaching laboratories, equipments, library, etc. The list of facilities observed is given in Annex 4.

On the 22nd April, 2010, the review team gave a feedback of the findings to the Head of the Department and other members of the academic staff.

Publications the review report

A report will be prepared after the review visit incorporating the findings of the review team. In the report, the strengths and good practices will be highlighted and the weaknesses will also be stated together with some recommendations. Each aspect will be given a judgment of good, satisfactory or unsatisfactory. The draft report will be sent to the Department and the feedback will be obtained. If there is disagreement with any judgment, it would be resolved by the Quality Assurance and Accreditation Council (QAAC) through discussion. The judgment 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 Department has to improve the quality of the aspects that receive a judgment of unsatisfactory within 6 months of approving the judgments by the Standing Committee on Quality Assurance of the UGC.

The primary source of documented information for this review was the self-evaluation report prepared by the DOC. The review team was also provided with supporting documents by the Department 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 (who was present at the university on the third day of the Team visit), Dean of the faculty and the Head/DOC & senior and junior academic staff members, Senior Student Counselor & Students Counselors, Academic Counselors, non-academic staff members and students from the first, second, third and final years. The team also visited laboratories, lecture halls, auditorium, library, computer centre and gymnasium.

Human Resources of the Department of Chemistry (DOC)

Head of the department submitted a list of names containing academic staff, non-academic staff and visiting staff at present of the Department of Chemistry. There are one Senior Professor, one Professor, six Senior Lecturers, ten Probationary Lectures, fourteen Demonstrators, five Technical Officers and thirteen Laboratory Attendants.

2. BRIEF HISTORY OF THE UNIVERSITY, FACULTY AND DEPARTMENT

Brief history of the University

The University of Ruhuna was established by a Special Presidential Decree in 1978, as Ruhuna University College. Initially it constituted with four faculties, namely Agriculture, Arts, Medicine and Science. The Faculties Science and Agriculture which were initially affiliated to University of Kelaniya and Peradeniya respectively were located in the premises of Technical College at Meddawatta, Matara. The Faculties of Arts and Medicine were affiliated to the University of Colombo. The Faculty of Arts was located in the premises of Teachers Training College at Eliyakanda, Matara. This affiliation to the other universities was continued until Ruhuna University was upgraded to a fully- fledged university on 1st February 1984. After the construction of the new building complex, Faculties of Science and Humanities & Social Sciences were relocated in the main campus at Wellamadama, Matara and Faculties of Agriculture and Medicine were relocated in Kamburupitiya, Matara and Karapitiya, Galle respectively.

The University presently comprises seven faculties with the recent establishment of three more faculties Faculty of Engineering in Hapugala, Galle, Faculty of Management and Finance in the Wellamadama and the Faculty of Fisharies and Marine Sciences & Technology in Wellamadama, Matara. A total of 272 students were enrolled for the bachelors' degree programme during the first academic year (1978/79) and at the commencement of the 2008/2009 academic year it has increased to 7825.

Brief history of the Faculty of Science

The Faculty of Science came to its being along with the establishment of University College on 27th August 1978 in the premises of Technical College, Meddawatta, Matara. It enrolled the maiden batch of students totaling to 34 in 1978 and toward the commencement of the academic year 2008/2009, it has increased its intake to 297 (Biological Science: 102 and Physical Science: 195). The academic activities of the new faculty commenced in five disciplines viz Botany, Chemistry, Mathematics, Physics and Zoology for the Bachelor of Science General Degree programme of three year duration. The Faculty was relocated in the main campus premises at Wellamadama in 1984. At the initial stages, limited number of students who completed their second year in the general degree programme were given the opportunity to read for the special degree courses in Chemistry, Physics, Mathematics, Botany and Zoology at the University of Kelaniya and this programme continued until the Department of Botany, Zoology and Physics started their special degree courses for four year duration in 1986. The Department of Chemistry and Mathematics became independent in starting their special degree courses in the years 1987 and 1996 respectively. The Fisheries Biology unit which emerged as a unit in the Department of Zoology was promoted to Department of Fisheries Biology in 1988 and was housed in the Science Faculty Complex and started to offer Fisheries its Biology as a subject to the Biological Science stream in 1997. The Computer Science Unit which provided a literacy course to the students of the Faculty and also other IT needs to the whole university was promoted to a status of a department and started offering Computer Science as subject in 1998 to Physical Science degree stream totaling the number of departments in the faculty to seven. The Department of

Fisheries Biology was elevated to a faculty status as Faculty of Fisheries & Marine Sciences and Technology in the year 2003. This reduced the number of departments in the faculty to six.
The curriculum in the faculty was changed to a semester based course unit system in 2002 and offers large number of core and optional course units by individual departments. The faculty also offers postgraduate degree programmes leading to MSc, MPhil, and PhD. At present, the Faculty has a capacity to recruit 130 students for the biological science and 210 students for the physical science stream for every academic year. The selection of students for the undergraduate courses is done by the University Grants Commission of Sri Lanka based on the performance of students in the relevant General Certificate Education (Advanced Level) Examination.

