SUBJECT REVIEW REPORT

DEPARTMENT OF AGRIC. ENGINEERING

FACULTY OF AGRICULTURE
UNIVERSITY OF JAFFNA

13th to 15th October 2008

Review Team :

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Prof. Ranjith P. de Silva, University of Peradeniya

Dr. (Ms.) Aruni Weerasinghe, Rajarata University of SL

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List of abbreviations

JUSL	Jaffna University of Sri Lanka
DAGENG	Department of Agricultural Engineering
GPA	Graded Point Average
GP	Grade Point
FGPA	Final Grade Point Average
CA	Continuous Assessment
SER	Self-Evaluation Report
RDA	Road Development Authority

1. SUBJECT REVIEW PROCESS

The purpose of the review of the academic programme of the Department of Agricultural Engineering (DAGENG) of the Jaffna University of Sri Lanka (JUSL) was to evaluate the quality of education in Agricultural Engineering in terms of curriculum, teaching and learning environment, the facilities available, students' achievements and the quality of graduates.

In the process, the Review Team studied the Self-Evaluation Report (SER) submitted by the DAGENG and all other relevant evidences made available. An initial discussion was held to discuss the agenda of the Review Team for the convenience of Review Team as well as the staff of the Department. The information on the general academic programme of the faculty presented by the Dean of the Faculty at the outset of the review provided a background for the review. The Head of the DAGENG presented the academic programme, resources available and the constraints in detail at the commencement, and made available numerous documents during the course of the review process.

The Review Team visited all the Departmental facilities like laboratory located in the Faculty of Medicine, computer rooms located at the Faculty premises and Technical College workshop where some of the machinery practical sessions are held, and offices of the academic staff and related University facilities like the Main Library complex. Discussions were held with the academic and non-academic staff separately to obtain information required for the review.

Lecture sessions and practical sessions were observed by the Review Team, and a group of undergraduate students, drawn from final year and second year were invited for discussions.

The Review Team concentrated on the following aspects of the academic programme of the Department:

1. Curriculum Design, Content and Review.
2. Teaching, Learning and Assessment methods.
3. Quality of students, student progress and achievements.
4. Extent and use of student feedback.
5. Postgraduate studies.
6. Peer Observation.
7. Skills Development.
8. Academic Guidance and Counselling.

The Review Visit was made on 13th – 15th October, 2008. The members of the Review Team were: Prof. Lakshman Jayathilake, National Institute of Business Management, Dr. (Ms.) Aruni Weerasinghe , Dean, Faculty of Agriculture, Rajarata University of Sri Lanka, and Prof. Ranjith Premalal De Silva, Head, Department of Agricultural Engineering, University of Peradeniya.

A large number of documents related to the undergraduate programme was scrutinised closely, as listed below:

- Teaching materials (handouts, tutorials, transparency sheets, etc.).
- Annual report.
- Examination papers.
- Term papers.
- Research abstracts of the final year students.
- Practical records.
- Assignments.
- Study tour reports.
- Course modules.
- Students' course evaluations.
- Evidence of peer evaluation.
- Corrected answer scripts with model answers.
- Student progress reports showing performance in each semester.
- Research dissertations.
- Reports on experiential learning.

The Review Team made judgements as *good*, *satisfactory* or *unsatisfactory* on each of the eight aspects regarding the academic programme of the DAGENG at the end of the 3-day review visit.

If the Department wishes, it may request clarifications from the Review Team or make any comment on the Review Report within a month of receiving the report. The Department is required to send a report on the action taken in response to review recommendations within one year. Finally, the Review Report will be published.

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

Jaffna University of Sri Lanka (JUSL) is one of the 15 Universities in Sri Lanka. The Jaffna campus was established in 1974 by an order made by the Honourable Minister of Education. The Campus became an independent and autonomous University bearing the name University of Jaffna on January 01, 1979.

The academic and administrative activities of the University are governed by the Universities Act. No. 16 of 1978, as last amended by Act No. 1 of 1995.

