



**COLLEGE OF ENGINEERING, SCIENCE
& TECHNOLOGY**

SCHOOL OF MECHANICAL ENGINEERING

**Trade Diploma in Renewable Energy
Engineering**

**Programme Details
&
Unit Descriptions**

2014

**COLLEGE OF ENGINEERING, SCIENCE
& TECHNOLOGY**

SCHOOL OF MECHANICAL ENGINEERING

Department of Renewable Energy Engineering

Trade Diploma in Renewable Energy

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College of Engineering, Science and Technology
School of Mechanical Engineering
Department of Renewable Energy Engineering
Trade Diploma in Renewable Energy Engineering

1.0 INTRODUCTION

To cope with the challenge of increased demand for energy, compatible with the growing awareness of society to the environment, graduates with a sound scientific and technical training are the need of the hour. The expertise in different fields of energy will enable them to manage rational use of available resources for current and future structure of the energy sector with minimum impact on the environment. The ensuing renewable energy diploma program will equip the students with inter-disciplinary knowledge of basic engineering skills. The graduates shall be able to adopt a holistic approach on application of civil engineering, mechanical engineering, electrical engineering, electronics and chemistry for the specific technologies as applicable to renewable energy.

1.1 Rationale

The impact of carbon emissions from conventional energy technology on environment has been of much concern. All over the world, technical institutions are training man power to utilize the renewable energy resources leading to diploma or equivalent qualifications to the trainees.

The present program is proposed to offer students a comprehensive training, focused on renewable energy sources, electricity generation and its suitability for connection to the grid. In addition, course content on distribution and storage of energy saving measures and efficient use of the energy shall be of great advantage to the students of pacific region.

The students of these programme are also expected to gain sufficient working knowledge of Mathematics, Physics, Chemistry, Graphic Expression, Computer and Business, and prepare them for the specific jobs in renewable energy sector.

1.2 Graduates profile:

Graduates shall be employable in technical areas where renewable energy engineering decision making is required at a low to moderate levels. With some years of field experience behind these Graduates and leadership abilities they will be team leaders or line supervisors and may rise to middle management levels with associated delegations.

The successful graduate shall be able to contribution within a wide range of technical activities and:

- Analyze and convert complex situations into simpler routines and procedures.
- Make useful contribution on selection, comparison and decision making in different sectors of renewable energy.
- Advice manufactures to perform specific task to meet standards and quality control requirements.
- Perform under minimal supervision, and take responsibility for other team members
- Maintain renewable energy plant and equipment to perform reliably during its expected working life and
- Undertake technical or financial investigative work in an objective and responsible manner and write detailed reports on the findings.

A Diploma graduate may have the technician's role in employment, become a supervisor/middle manager or proceed to higher education studies to become a fully qualified professional. Also Diploma graduates from Renewable Energy Engineering has eligibility to direct enter into second year Bachelor in Engineering program offered by Fiji National University.

1.3 Program Philosophy

The Trade Diploma in Renewable Energy Engineering (TDREE) is justified both by the existence of a real and growing demand for training specialists in the sector. The demand for a renewable energy program will grow and become more important in the coming years and will extend from the field of generation, transmission and distribution of energy to other sectors such as transport, construction etc. This diploma program has been designed to cope with the growing importance of renewable energy in all sectors. In future, these graduates will have to find engineering solutions to provide renewable energy for electric vehicles, power plants or the extraction of energy from ocean waves, etc.

1.4 Aims and Objectives:

The educational profile combines theoretical knowledge with practical skills, in order to educate versatile professionals who are able to:

- Develop projects in the field of Renewable Energies.
- Optimize and manage facilities for energy efficiency.
- Evaluate the potential of energy resources.
- Develop electrical and electronic systems isolated for connection to the grid
- Analyze the environmental impact on the implementation of various Renewable Energy technologies.
- Participate in research projects in different areas of Renewable Energy.

It is considered that after completing a renewable energy diploma programs, the graduates may reach a level of expertise that allows them to meet the responsibilities and tasks in technical positions of the various administrations and companies that have skills or develop their activities in the renewable energy sector.

2.0 PROGRAMME REGULATIONS

~~2.1 Admission Requirements:~~

- ~~(a) Fiji School Leaving Certificate or equivalent with good passes in Mathematics, English, Physics and any other relevant subjects to a minimum of 240 marks.~~
- ~~(b) Under exceptional circumstances mature applicants with exceptional academic records in certificate program and training and special commendation from their employer might be admitted.~~

2.2 Credit Value of Programme

The total credit value for the units in this program is 250 credits.