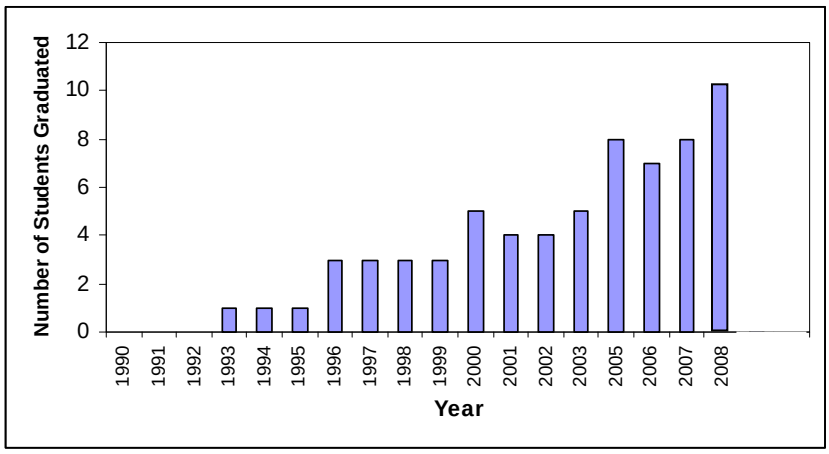
The Department of Chemistry
Department of Chemistry is one of the founder departments and has been in existent from the inception of the University in 1978. The first Head of the Department was Prof. R.H. Wijayanayaka who was also the pioneering Dean of the Faculty of Science. Having contributed only to a B.Sc. General Degree in Science initially, a Special Degree programme in Chemistry commenced in1979 in collaboration with the University of Kelaniya. This programme continued until the Department was independent in commencing its own Special Degree course in 1987. The Department was initially housed in the buildings of the Technical College at Meddawatta and was relocated in the new building complex of the Faculty of Science at Wellamadama, Matara in 1984.

The department is equipped with five elementary (teaching) laboratories with a total capacity of 240 to 300 undergraduates and two advanced laboratories for students reading for B.Sc. Special Degree and for Postgraduate Degrees in Chemistry. In addition to the above, the department has a special equipment room and also a computer room with Internet and e-mail facilities. Computer facility is being used for computer assisted learning in Chemistry. The department offers several optional course units with an objective to enhance the employment opportunities of graduates of University of Ruhuna.

Student
Approximately 300 students enrol at the Faculty of Science for Biological Science and Physical Science streams each year. Of these, about 50% follow Chemistry in their Level I, Level II (four semesters) and first semester of the level III of undergraduate programme. The course units offered by the department in the second semester of the Level III are optional and as a result the number of students who follow Chemistry in the final semester is less compared to the previous semesters. The following subject combinations with Chemistry as a subject are available for the new entrants

Combination Code	**Subject combinations**	**Stream Biological/ Physical**
BS1	Chemistry, Botany, Zoology	B
BS2	Chemistry, Physics, Zoology	B
PS1	Chemistry, Physics, Mathematics	P
PS2	Chemistry, Computer science, Mathematics	P
PS5	Chemistry, Mathematics, Industrial Mathematics	P
PS7	Chemistry, Applied Mathematics, Industrial Mathematics	P

Based on the academic performance at the Levels I and II examinations, students are screened for their eligibility to follow a four-year Special Degree programme in Chemistry. Only 5-10% of the students offering chemistry as a subject in their Levels I and II have the opportunity of following the Special Degree programme. Graph 2.1.2 shows the number of graduates produced following Chemistry in each academic year since the commencement of the Special Degree programme in 1987. As it can be seen the department has increased the student intake for the Special Degree programme over the years accommodating to ever increasing demand for the subject.



Chemistry Special graduates produced since commencement of the programme

Students following a General Degree programme in the second semester of the Level III are given the opportunity to select the optional chemistry course units at their discretion, according to the selection criteria prescribed by the Department. The Department offers several optional course units with an objective to enhance the employment opportunities of graduates of University of Ruhuna.

Staff

There are 18 academic staff members consisting of a senior professor, a professor, senior lecturers (06) and probationary lecturers (10) at the Department of Chemistry as listed in Table 5 with their responsibilities at the department and at the Faculty of Science, University of Ruhuna. Details regarding their area of specialization, teaching and research interests are given in the Faculty Handbook and in the University website (www.ruh.ac.lk)

In addition to the above academic staff members, the Department depends on number of visiting lecturers from Universities of Colombo, Sri Jayawardenapura, Kelaniya, Moratuwa, Industrial Technology Institute(ITI), Government departments and other institutes in order to maintain the highest standards in the four-year Chemistry Special Degree.

The Department also employs a number of supporting academic staff: Demonstrators (14) who are appointed yearly mainly from the fresh Chemistry Special graduates and occasionally from the General Degree Students.

In order to function and maintain the Department office, all the laboratories, lecture halls and tutorial rooms, services of Non-academic staff comprising of senior technical officer super grade (01), technical officers (04), Laboratory attendants (13), and a Labourer are utilized.

All staff members are engaged in research activities in their specialized fields whenever possible in addition to their heavy teaching schedule and also involved in collaborative research with other universities and institutions.

In addition to the academic, research and administrative work at the University of Ruhuna, most of the staff members are actively involved in upgrading the secondary and tertiary education in Sri Lanka by participating in school seminars, invited lectures, conducting workshops for A/L students and teachers.

Facilities

The Department is accommodated in inter connected two-story building with another three-story building, "***Ranmuthu Wijayanayake Building***" which was named after Professor R. H. Wijayanayake in recognition of his yeoman service to the Department.

The department has only one lecture theatre called the chemistry lecture theatre which is equipped with a black board, overhead projector and a sound system. This main lecture theatre can accommodate about 250 students. In addition to this, there are two tutorial/mini-lecture rooms of capacity of 40 students with black boards, white boards and overhead projectors. These rooms are mainly used for conducting lectures/tutorials for Levels I and II special degree students. Neither lecture theatre nor lecture rooms possess in-house multimedia facility but only multimedia projector available in the department is moved around whenever necessary.

There are three elementary (teaching) laboratories (Lab I, Lab IV and Lab V) for organic, inorganic and analytical chemistry each having a capacity for 60 students and two laboratories (Lab II and Lab III) for physical chemistry, each having a capacity for 40 students. These five laboratories are located in the three-story building. The two advanced laboratories located in the two-story building each having a capacity of 12 are used by the students reading for B.Sc. Special Degree and for postgraduate degrees in Chemistry. One technical officer and one to three laboratory attendants depending on the student capacity are assigned to each laboratory for routine work.