From a small beginning in the thirty acre campus of the then Parameswara College premises founded by the veteran philanthropist, Sir Ponnampalam Ramanathan, the University has grown enormously and is today the home of eight Faculties with fifty seven academic

Departments, several service/academic/support units and centers and a Campus at Vavuniya, about 130 Km from Jaffna (www.jfn.ac.lk).

The Faculty of Agriculture is one of the leading Faculty in the university of Jaffna. In 1985, on the request of the University, University Grants Commission approved the establishment of Faculty of Agriculture in 1985 and the Faculty was established in Kilinochchi in 1989. In August 1997, the Council of University of Jaffna decided to shift the Faculty from Kilinochchi to Jaffna and temporally located in the buildings of Faculty of Medicine. Few private houses have also been taken over by the Faculty to locate its Departments.

The first batch of students (1989/90) was admitted to the degree programme and there were 20 students in the first batch. Since then, a more than 300 students had graduated from the Faculty of Agriculture and 57 students have opted for Agricultural Engineering as their specialization. Presently, the Department has eight students for specialization.

The degree programme offered by the Faculty of Agriculture includes 6 courses from the Department of Agricultural Engineering during the first three years with a credit load of 19 out of a total of 130. In addition, 12 credit units in 6 courses are offered by the Department for specialization module.

3. AIMS AND LEARNING OUTCOMES

3.1 Aims

The aim of the degree programme is to make the recipient graduate a person with the core structure of experimental knowledge in agricultural machinery towards mechanization in all agricultural practices with other supporting disciplines as a major challenge while maintaining international standards in education.

1. The degree programme is to open proper opportunity for students to coincide with policy of the University of Jaffna, Sri Lanka.
2. The degree programme is to fulfil the policy of the Faculty of Agriculture and its vision and mission.
3. A standard justification of the degree programme is to move simultaneously with aim and objectives of the University, Faculty and the Department.
4. Knowledge base education to the students is to justify mathematics as foundation for commencement of machinery dealing with its function, maintenance and operation.
5. Knowledge base education to the students is too familiar with engineering drawings for understanding functions of machines.
6. Practical and field knowledge on structural design and fabrication of agricultural machinery through better designed laboratory practical and field visits in the workshops already selected.
7. Knowledge on fasteners and welding practice is well arranged for conducting smooth practical classes.
8. Knowledge on engines developed accident prevention in field and road driving of vehicles.
9. The recent land value increment creates the needs of surveying and levelling and its specialty.
10. Deep knowledge in irrigation structures is essential to control saline water intrusion and salinity problems in lift irrigation.

11. It is vital to have better knowledge on post-harvest technology and biology for establishment of various fruit processing units in our country.
12. Friendly Departmental relationships and team action among the Departments towards the vision of the University help improving the quality of Institution in a tremendous way.

The above aims were provided by the Department and the Review Team has not made any amendments.

3.2 Learning Outcomes

Agricultural Engineering includes several traditional disciplines and some modern technologies in an integrated approach for providing technology for agriculture. Accordingly, the teaching outcomes expected are listed below.

The recipient graduates should be able to:

1. To gain a broad knowledge and understanding in the field of machinery management, water management, waste management and environmental studies.
2. To gain a better knowledge particularly on function, operation, maintenance and cost estimation of engines and machines which could be utilized wherever possible.
3. To earn a knowledge on machinery could be applied to find immediate job even in abroad whenever applicable.
4. To earn a knowledge on water quality for drinking and irrigation
5. To create inter-personal relationships among scientists for personal carrier development.
6. To learn technical, intellectual and managerial skills necessary for carrier improvement in teaching, learning, research, assessment and feed back through administrators.
7. To develop appreciative personal skill in dealing with top level management circle and also supervisory level without bias.
8. To develop performance appraisal methods (12 methods) vital for utilization of animate and inanimate resources and evaluation techniques through scientific management and to have the direct first hand knowledge on human resource management research.