2.3 Duration of Programme

The program can be completed in two and half years, including the mandatory minimum of six-months industrial attachment normally attended between trimesters or after trimester three. The industrial experience requirement can be waived for students with adequate industrial experience at enrollment. The maximum duration of the program is four years.

2.4 Cross Crediting

All units common to other School programs are fully cross-credited. Also some units from other relevant programmes can be cross-credited if deemed appropriate at the time of enrollment.

2.5 Award of Diploma

The general requirements for award of the qualification are laid down in the latest issue of the University Academic and Student Regulations. Grades A to E are allocated according to the level of achievement.

3.0 PROGRAMME STRUCTURE

3.1 General

The five stages are interspersed with relevant industrial experience for school leavers. The student will be expected to maintain a diary of experience during the period of employment to demonstrate industrial application of the full range of core activities. The programme consists of 39 (including theoretical and practical) units drawn from Levels 4 to 6. Students will be expected to demonstrate their ability to organize and progress work as part of the underlying core skills required of a responsible employee.

3.2 Compulsory Components

All the units are compulsory.

3.3 Optional Components

No optional units are offered in this programme.

3.4 Special Requirements

Students must complete a minimum of 6 months industrial practice before or after the final stage.

3.5 Delivery Mode

The programme is full-time based on 16 weeks trimesters. Intakes are at the beginning of each academic year and students proceed from one trimester to another until trimester five.

3.6 Order of Delivery

Units are timetabled according to the chronological order of the Programme Descriptor Table 1. Content material instruction is delivered chronologically as itemized in the Unit Descriptors.

There is a considerable degree of flexibility tolerated for students who wish to break their studies, have to resit examinations or repeat units. The only stipulations being

- Prerequisites must be satisfied before proceeding to advanced units and
- Re-sits and repeats can only be taken when the unit is next offered officially.

The final outcome for graduation must be the accumulation of 39 appropriate units plus the mandatory 6 months industrial experience with diary.

Table 1. Programme Descriptor for Trade Diploma in Renewable Energy Engineering			
Code: REE	Trade Diploma in Renewable Energy Engineering		
Minimum entry requirements: Fiji Form Six Examination or equivalent with good passes in Mathematics, English, Physics and any other relevant subjects to a minimum of 240 marks.			
Year One, Trimester 1			
Unit Code	Unit Title	Pre- requisite	Credit Point
COM401	Technical Communication	Form 6 Pass	5
MTH405	Engineering Mathematics I	Form 6 Pass	10
MEC450	Engineering Graphics	Form 6 Pass	4
PHY416 / CHM406	Engineering Physics / Engineering Chemistry	Form 6 Pass	8
CIN445 / EEE460	Introduction to Computer Programming / Introduction to Electrical and Electronics Engineering	Form 6 Pass	8
OHS402 / ETH401	Occupational Health and Safety / Introduction to Ethics Governance	Form 6 Pass	5
MEC470	Engineering Graphics Laboratory	Form 6 Pass	6
PHY470 / CHM470	Engineering Physics Laboratory / Engineering Chemistry Laboratory	Form 6 Pass	2
CIN470/EEE 470	Introduction to Computer Programming Laboratory / Electrical and Electronics Engineering Laboratory	Form 6 Pass	2
Year One, Trimester 2			
Unit Code	Unit Title	Pre- requisite	Credit Point
MEC451	Engineering Mechanics	Form 6 Pass	8
MTH504	Engineering Mathematics II	MTH 405	10
PHY416 / CHM406	Engineering Physics / Engineering Chemistry	Form 6 Pass	8
CIN445 / EEE460	Introduction to Computer Programming / Introduction to Electrical and Electronics Engineering	Form 6 Pass	8
OHS402 / ETH401	Occupational Health and Safety / Introduction to Ethics Governance	Form 6 Pass	5
MEC452	Workshop Practice	MEC 450	5
MEC 472	Engineering Mechanics Laboratory	Form 6 Pass	2
PHY470 /CHM 470	Engineering Physics Lab / Engineering Chemistry Laboratory	Form 6 Pass	2
CIN470/ EEE470	Introduction to Computer Programming Laboratory / Electrical and Electronics Engineering Laboratory	Form 6 Pass	2
Year One, Trimester 3			
Unit Code	Unit Title	Pre- requisite	Credit Point
MEC553	Fluid Mechanics and Machinery	PHY416	8
MEC554	Thermal Engineering	PHY416	10
REE506	Biomass Energy System	CHM406	8