In addition to the above, the department has a well-equipped air-conditioned special equipment room with a separate computer section connected to the Internet. This computer facility is being used for computer assisted learning in Chemistry. Some of the modern equipment available in the room are UV/visible Spectrophotometers, IR Spectrometer, Atomic Absorption Spectrometer (AAS), Cyclic Voltmeter, High Performance Liquid Chromatography (HPLC), Gas Chromatograph (GC), Differential Thermal Analyzer and Tubidtimeter.

The main department computer room is located in a rear room of the Chemistry Laboratory III. It is air-conditioned and equipped with 06 personal computers with internet facilities, one printer and a scanner. This unit is primarily utilized by the Chemistry Special Degree students for the internet and typing facilities. All academic and some non-academic members also use this facility for academic and administrative work.

The department has its own library, with a substantial collection of text books. Only staff and Special Degree students are allowed to use this facility.

The department has a Service laboratory (Ruhuna University Service Laboratory-RUSL) which has been established with the view to provide analytical services to public and private sector institutes, industries and Non Government Organizations, particularly in the southern region of Sri Lanka.

3. AIMS AND LEARNING OUTCOMES

3.1 Aims

The mission of the Department of Chemistry, University of Ruhuna is to produce graduates with a sound knowledge in Chemistry who will be able to be involved in professional careers, develop skills and competency needed to pursue graduate studies and research in chemistry and to fulfill Chemistry based current needs of the country.

With this mission department aims

- to provide students who follow the B.Sc.(General) Degree with a sound knowledge in fundamental and advanced chemistry including relevant analytical and other skills for them to successfully continue their studies and for career related and non-related to chemistry.
- to provide students who follow the B.Sc. (Special) Degree with advanced knowledge in chemistry and a wide range of skills in order for them to become recognized chemists who can successfully compete with other local or foreign graduates either for further education and training in chemistry or for direct entry into scientific carriers.
- to provide students who follow the B.Sc.(General & Special) Degree with knowledge and skills in applied fields in chemistry and expose them to recent advances in chemistry and technology in order for them to be qualified as graduates who will meet the demands of the industry and contribute to the economic development of the country.
- to offer opportunity to choose a variety of subject areas in chemistry from a range of course units offered for the B.Sc.(General) Degree enabling the undergraduates who follow them to develop their academic potentials and research skills according to their interests.
- to develop research skills of undergraduates, who follow the B.Sc. (Special) Degree in Chemistry and the students who follow postgraduates degrees, to enable them to apply their knowledge and skills to solve problems in Chemistry and related multidisciplinary areas they encounter during their future careers and to fulfill chemistry based needs of the development programmes of the country.
- to provide opportunity for students to develop skills and enthusiasm for lifelong learning.
- to provide necessary support to academic staff to improve their teaching and research skills in order to reach an intellectually challenging academic positions and to conduct research of high calibre.
- to provide a friendly, responsive and supportive environment for enthusiastic learning of high standards and to achieve good rates of completion of relevant degree programmes.
- to provide opportunity for students in the Faculty of Science including students who do not follow chemistry as a major subject to gather a considerable knowledge on economically important natural resources in Sri Lanka and related geological aspects wherever necessary.

- to provide opportunity for students in other faculties to gain sufficient knowledge in fundamental and advanced chemistry including relevant analytical and other skills in order to apply their knowledge in relevant subjects areas.
- to provide effective strategies for organization of teaching, learning, assessment, review quality assurance and maintain discipline.

3.2 Learning Outcomes

- First two years of study
  After successful completion of core courses in four semesters of the first two years of degree programme, students are ready to select either B.Sc. (General) Degree programme or B.Sc. (Special) Degree programme from their third year onward.

These students have
- learnt all the fundamental principles necessary for chemistry, and some for biochemistry.
- analytical chemistry, organic chemistry, physical chemistry, applied chemistry, computational chemistry, physics and biology. Namely, chemical bonding, atomic and molecular structures, thermodynamics, qualitative properties and electrolyte solutions, qualitative and quantitative techniques for analytical chemistry, separation methods, spectroscopy (Molecular spectroscopy, NMR, Mass spectroscopy), chemical kinetics, equilibria, quantum chemistry, electrochemistry, solid state chemistry, quantum chemistry, organic chemistry topics including stereochemistry, nomenclature, chemical properties and reactions of the functional groups, coordination chemistry including crystal field theory and radiochemistry.
- acquired the knowledge in safety of handling chemicals, glassware, electrical items, taking precautions for hazards in the laboratory, qualitative and quantitative techniques in the analysis of organic chemistry and inorganic chemistry.
- Developed qualitative and quantitative analytical skills in problem solving of chemistry thereby acquiring lifelong general analytical ability.
- been trained to work in groups and hence obtained the training of listening to others and of taking collective decisions while maintaining laboratory discipline.

B.Sc. (General) Degree
- After successful completion of core courses in the first semester and optional courses in the last semester of the final year (Level III) of the degree programme, students qualify to obtain the B.Sc. (General) Degree and by which time, students have
- developed the knowledge of applying all the fundamentals they have learnt in their three years of the degree programmme in chemical & biological analysis, in industrial processes and in environmental quality assurance.
- learnt to use physical chemistry instruments and developed skills in use of them in chemical analysis to design experimental set up and to analyze data statistically.
- obtained confidence in their ability to work in industry, to hold administrative responsibilities, to move forward with society in their career.

B.Sc. (Special) Degree
- After successful completion of courses (all courses offered are mandatory) in Level I and Level II of the Special Degree programme, students have
- expanded their fundamental knowledge of chemistry and sub -disciplines into a wide area of advanced chemistry in which one should acquire in-depth to begin his career as a

scientist in either academic field or industry; namely inorganic chemistry, physical chemistry, organic chemistry, analytical chemistry, biochemistry, computational chemistry, environmental chemistry, food chemistry and industrial chemistry.