Therefore, the recipient graduates are expected to have theoretical and practical knowledge in all engineering aspects related to agriculture. Apart from these subjected related skills, the graduates are expected to develop a range of other skills which are needed for professional and ethical practice as well as to be productive and responsible member of the society. These personal and interpersonal skills include but are not limited to:

- the ability to understand how this knowledge could be applied effectively and efficiently for the practical use as well as for the well being of the society
- use the knowledge for productivity, profitability and sustainability
- intellectual and analytical skills
- technical skills and capabilities for scientific experimentation
- capability to work and perform in groups and an understanding of the importance of teamwork
- management skills and effective communication skills

4. FINDINGS OF THE REVIEW TEAM

4.1 Curriculum Design, Content and Review

The Department of Agricultural Engineering supports the degree programme offered by the Faculty by offering courses in all the semesters in the degree programme. The courses offered by the Department of Agricultural Engineering for the core programme of the degree are given below.

AEN 1101 Engineering Mathematics & Engineering Drawings	3: 30/30
AEN 1201 Basic Farm Machinery Implements &Structure	3: 30/30
AEN 2101 Applied Hydrology & Engineering Hydraulics	3: 30/30
AEN 2201 Irrigation, Surveying & Leveling	3: 30/30
AEN 3101 Soil conservation, Drainage & Groundwater Engi.	3: 30/30
AEN 3201 Post Harvest Technology, Energy & Machinery Mgt.	4: 45/30

In addition, six courses are offered by the Department for the specialization module as given below.

AEN 4101: Advanced Irrigation & Water Management	2: 30/00
AEN 4102: Advanced Post Harvest Tech. & Machinery Mgt.	2: 30/00
AEN 4103: Energy, Environment & Waste Mgt.	2: 30/00
AEN 4104: Advanced Hydrology	2: 30/00
AEN 4105: Food Processing Engineering	2: 30/00
AEN 4106: Geographic Information System	2: 30/00

Further, the course on Experiential Learning offered as a common course is found to be very useful for the students to obtain field exposure through their own experience. There are three others courses namely, Experimental Design, Computer Applications in Bio-statistics, and Agri Business Management which are found to be very useful supplementary courses included in the curriculum.

The total credit load of the students in the present curriculum is 156 out of which 130 is offered in the first three years. In every semester of the core degree programme, the Department offers a 3 credit course with the exception of offering a 4 credit course in the second semester of the third year. These courses cover the all important aspects of Agricultural Engineering in providing both theoretical knowledge and practical skill development.

A GPA system is used to evaluate the student performance and a student may acquire in excess of 130 credits from the programme. All the courses offered by the Department for the core programme are compulsory to all students. The six courses specified under the specialization stream are optional for students depending on their choice of subject provided that they choose at least 8 credits in the specialization programme. The credit ratings have been allocated such that 15 hours of lectures per semester and 30 hours of laboratory practical work per semester is equivalent to 1.0 credit. The weight of the final year research project is 10 credits.

The curriculum design is good, given the fact that this is a relatively low staffed Department still in the process of evolving. However, it shows an obvious bias towards the Farm mechanization and a balance among the various contributing disciplines needs to be maintained in the process of curriculum revision. Course sequencing has to be looked at again to provide a better flow of learning in the degree programme. Some of the course contents need to be revisited.

The original curriculum has been designed in 1990 and subsequently, it has been revised in 1999 and 2006 to incorporate improvements. The Department has made consistent effort in improving the curriculum. It is commendable that the Department is actively pursuing a curriculum review process with input from experts in the subject areas, and from the profession. This process can be used to streamline and improve the flow of the undergraduate programme in the future.

The Curriculum Design, Content and Review methodology of the DAGENG is adjudged GOOD.

4.2 Teaching, Learning and Assessment methods

The knowledge on Agricultural Engineering is transferred to the students through lectures, laboratory practical classes, field practical classes and field trips. Being a relatively young Department which have to be relocated in Jaffna, the limitation of staff is a serious constraint. There are only two Senior Lecturers attached to the Department and one Lecturer; it has three temporary staff members; one lecturer and two demonstrators. However, the human resources of the other government institutions such as Technical College and RDA are also available for the students, especially during the practical sessions of the courses.