REE400	Renewable Energy Project 1	MEC452	8
MEC556	Materials Engineering	PHY416	8
MEC570	Fluid Mechanics and Machinery Laboratory	PHY416	3
REE570	Biomass and Thermal Engineering Laboratory	CHM406	3
MEC572	Materials Engineering Laboratory	PHY416	2
Year Two, Trimester 1			
Unit Code	Unit Title	Pre- requisite	Credit Point
REE510	Solar Energy System	MEC554	8
REE511	Wind Energy System	MEC553	8
REE500	Renewable Energy Project 2	REE400	8
EEE566	Electrical Machines Drives and Controls	EEE460	8
MEC560	Engineering Management	MTH504	9
REE574	Solar Energy Laboratory	MEC554	3
REE575	Wind Turbine Laboratory	MEC553	3
EEE580	Electrical Machines Drive and Controls Laboratory	EEE460	3
Year Two, Trimester 2			
Unit Code	Unit Title	Pre- requisite	Credit Point
REE601	Energy Conservation Technology	REE510, REE511	10
REE602	Energy Audit, Security, Policy and Planning	MEC560	10
REE603	Hydro-Electric Power System	MEC553	10
REE600	Renewable Energy Project 3	MEC500	16
REE672	Hydro-Electric Laboratory	MEC553	4

4.0 ASSESSMENT

4.1 Assessment Philosophy

Assessment is broken down into formative and summative components. Details are expanded below.

4.2 Methods of Assessment

Formative assessment takes the form of projects and assignments, classroom exercises and laboratory practical. Summative assessment takes the form of formal tests. Theoretical units also carry a final examination. Marking weightings for the various components are detailed in each Unit Descriptor.

4.3 Criteria for Assessment

Skills assessed are: cognitive, communication and motor through tests, assignments, presentations and practical work respectively. Projects are used as a gauge for planning and organizational skills as well as self/collective motivation. Minimum passing requirements:-

- Coursework 50%
- Examination 50%
- Attendance 75%

4.4 Fairness, Validity and Reliability

The programme contains mainly examinable units in order to provide fair assessment across a wide range of academic abilities. Examinable units provide a high degree of objectivity whereas the few non-examinable units provide a measure of non-quantifiable personality factors through a more subjective approach such as a student's conscientiousness, inter-relations with peers and superiors and general attitude towards work.

Each unit carries at least one summative test. Marks for these and other forms of course work are entered onto the program record spreadsheet which is submitted to the Examination Board for scrutiny. Examinable units have their papers moderated prior to sitting and afterwards, the marking is assessed. Results are scrutinized by the Examination Board prior to submission to the Academic Board.

Definitions of Boards and other quantifiable assessment criteria and validation are explained in full in the University Academic and Student Regulations.

5.0 TEACHING AND LEARNING METHODS

5.1 Introduction

The teaching methods used will consist of a variety of techniques in order to achieve the specified learning outcomes. The teaching methods used will generate a learning environment whereby the practical skills and theoretical knowledge are integrated so that the students can meet the requirements of work situations.

The teaching methods will positively encourage the development of independent learning and the teaching strategies will accommodate the following:

- (a) the amount of classroom time, reference books and written resources.
- (b) use of data readers and measuring instrument to illustrate and demonstrate the systematic graphic representation of concepts.
- (c) graded projects will be used to facilitate the development of independent learning skills interpersonal skills, leadership and organizational skills.

Generally the summative and formative assessment will be an integral part of the teaching methods.

5.2 Student Centered Learning

The emphasis would on training students in making working models related to the relevant topics and monitoring of learning outcome of the students during their industrial attachment.

5.3 Methods

An appropriate blend of classroom instruction coupled with laboratory experimentation to develop hands-on skills. Drawing office practical to develop representational abilities. Tutorials for practicing problem solving and other analytical skills. Project work to develop initiative and teamwork. Research is to help them in systematic investigative process employed to increase or revise current knowledge by discovering new facts.

6.0 MONITORING, EVALUATING AND REVIEW OF PROGRAMME

6.1 Board of Studies

The Board of Studies composition as detailed in the University Academic and Student Regulations is assembled to review, discuss and amend programme curricula.

6.2 Examination Board

The Examination Board composition as detailed in the University Academic and Student Regulations sits to review, discuss and amend individual results by consensus at the end of every stage.

6.3 On-going Monitoring

The Board of Studies sits quarterly to review programme curricula and make adjustments according to various inputs including

- new technologies
- new industrial practices legislation
- new educational developments
- changes to staff responsibilities
- employers and the IAC
- the Academic Board
- the student body
- staff training roster
- reviews by external consultants etc.

The monitoring process is implemented by the application of TQM procedures which ensure timely scheduling and recording of various meetings, regular calls to employer groups, launching and recording questionnaires, setting of internal and external reviews and maintaining close liaisons with industries, governments and educational bodies locally and abroad.

6.4 External Moderation

Final stage papers are externally moderated by experts in appropriate fields.