- been trained with the high standard pure chemistry laboratory techniques, spectroscopic methods and familiarized with major analytical instruments such as HPLC, UV, IR, AAS and Potentiostat.
- developed advanced analytical techniques applicable to areas of applied chemistry in industry and in programmes of environment protections.
- acquired knowledge of fundamental computer based applications required for data analysis and manipulations, graphical representations and pictorial animations, documentations, and presentations.
- acquired fundamental knowledge of computer simulation techniques including ability of writing algorithms, programming codes, scripts applicable to advanced research in interdisciplinary sciences such as biophysics, solid states, nano-science and drug discovery.
- developed all the skills those should be acquired by a research scientist such as ability of working independently, working as a group, carrying out the literature survey, use of online sources of information, developing new experimental procedures, print and oral expressions of research findings and exploring new research areas
- developed the skills of dissemination of knowledge, such as oral presentation and communication.
- obtained industrial experience from major industries and institutes in Sri Lanka

4. FINDINGS OF THE REVIEW TEAM

4.1. Curriculum Design, Content and Review

The academic year consists of two semesters, each of 15 weeks. The capacity of a study course is based on the credit value assign to each of the course. For the lecture courses, 15 hours of lectures is equivalent to 1 credit and department offers courses having varying credit weights from 1 credit (15 hours) to 4 credits (60 hours). For practical coursers, 22.5 laboratory hours is equivalent to 1 credit and the department offers practical courses having varying credit weights from 1 credit (22.5 hours) to 4 credits (90 hours).

During the first two years, department offers only core lecture and practical courses for the students offering chemistry as a subject. Each of the semesters in the first two years, the department offers a 4 credit lecture course and a 2 credit practical course amounting 16 lecture credits and 8 practical credits. At the end of the second year, the Special Degree students are selected based on their merits and the performances at the viva vorce interview conducted all the faculty members. Those who are unable to get into the Special Degree program opt for a General Degree.

The credit values for the first two year practical courses are modified with effect from the 2009/2010 intake where the number of practical hours equivalent to a practical course has increased from 22.5 hours to 45 hours. Thus, from 2009/2010 intake onwards the credits values for the practical courses are reduced from 4 to 2 in each of the Levels I and II.

The students whom are selected to follow a General Degree must follow a 4 credit lecture course and a 2 credit practical course (changed to a 1 credit practical course from 2009/2010

intake) as core courses having a total of 30 core credits (23 core credit courses from 2009/2010 intake) within the first five semesters. Department offers 6 credit optional courses for General Degree students during their final semester and two of the courses included lecture and practical components. From the 2009/2010 intake the credit value of the three optional courses reduced to 5 but the number lecture hours and the practical hours remain unchanged.

During the last six years, intakes of the Special Degree varied between 7 and 11 and the selected number was based on the availability of the staff and the facilities in the research laboratories. Special Degree course included 41 lecture credits, 21 practical credits, 6 research credits, 2 essay credits and 10 optional topics totalling 80 credits but from 2009/2010 intake 7 practical credits are reduced other credit values remain unchanged.
The detail of the undergraduate programs conducted by the Chemistry Department is given to the students in the Students Hand Book which is provided to the students at the beginning of the program.

The review team observed that the theory and practical courses within the Levels I (year 1) and II (year 2) are designed to cover more of the fundamentals in the subject areas with the exception of the physical chemistry practical. However, some of the physical chemistry practical is covered in the fifth semester for both the degree programs to different extents. The optional courses offered by the department are more career oriented courses.

The review team welcomes the opportunity of the general degree students to follow a mini-research project under the guidance of a senior member of the department.

Review team appreciates the effort made by academic staff for their contribution in guiding the students in their research projects with the limited facilities and the inclusion of computational chemistry course into the curricula.

Seminar topics and the essays cover several areas of modern chemistry aspects in the Special Degree program. It was observed that the selections of the research projects are done by the students themselves from a list of topics provided by the academic members. The current undergraduates and the immediate graduates have appreciated the availability of the selection of the project based on their choice and extended their gratitude to the academic staff for their valuable guidance.

Review team had the opportunity to discuss the progress of the academic review with the academics and the students at different forums and noticed the commitment of the department members to gain the current levels and the academic members believe the revisions should be done periodically to give the best for their students.

It is the view of the Review Team that the present state of curriculum design, content and review adopted by the Department can be judged as GOOD.

4.2. Teaching, Learning and Assessment Methods

The common method of imparting the knowledge is through the delivery of lectures. It was observed that both the senior academic staff members and the probationary lecturers are conducting lectures for the General Degree students even at their first year lecture courses. At the discussion with the students and the recent graduates whom are serving the department as

demonstrators, it was revealed that some of the probationary lecturers are as good as the senior academic members in delivering the lectures. The review team had the opportunity to visit a lecture and couple of tutorial sessions and it was noticed that the students are copying down the lecture notes presented by the lecturer using the overhead projector. Lecturers have attempted to get the involvement of the students to work out the problems during the tutorial classes.

The only lecture theatre available in the department is used when the student number is large both in the tutorial sessions and in the lectures. The lecture theatre is equipped with a traditional board with chalk, a sound system for the student capacity of around 250 students. Two other rooms with about 40 seating capacity are available for the lectures for Special Degree students and for small groups. They have the same facilities along with a mobile multi-media unit.

The review team noticed the availability of printed tutorials among the students in the tutorial classes. The review team also noticed that some students are copying the tutorials from the notice board. It was revealed that the lecturer him(her)self is conducting the tutorial class as a single group due to the lack of facilities in the department. The review team felt that it would be better to have several small groups for the tutorial sessions rather than having a single group tutorial.