There are no proper classrooms available for the lectures in the Department and the Faculty classrooms are used for teaching. Teaching and learning environment is not very conducive and this has arisen due to the relocation of the Faculty from Kilinochchi.

Lectures are conducted using minimum teaching aids and this area needs to be considered seriously by the Department. It is also noticed that standard diagrams need to be used in teaching rather than drawing diagrams for standard processes as perceived by the Lecturer. In some lectures, handouts (lecture notes) are provided, however, these can be easily improved further to provide information to the students. The practical sessions and field visits are limited and students are concerned on this limitation.

It is identified that the relationship between students and staff is very healthy and it assists in effective delivery of knowledge.

The continuous assessment and evaluation criteria are very commendable. The assessment methods include spot tests, quizzes, tutorials, term papers in addition to the mid and end semester examinations. The Department can pay more attention to the scrutiny and moderation of the examination papers where support from more than one staff member is recommended to be sought.

During the specialisation programmes, students undertake a research project of one semester duration. This is currently organised through the support of various institutions. Each student submits a research proposal, and upon its acceptance, conducts the research programme and

presents the results by means of a report and an oral presentation. The research projects are conducted under the guidance of academic staff and outside experts.

The students are advised to take the course on Experiential Learning where the students get first hand field experience in the farming systems of the Jaffna peninsula. However, this training can be organised in the other parts of the country to provide exposure to the students on a wide range of farming environments.

The Teaching, Learning and Assessment Methodology practiced by the DAGENG is adjudged SATISFACTORY.

4.3 Quality of students including Student Progress and Achievements

Students entering the Faculty have a Z-score cut-off that is above that for most of the Physical Sciences and Applied Sciences. The total intake to the Faculty is about 40 students per year. However, the actual number of students is less than the capacity due to the choice of some qualified students not to take up studies at Jaffna university based on their various personal reasons. The quality of the students seems to be very good and they are very responsive for the interview of the Review Team. Agricultural Engineering is a subject with a high demand among students.

The Review Team noted that the completion rate of the degree programme is around 50%. However, the reasons for the low completion rate are beyond the control of the Department. It is commendable that the Department makes every effort to encourage the students to complete the degree programme.

It is very encouraging to note that the DAGENG maintains performance records of the students. This is a good practice that other universities can share. Except for an exceptional case, the records show that all students specialized in Agricultural Engineering have performed well and the performances have shown a steady progress from year to year.

Almost 100% of the past graduates are employed, with more than half of them in the government sector. The main employer in the government sector is the Agriculture Department. Other government sector employers are Banks, Government Departments including Education, etc.. The Faculty also recruits some graduates in both permanent and temporary positions.

The view of the Review Team is that the Quality of Students including Student Progress and Achievements is GOOD.

4.4 The Extent and Use of Student Feedback

The DAGENG has carried out teacher evaluation regularly for a long period of time. The practice is that each lecturer is evaluated and comments are made individually. However, the Review Team feels that it is better for the DAGENG to adopt a structured questionnaire for this evaluation.

Since the size of the classes are relatively small and that the students – staff relationships are very good, informal evaluation and takes place and staff gets feedback from the students. There are evidences for the Review Team to conclude that the staff has taken student

feedback seriously and made changes in teaching to reflect the needs and the demands of the students. The Head of the Department makes a commendable effort to have a strong and close relationship with students to ensure proper communication both for academic and other matters.

During the discussions with the students, several actions were suggested, which the Review Team would recommend for consideration by the Department and the Faculty. These are:

(i). Whether an additional field visits could be arranged for the students outside Jaffna so that they can get first hand exposure to other farming systems practised in the country.
(ii). Increase the time allocated for library use and references while making more materials available in the library and the Faculty.
(iii). Develop the computing facilities available in the faculty and provide regular access to the computer unit for the students in all four years.

The view of the Review Team is that the Use of Student Feedback, Qualitative and Quantitative, is GOOD.