The review team visited all the laboratories and two different practical sessions, one with hands on experiment and the other was not hands on experimental session, but, an problem solving session based on the provided information. Laboratories had a good student to supporting staff (academic and non academics) ratio and the students have worn an apron but there was no protection to their eyes (safety glasses). Several practical classes were held in parallel with the supervision of a senior staff member and the supporting academic staff included a lecturer in- charge and several demonstrators from the recent graduates. The review team appreciates the active participation of the staff in smooth functioning of the laboratories.

Both the students and the non academics have complained the lack of facilities in the laboratories. The non academic supporting staff was found to be highly motivated and devoted to their services despite the lack of their training.

The examinations are carried out according to the credit system. In the first two years, examinations are held at the end of the semester. Special degree students preferred to have the examinations at the end of each semester instead of the current practice of having examinations at the end of the year. Also they would like to devote the last semester for research project only.

The examination papers set by the examiners are moderated by senior academic members and they are moderated again by experts in the local universities. The moderators are appointed by the Head of the Department and the comments from the moderators were available for the review team.

It is the view of the Review Team that the present state of teaching, learning and evaluation adopted by the Department can be judged as GOOD.

4.3 Quality of Students including Student Progress and Achievements

The student enrolment in the Faculty of Science is around 350 per academic year of which about 60% follow Chemistry as a subject. The documents supplied by the department revealed that the performance of the students is monitored at all levels by tutorials, continuous assessments, practical examinations and the formal end of semester examinations. The marks of formal end of semester examinations and final practical mark of students are available with the Head of the Department of Chemistry. The attendance of the students at practical classes is monitored well and only students with an 80% attendance are allowed to sit for the practical examinations.

The Z-score of students following chemistry programme during last five years varies from 0.5 to 1.76 and majority of the students possess a range of Z-score between 0.7-1.2 for Physical Science stream and 0.7-1.4 foe Bio-science stream. The Review Team noted that students with low Z-score too have entered the special degree programme, indicating student progress within the university period. However, no meaningful conclusions can be made as Z-score values of all the students following chemistry as a subject is not available. It was noted by the review team that the performance of the Special Degree Chemistry is better than the General Degree students with Chemistry as a subject. On an average sixty five percent of the students offering chemistry as a subject in the General Degree passes the subject whereas hundred percent of the Special Degree student passes the chemistry. On an average 25% of the General Degree students graduates with classes whereas 60% of the Special Degree students obtain classes. The Department records show that the special degree graduates passed out during last 2-3 years are all employed with majority in them in the Government sector and others in the private sector and none of them are following postgraduate programmes.

It is the view of the Review Team that the quality of students, student progress and achievements can be judged as GOOD.

4.4. Extent and use of Student Feedback

The Department obtains qualitative student feedback about the academic programme and the requirement of infrastructural facilities at lectures & tutorial classes. Students expressed happiness about their interaction with the teachers and higher authorities.
The Department has perceived the importance of quantitative student feedback. The teaching process is evaluated by student feedback using a questionnaire since 2008. The questionnaire includes feedback on several aspects of teaching & learning such as student awareness of learning outcomes, organization & clarity of the lecture, motivation & interaction of the lecturer, speed & audibility of the lecture, etc. Student feedback data obtained by the lecturer have been analyzed to identify the strengths and weaknesses of each staff of the department. The outcome of the quantitative student feedback has been brought to the notice of all academic staff at departmental meetings. The Review Team noted that student feedback data has been taken into consideration during the revision of the curriculum and to increase the tutorial classes and industrial visits.
The Review Team recommends that the practice of obtaining students feedback may be extended to all visiting staff as well as for practical classes. Also data may be collected for a lecturer to compare his/her scores over the years on a particular course to evaluate the progress. It is also recommended to include the title and number of hours of the lecture course, medium of instruction, number of students registered, and number of students participated for the evaluation in the report of the evaluation of each lecture course. It is more valuable if this can be done by another staff member in the department.

It is the view of the Review Team that the Extent and Use of Student Feedback, Qualitative and Quantitative adopted by the department can be judged as SATISFACTORY.

4.5. Postgraduate Studies

The Department of Chemistry enrolls students for M.Phil. and Ph.D.degree programmes depending on the availability of research funds, facilities in the department and the staff with postgraduate qualifications. Applications of the postgraduate programmes are recommended by the Faculty Board and finally approved by the University Senate. Graduates with B.Sc. General Degree who have followed Chemistry are required to pass a qualifying examination held by the department to register for postgraduate degrees whereas candidates with Special Degree in Chemistry are exempted from sitting the qualifying examination.

The Department of Chemistry has produced six M.Phil. Degrees and one Ph.D. Degree during the past years under the supervision of senior staff members of the department in collaboration with other faculties and institutions. A student who read for an M.Phil. Degree completed the research work and is writing up the thesis and also another M.Phil. student is continuing the research programme at the moment. Several senior members of the department are involved in teaching in the postgraduate programmes conducted by the faculty.

The department has drafted a syllabus for an M.Sc. programme in Industrial Chemistry sometime back. As there are sufficient senior staff are available this programme shall be commenced as early as possible and the Review Team found that students have shown interest in following such course.

It is the view of the Review Team that the postgraduate studies of the Department can be judged as SATISFACTORY.

4.6 Peer Observation

The Department has perceived the importance of peer evaluation and the review team was pleased to find that the practice of peer evaluation of teaching by colleagues in their own department has begun recently by few staff members. The peer evaluation data are collected on communication, clarity, delivery, sequence and student interest. In addition, temporary and junior staff members are being monitored by senior academics. The peer observation is found to be a workable tool in the department. It can be recommended that the peer observation data may be collected for few years, analyze them and be correlated with the student feedback responses for further improvement of teaching, learning and assessment of lecturers concerned.

Having considered carefully the extent and use of peer observation, the review team is of the opinion that this component can be stated as SATISFACTORY.