4.5 Postgraduate Studies

All the Department staff members have completed the MSc degree elsewhere and they have also published their MSc research studies. It is appreciated in the given circumstances that the university has initiated a graduate school. However, only three students have been registered for MSc degree programme. Also Department staff members get involved neither in teaching in postgraduate programme significantly nor in supervising postgraduate students. However, the Head of the Department is a member of the Board of Study in Agriculture.

The Review Team noted the possibility of collaborating with on-going research activities in the institutions in close locations, such as Technical college, DOA research station. Such initiative would open avenues to develop a strong postgraduate degree programme by research in the Department with the available resources.

The view of the Review Team is that the Postgraduate Studies component is SATISFACTORY.

4.6 Peer Observation

The Review Team was pleased to find evidence of peer evaluation of teachers. However, this recently initiated activity is limited mostly to evaluation of the junior staff by senior staff. Extension of this practice to a much wider scale allowing juniors to observe and evaluate senior teachers would provide a better opportunity for the junior staff to learn on the job and the practices much more effectively.

It was evident that staff members informally discussed the problems arising during academic activities among themselves. They also conduct regular meetings to plan academic activities.

It is recommended that peer observation and evaluation system be more formalized and implemented as a regular feature in the administration of the Department. As a beginning, peer observation could be included as an agenda item in the regular meeting of the Department.

The view of the Review Team is that Peer Observation is GOOD.

4.7 Skills Development

As far as subject specific skills are concerned the Department has made a special effort to provide its students with current and latest knowledge in the respective subject areas. For example, Department has taken measures to take students for their practical sessions to well equipped laboratories in the Technical College. Also Department staff motivates students to design machinery during their practical classes. Apart from those, "Experiential Learning" course offered in the second semester of the fourth year gives students adequate exposure to field experiences, where each student interacts with farmers and exchange their experiences in agriculture.

At the same time, the Department and the Faculty have made arrangements to equip students with communication and presentation skills. Each course unit of the Department has a compulsory presentation assignment. Therefore, students have ample opportunities to improve their presentation skills. English language is taught for two semesters through ELTU. During the discussion held with students, the Review Team was pleased to learn that their English Language skills are at a very satisfactory level. Though the Department curriculum does not include a course in Technical writing, the students are guided in report writing prior to their dissertation work by the carrier guidance unit of the university. There were reports of research projects of final year undergraduate students giving evidence that the students are being trained to conduct independent research studies that enhance their research capabilities.

The students have brought to the notice of the team that they are provided with a limited number of computers and also a few computers with internet facilities at the faculty computer centre. The Review Team is in the opinion that providing adequate internet facilities will help to enhance not only their research skills but also the subject specific skills.

The Review Team has noticed that the students are not engaged in various extra-curricular activities such as sports, cultural or religious activities, etc. Supporting the students for extra activities would help them to develop and enhance their leadership qualities, organization skills, and social responsibilities.

The Review Team finds that Skills Development is GOOD.

4.8 Academic Guidance and Counselling

Due to the prevailing conditions in the University and the surrounding area student counselling appears to be one of the highly important aspect in undergraduate study programmes. Academic guidance and counselling are readily available from staff. Thus opportunities are given to students to discuss their academic queries and personal difficulties. The Faculty has three counsellors, one of them is specially trained for counselling and the other two are somewhat exposed to counselling background. Apart from counsellors, three academic members are in-charge of each batch of students to solve their academic difficulties. During the visit, Review Team has observed that good rapport built up between staff and students will also help students to resolve their problems in a friendly environment.

The Review Team finds that Academic Guidance and Counselling is GOOD.