4.7. Skills Development

Department has recognized that the skills development is an integral part of the curriculum and several methods have been adopted to improve the skills of the students. They included IT skills, presentation skills, report writing and scientific investigations. At the beginning of the program, steps were taken to improve the English Language skills and the proficiency of English is further assessed during the program where the students are required to pass two examinations at the Levels I and II as a requirement of the degree. Special degree students are sent to an industrial training at the end of their Level III which enhances the job opportunities for them. At the fourth year second semester Special Degree students are engaging a research project under the guidance of a senior academic staff member. Few General Degree students were given the opportunity to engage a mini-research project under the guidance of a supervisor at their final semester.

It is the view of the Review Team that the present state of skills development adopted by the Department can be judged as GOOD.

4.8 Academic Guidance and Counseling

When new students are recruited, they are provided with the faculty handbook containing curriculum and a university prospectus. An orientation programme is being conducted during the first week of their entry. The hand book and the website provides information about University, Faculty, Departments, subjects offered, subject combinations, academic programmes and details of course titles. On the first day of the orientation programme, the Vice-Chancellor, Dean of the Faculty, Career Guidance Officer and Senior Student Counselor address the students. At this programme an introduction is given to the students about the University, Faculties, Departments and various student learning support system available at the University.

During the orientation programme student visit various departments in the faculty and they come to know about the staff, the courses offered by each of the department, subject combinations available and the method of selecting subjects and the selection criteria to offer the special degree programmes. An intensive course in English is being taught for 10 weeks before students start their formal academic programme. In addition English is taught throughout the student career at the rate of two classes a week and a pass in English is made compulsory.

Whenever students encounter personal problems it has been found that the students can meet the faculty student counselors or any staff member to this effect. There are four student counselors attached the FSc under the guidance of a Senior Student Counselor. There is in addition a trained person is functioning as a professional counselor.

There is an Acting Director for Career Guidance Unit (CGU) to facilitate students by giving trainings/seminars on job related matters and improve attitudes to carry out a successful career. However, the Team found that CGU is not conducting any programme oriented to assist the general science students. All the staff assists students in applying for their postgraduate studies and seeking employment opportunities.

It is the view of the Review Team that the Academic Guidance and Counselling can be judged as GOOD.

Based on the observations made during the visit by the review team and discussed above, 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	Satisfactory
Postgraduate Studies	Satisfactory
Peer Observation	Satisfactory
Skills Development	Good
Academic Guidance and Counseling	Good

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:

1. The curriculum is designed adequately to cater for both three-year B.Sc. General Degree and four-year B.Sc. Special Degree programmes

Weaknesses:

1. Curricula and the examinations are designed with a year planer having two semesters per academic year. However, the semester basis is not properly applied with the Special Degree. Need to use the year planar effectively for smooth operation of the degree program.

Judgment: ***Good***

2. Teaching, Learning and Assessment Methods

Strengths:

1. Use of variety of opportunities to provide appropriate teaching and learning experiences.
2. Moderation of question papers and second marking of the answer scripts are done.

Weaknesses:

1. Less opportunities to promote self learning abilities of the students following the General degree programme.
2. Conduct tutorials to total class as one group.
3. Inadequate facilities in the lecture theatres and in the laboratories
4. Inadequate safety facilities in the laboratories

Judgment: ***Good***

3. Quality of Students, including Student Progress and Achievement

Strengths:
1. There is evidence for student progress during the university career.
2. Quality of B.Sc. Chemistry Special Degree students graduated during last few years is good with 100% pass rate and all the students are employed.

Weaknesses:
1. None of the recent graduates are doing postgraduate degree.

Judgment: ***Good***

4. Extent and Use of Student Feedback

Strengths:
1. Obtaining qualitative student feedback is in practice.
2. Obtaining quantitative student feedback procedure has begun.

Weaknesses:
1. Obtaining quantitative student feedback practice is not extended to practical sessions as well to all visiting academics.

Judgment: ***Satisfactory***

5. Postgraduate Studies

Strengths:
1. Few M.Phil. and a Ph.D programme are continuing satisfactorily.
2. Department is in a position to commence a taught postgraduate program and the students are waiting for such a program

Weaknesses:
1. Few equipments are not available or to be repaired and updated to carry out research work more effectively.
2. Department has not started the taught postgraduate program in industrial chemistry planed in 2004.

Judgment: ***Satisfactory***

6. Peer Observation

Strengths:
1. Commencement of formal peer observation for few academic staff members' teaching.
2. Guidance provided to the newly recruited academic staff by the senior academic members on various issues in teaching and other duties

Weaknesses:
1. Obtaining peer observation has not yet extended to all academics/visiting academics

.

Judgment: ***Satisfactory***

7. Skills Development

Strengths:

1. Every special degree student take part in several skill development exercises; industrial training, practical, research, oral presentation, seminar presentation, popularization of chemistry for A/L students, exhibition, chemical society, etc.

Weaknesses:

1. Skill development of all the students through industrial visits and having guest lectures by the industrialist, scientists etc not available.

Judgment: ***Good***

5.8 Academic Guidance and Counselling

Strengths:

1. Availability of student handbook/prospectus and a website.
2. Availability of an orientation programme.
3. Availability of Academic Advisors.
4. Availability of Student Counselors and Professional Counselor for counselling.

Weaknesses:

1. Insufficient programmes to develop the skills for a successful career of the science students

Judgment: ***Good***

6. RECOMMENDATIONS

Based on the findings of the review, the review team wishes that the Department may consider the following recommendation in order to improve the quality of the study programmes further.

1. Extend the time duration for the industrial training programme.
2. Special selection should be based on the merits only.
3. Steps needs to be taken to increase the number of students for the Special Degree
4. Strengthen the mini-research projects concept for General Degree students
5. Opportunities shall be provided to General degree students to promote their self
6. learning skills.
7. Facilities shall be improved to deliver lectures through the combination of black
8. board and chalk with multimedia as much as possible.
9. Better to increase the contribution of senior academic staff for courses taught at Levels I and II

10. It is recommended that as far as possible to keep students' z-scores and year to year performances in a suitable manner to follow the progress and the achievements of the students following courses in the chemistry department.
11. It is worth to investigate the selection of the optional courses offered by the Department of Chemistry for General Degree students.
12. Obtaining quantitative student feedback procedure may be extended to practical sessions as well to all academics/visiting academics.
13. Findings of the student feedback practice may be carried out regularly to see the change over the years for each staff.
14. Explore the possibilities of obtaining grants to acquire instruments required to conduct M.Phil and Ph.D programmes more effectively.
15. Commence the postgraduate degree programme already planned on industrial chemistry as early as possible.
16. Obtaining peer observation may be extended to all academics/visiting academics
17. Peer observation data has to be correlated with the student feedback responses for staff development programme of the lecturer concerned
18. Need to establish programs to have more interactions with the scientific and industrial community.
19. Service of CGU shall be improved.

Acknowledgements

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

7. ANNEXURES

Annex1. AGENDA OF THE SUBJECT REVIEW VISIT

Day 1 –April 20, 2010

08.30 – 09.00	Review Panel meeting(s) with the Vice Chancellor, Dean/Science, Head/ Dept. of Chemistry
09.00 – 09.30	Discussion of 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 Departmental Facilities
12.00 – 13.00	*Lunch*
13.00 – 14.00	Observing Departmental Facilities cont….
14.00 – 15.30	Observing Faculty Library and the Main Library, Computer Pool University Gymnasium & Physical Training Center
15.30 - 16.00	Observing Teaching – Level I Lecture
16.00 – 17.00	Meeting with Department Academic Staff (*working tea*)
17.00 – 17.15	Brief Meeting of Reviewers

Day 2 – April 21, 2010

08.45 – 09.45	Observing Documents
09.45 – 10:15	Observing Teaching – Level II practical class
10.15 – 10.30	*Tea*
10.30 – 11.00	Observing Teaching – Level III lecture
11.00 – 12.00	Meeting with Technical Staff and other Non-Academic Staff
12:00 – 13:00	*Lunch*
13.00 – 13.30	Meeting with Demonstrators
13.30- 14.30	Meeting with Undergraduate Students
14.30- 14.45	*Tea*
14.45 – 15.30	Meeting with course coordinators of other optional courses (FSC, CLC, English)
15.30 – 16.15	Meeting with Special Degree students
16.15 – 16.45	Meeting of Reviewers

Day 3 – April 22, 2010

08.00 – 08.30	Observing Teaching – Level I Lecture
08.30 – 09.15	Meeting with postgraduate students
09.15 – 09.45	Meeting with Director Career Guidance Unit
09.45 – 10.30	*Tea (with observing Documents)*
10.30 - 11.00	Observing Teaching – Level I practical class
11.00 – 11.30	Reviewers Private Discussion
11.30 – 12.30	Meeting with Head and Staff for Reporting
12.30 – 13.30	*Lunch*

Annex 2. LIST OF PERSON MET BY THE REVIEW TEAM

Vice Chancellor
Deputy Vice Chancellor
Dean of Faculty of Sciences
Head of the Department of Chemistry
Acting Director, Staff Development Centre
Librarian
Head, ELTU
Student Counselors and Academic Counselors
Academic staff of the department
Non-academic staff of the department
Students of 1st, 2nd, 3rd and final year
Recent graduates
Postgraduate Students
Demonstrators

Annex 3. DOCUMENTS PERUSED BY THE REVIEW TEAM

Cadre
Career Guidance (Workshops / Training Programs)
Curriculum Revision
Department Meetings
Equipment and Consumables
Industrial Training
Moderated Papers
Panel Member and Meetings
Peer Observation Data
Student Feedback Data
Permanent Academic Staff
Postgraduate Studies & Research
Question Papers 1st year
Question Papers 2nd Year
Question Papers 3rd Year
Question Papers 4th Year
Student GPA
Student Matters
Subject Review
Time tables
Undergraduate Research Projects
Postgraduate Research Projects
Visiting Appointments

Annex 4. FACILITIES OBSERVED BY THE REVIEW TEAM

Two and three-story building complexes of the department of chemistry comprising –A large lecture theatre, three small lecture rooms, seven teaching laboratories, two research laboratories and staff rooms
Central computer laboratory with computers & internet facilities
Department computer laboratory
Equipment rooms with specific instruments and glassware
Central library
Department mini-library

Annex 5. ACADEMIC STAFF OF THE DEPARTMENT OF CHEMISTRY.