5. CONCLUSIONS

Based on the observations made during the observation visit by the Review Team, the eight aspects were adjudged as follows:

Aspect	Judgement
Curriculum Design, Content and Design	Good
Teaching, Learning and Assessment Methods	Satisfactory
Quality of Students, Student Progress, and Achievements	Good
Extent of use of Student Feedback	Good
Postgraduate Studies	Satisfactory
Peer Observation	Good
Skills Development	Good
Academic Guidance and Student Counselling	Good

6. RECOMMENDATIONS

1. The curriculum shows an obvious bias towards the Farm mechanization and a balance among the various contributing disciplines needs to be maintained in the process of next curriculum revision. Course sequencing has to be looked at again to provide a better flow of learning in the degree programme. Some of the course contents need to be revisited.
2. There are only two Senior Lecturers attached to the Department and one Lecturer; it has three temporary staff members; one lecturer and two demonstrators. It is recommended that the Department makes an effort to increase the cadre strength of the Department.
3. There are no proper classrooms available for the lectures in the Department and the Faculty classrooms are used for teaching. Available teaching and learning environment is not very conducive and it is recommended that the Department seeks support to obtain facilities to have a better teaching and learning environment.
4. Lectures are conducted using minimum teaching aids and this area needs to be considered seriously by the Department. It is also noticed that standard diagrams need to be used in teaching rather than drawing diagrams for standard processes as perceived by the Lecturer. The Review Team wishes to recommend to the Department to pay special attention into these areas and make improvements.
5. The Review Team noted that the completion rate of the degree programme is around 50%. Although the reasons for the low completion rate are beyond the control of the Department, it is recommended to make an initiative to improve this situation.
6. It is recommended that a peer observation and evaluation system be more formalized and implemented as a regular feature in the administration of the Department.
7. It is recommended that more computer and internet facilities be provided to the students within the Faculty or the Department.
8. It is recommended that the students are provided with more opportunities to engage them in various extra-curricular activities such as sports, cultural or religious activities, etc.

7. ANNEXES

Annex 1. AGENDA OF THE SUBJECT REVIEW - DEPARTMENT OF AGRICULTURAL ENGINEERING

Day – 01 (13-10-2008 Monday)

8.45	– 9.15	am	Welcome meeting with the Dean and Departmental staff members
9.15	– 10.00	am	Discuss the agenda and presentation by Dean, Faculty of Agriculture
10.00	– 10.15	am	Tea Break
10.15	– 11.30	am	Presentation by Head (Self evaluation report)
11.30	– 12.30	pm	Field Visit to Technical College, Jaffna
12.30	– 1.30	pm	Lunch
1.30	– 2.00	pm	Observation of teaching class – 01
2.00	– 2.15	pm	Informal discussion with students
2.15	– 2.45	pm	Observation of teaching class – 02
2.45	– 3.00	pm	Informal discussion with students
3.00	– 3.30	pm	Observation of practical class – 01
3.30	– 4.00	pm	Field observation of practical
4.00	– 4.30	pm	Brief meeting with reviewers

Day – 02 (14-10-2008 Tuesday)

8.45	– 10.30	am	Observation of documents
10.30	– 10.45	am	Tea Break
10.45	–12.30	pm	Field Visit to Fruit Industry (JACHUFI), Tractor yard and Rice mill
12.30	– 1.30	pm	Lunch
1.30	– 2.00	pm	Observation of Workshop
2.00	– 3.00	pm	Observation of Agric. Engineering laboratory
3.00	– 3.30	pm	Discussion with special students
3.30	– 4.30	pm	Field Visit to Water supply wells, Metrological station and Agric.extention field

Day – 03 (15-10-2008 Wednesday)

8.45	– 9.30	am	Observation of Library and Computer unit
9.30	– 10.00	am	Meeting with Technical staff
10.00	– 10.30	am	Observation of documents
10.30	– 10.45	am	Tea Break
10.45	–11.15	am	Meeting with students councellor (Academic guidance) Dr. (Mrs).N.Gnanavelrajah and Dr (Miss).J.Sinnaih
11.15	– 11.45	am	Meeting with Trained Councellors Dr.G.Mikunthan and Mr.S.Vasantharuba
11.45	– 12.30	pm	Private meeting of reviewers
12.30	– 1.30	pm	Lunch
1.30	– 2.30	pm	Meeting with Head and staff for reporting
2.30	– 4.00	pm	Report Writing