Table. 2.2.1. Academic staff of the Department of Chemistry

Name	Designation	First appointment	Other responsibilities
Prof. R.N. Pathirana B.Sc. (P'deniya, SL), M.Sc. (Southampton, U.K.) Ph.D. (Southampton, U.K.)	Senior Professor(Chair)	1982	Council member Senate member
Prof. (Ms.) H.M.K.K. Pathirana B.Sc.(University of Sri Lanka, Vidyodaya) Ph.D. (Aston in B'ham, U.K.)	Professor	1991	Senate member
Dr. A.S. Dissanayake B.Sc. (Colombo, SL), Ph.D. (Wayne, USA.)	Senior Lecturer I	1987	
Dr. (Ms.) M. Edussuriya M.Sc., Ph.D. (Moscow, Russia)	Senior Lecturer I	1996	Head Academic counselor Patron- Buddhist Society Senior Treasurer- Faculty Sports Society
Dr. (Ms.) V. P. Bulugahapitiya B.Sc. (Ruhuna, SL), Ph.D.(Fribourg, Switzerland)	Senior Lecturer I	1992	Student Counselor Coordinator of Faculty Course Units (FSC) Coordinator-RUSL
Dr. Jinasena W. Hewage B.Sc. (Ruhuna, SL), Ph.D. (Maine, U.S.A.)	Senior Lecturer I	1995	Faculty Course Coordinator
Dr. L A. Panamgama B.Sc. (P'deniya, SL), Ph.D. (WITS, R.S.A.)	Senior Lecturer II	2005	
Dr. G.B.C. Sanath B.Sc. (Ruhuna, SL), Ph.D. (Netherlands)	Senior Lecturer II	1999	Academic Warden, Patron- Kala Hawla, Senior Treasurer- NES Academic counsellor
Mr. G.S.P. Garusinghe B.Sc. (Ruhuna, SL) (on study leave) Reading for a Ph.D. in U.S.A.	Probationary Lecturer	2002	
Ms. S. K. Hettihewa B.Sc. (J'Pura, SL), M.Sc.(UK) MPhil (P'deniya, SL)	Probationary Lecturer	2002	
Ms. R.H.W. Gunasekera B.Sc. (Ruhuna, SL) (on study leave) Reading for a Ph.D. (U.S.A.)	Probationary Lecturer	2002	
Ms. W.S. Hemalika B.Sc.(Ruhuna, SL) (on study leave) Reading for a Ph.D. (U.S.A.)	Probationary Lecturer	2003	

Mr. S. Wanniarachchi B.Sc. (Ruhuna, SL) (on study leave) Reading for a Ph.D. (U.S.A.)	Probationary Lecturer	2003	
Mr. K. Nishantha Kumara B.Sc.(Ruhuna, SL)	Probationary Lecturer	2005	
Ms. H. D. Jayasekera B.Sc. (Ruhuna, SL)	Probationary Lecturer	2005	
Mr. H.J. Sampath B.Sc.(Ruhuna, SL)	Probationary Lecturer	2007	
Mr. Y.M.A.L.W. Yapa B.Sc.(Ruhuna, SL)	Probationary Lecturer	2008	
Ms.D. L.S. de Silva B.Sc.(Ruhuna, SL)	Probationary Lecturer	2009	

Annex 6. SUBJECT COMBINATIONS.

Combination Code	Subject combinations	Stream Biological/Physical
BS1	Chemistry, Botany, Zoology	B
BS2	Chemistry, Physics, Zoology	B
PS1	Chemistry, Physics, Mathematics	P
PS2	Chemistry, Computer science, Mathematics	P
PS5	Chemistry, Mathematics, Industrial Mathematics	P
PS7	Chemistry, Applied Mathematics, Industrial Mathematics	P

Course units and examination details of B.Sc. General Degree Programmes

Year	Course Unit	Description	Lecture hours allocated	Credit hours allocated	Exam time duration
Level I	CHE 1114	Basic concepts in Chemistry I	60	4	3 h
	CHE 1214	Basic concepts in Chemistry II	60	4	3 h
	CHE1b24	Basic laboratory experiments in inorganic and organic chemistry	90	4	3 h
Level II	CHE 2114	Topics in Chemistry	60	4	3 h
	CHE 2214	Introduction to Advanced Chemistry I	60	4	3 h
	CHE2b24	Experimental Inorganic and Organic Chemistry	90	4	3 h

Level III	CHE 3114	Introduction to Advanced Chemistry II	60	4	3 h
	CHE 3122	Experimental Physical Chemistry	45	2	3 h
	CHE 3213	Industrial Chemistry: Theory Practical	30 21	2 1	2 h 3 h
	CHE 3222	Environmental Chemistry: Theory Practical	 15 24	 1 1	 1 h 3 h
	CHE 3231	Chemistry related some economically important resources of Sri Lanka	15	1	1 h

Course units and examination details of B.Sc. Special Degree Programmes

Level	**Course unit Examination Paper**	**Number of credits allocated**	**Number of hours allocated**
1	CHE 3414: Advanced Analytical Chemistry I and Physical Methods	4	3 h
	CHE 3423:Biochemistry	3	2 h
	CHE 3432: Molecular Structure & Properties I	2	2 h
	CHE 3444:Advanced Inorganic Chemistry	4	3 h
	CHE 3453: Advanced Organic Chemistry I	3	2 h
	CHE 3462: Advanced Organic Chemistry II	2	2 h
	CHE 3473:Laboratory and Quality Management (L+P)	3	2 h
	CHE 3482: Chemical Equilibrium & Changes	2	2 h
	CHE 3491: General Chemistry and Current topics	1	2 h
	CHE 3504: Laboratory Inorganic Chemistry	4	3 h
	CHE 3514: Laboratory Organic Chemistry	4	3 h
	CHE 3524: Laboratory Physical Chemistry	4	Continuous assessment

2	CHE 4412: Advanced Analytical Chemistry II	2	2 h
	CHE 4422: Molecular Structure and Properties II	2	2 h
	CHE 4472: Chemical Equilibrium and Changes II	2	2 h
	CHE 4442: Basic Course in Geochemistry, Petroleum Chemistry and Chemical Engineering	2	2 h
	CHE 4452: Basic Course in Mineralogy, Gemmology and Metallurgy	2	2 h
	CHE 4462: Basic Course in Applied Chemistry	2	2 h
	CHE 4472: Industrial and Environmental Chemistry	2	2 h
	CHE 4482: Special Topics in Chemistry	2	2 h
	CHE 4492: Computer assisted learning of Chemistry	2	2 h
	CHE 4503: Practical Applied Chemistry I	4	3 h
	CHE 4513: Practical Applied Chemistry II	4	3 h
	CHE 4526 – Research Project	6	-
	CHE 4532 – Essay.	2	-
	Total	70	-

Note: Please refer the faculty handbook for the details and syllabi of each course unit.